STATE OF MINNESOTA
POLLUTION CONTROL AGENCY

In the Matter of Proposed
Amendments to Solid Waste
Management Rules Governing
Compost Facilities, Minn. R. 7035.2835,
renumbered as Minn. R. 7035.2836.

STATEMENT OF NEED
AND REASONABLENESS

I. INTRODUCTION

In 1984, the Minnesota Pollution Control Agency (MPCA) began work on development of new Solid Waste Management Rules to replace rules the MPCA adopted in the early 1970s. This entire body of rules sets requirements for the location, design, construction and operation of solid waste management facilities. The MPCA staff drafted rules and distributed them for review and comment to a list of interested persons. The rule development period continued for the next three and a half years. The proposed rules were finalized in the winter of 1987 and published in the State Register on March 7, 1988. The Office of Administrative Hearings conducted hearings on the rules throughout the state during May and June of 1988. The MPCA Board adopted final rules in September of 1988, and the final rules became effective on November 15, 1988.

Compost facilities are a component of the solid waste management system of the state, and are regulated by the Solid Waste Management Rules. Based on its experience in implementing the compost rule, the MPCA has recognized a need to amend the rules which regulate compost facilities. The proposed amendments clarify and update the compost rules.

A Notice of Solicitation of Outside Information or Opinions was published in the State Register on April 3 and on July 31, 1995. MPCA staff received comments regarding amending the compost rules from ten parties and took them into consideration when drafting the final rule. Work group meetings were held on May 11, June 8, and July 13, 1995. Attachment 1 lists the persons who attended the work group meetings and who submitted comments on the draft proposed rules. The MPCA staff incorporated most of the changes suggested by work group members. A draft proposed rule was mailed to work group members on August 24, 1995, with additional revised drafts being mailed on October 4, and November 3, 1995, December 1995, and January 1996.

II. STATEMENT OF MPCA'S STATUTORY AUTHORITY

The MPCA's statutory authority to adopt the rules is set forth in Minnesota Statutes section 116.07, subd. 4 (1992), which provides:

> Pursuant and subject to the provisions of chapter 14, and the provisions hereof, the pollution control agency may adopt, amend, and rescind rules and standards having the force of law relating to any purpose within the provisions of Laws 1969, chapter 1046, for

the collection, transportation, storage, processing, and disposal of solid waste and the prevention, abatement, or control of water, air, and land pollution which may be related thereto, and the deposit in or on land of any other material that may tend to cause pollution. . . . Any such rule or standard may be of general application throughout the state or may be limited as to times, places, circumstances, or conditions in order to make due allowance for variations therein. Without limitation, rules or standards may relate to collection, transportation, processing, disposal, equipment, location, procedures, methods, systems or techniques or to any other matter relevant to the prevention, abatement or control of water, air, and land pollution which may be advised through the control of collection, transportation, processing, and disposal of solid waste. . . and the deposit in or on land of any other material that may tend to cause pollution.

Under this statute the MPCA has the statutory authority necessary to adopt the rule amendments.

III. STATE OF NEED

Minnesota Statutes chapter 14 requires the MPCA to make an affirmative presentation of facts establishing the need for and reasonableness of the rules as proposed. In general terms, this means that the MPCA must set forth the reasons for its proposal, and the reasons must not be arbitrary or capricious. However, to the extent that need and reasonableness are separate, need has come to mean that a problem exists which requires administrative attention, and reasonableness means that the solution proposed by the MPCA is appropriate. The need for the rule is discussed below.

On November 21, 1988, the Minnesota Pollution Control Agency (MPCA) promulgated standards and regulations for the use of yard waste and solid waste compost. In November 1994, a representative group of solid waste compost operators requested in a report (attachment 2) that the MPCA review the pollutant limits for unrestricted, Class I solid waste compost. In addition, the industry group requested rule changes that would allow them to distribute Class II compost prior to MPCA approval. The following changes to Minn. R. 7036.2835 are a response to this request. The testing parameters were chosen after careful review of existing compost data, U. S. Environmental Protection Agency's (EPA) 40 CFR Part 503 rule (Standards for the Use and Disposal of Sewage Sludge), compost regulations from other states, existing literature and comments from the compost rule work group and others. At the same time, the MPCA is reorganizing the rules so that those affected by the rules will find it easier to understand and comply with.

IV. STATEMENT OF REASONABLENESS

The MPCA is required by Minn. Stat. ch. 14, to make an affirmative presentation of facts establishing the reasonableness of the proposed rules. Reasonableness is the opposite of arbitrariness or capriciousness. It means that there is a rational basis for the MPCA's proposed action.

Minn. R. 7035.2835, subp. 4, sets out the design requirements for a solid waste compost facility. Subpart 5 lists the operation requirements while subp. 6 addresses the criteria for compost classification standards. Subpart 7 lists the requirements for compost distribution and end use. Since each subpart contains amendments and deletions and the entire rule is reorganized, the original rule is simply repealed and replaced with Minn. R. pt. 7035.2836. The reasonableness of the proposed rules is discussed below.

SUBPART 1. SCOPE

A change to this subpart and to subp. 4 is the inclusion of source separated compostables as an additional and appropriate compost feedstock. While in its infancy, source separated compostable compost technology exists and such facilities are being permitted and proposed in Minnesota. Backyard compost facilities are exempt as provided in Minn. R. 7035.2525, subp. 2, and therefore the redundant statement in the original rule that backyard compost facilities are exempt has been deleted.

SUBPART 3. OPERATION REQUIREMENTS FOR A YARD WASTE COMPOST FACILITY

Item A requires yard waste operators to comply with the applicable provisions of existing air quality rules which are contained in Chapter 7029. These rules have recently been revised and renumbered.

Item B. The existing rules allowed sharp objects up to one inch in diameter in the yard waste compost. Rather than allow such a large sized sharp object in a yard waste compost that is distributed primarily to homeowners, the present language was deleted and a requirement in Item C, for yard waste compost to contain no greater than 3 percent inerts (greater than 4 mm) was added. Yard waste compost facilities can only accept and compost yard waste. Yard waste is defined in Minn. Stat. 115A.03, subd. 38 as garden wastes, leaves, lawn cuttings, weeds, shrub and tree waste and prunings. It is the compost operator's responsibility to accept only the above materials for composting and to minimize the contamination of the product from improperly disposed of inerts at the facility. Injury to individuals using the compost must be avoided yet to require operators to finely screen all the compost would be cost-prohibitive and labor intensive. The operator, therefore, must control the problem upfront by preventing and removing inerts during operations at the facility.

Item F requires yard waste compost facilities to be constructed and operated to prevent discharge of the yard waste, the leachate, any non-processables and the compost into surface water. Plant material from leaves and grass clippings is high in phosphorus and ammonia and could be detrimental to surface water quality if allowed to reach a stream or lake. Phosphorous can cause increased algae growth in lakes. Research has also shown that surface waters high in ammonia are quickly oxidized in the atmosphere to form nitrate and nitrite (Hem 1992[1]).

[1] Hem, John D. 1992, "Study and Interpretation of the Chemical Characteristics of Natural Water;" U.S.G.S. Water - Supply Paper 2254 Third Ed. 1992

Construction of a berm on the perimeter of the site will minimize the potential of the yard waste and other materials from entering surface water. When yard waste composting is managed under controlled conditions that include turning of the windrows and removal of non-processables, the potential of surface water contamination by those materials is also lessened.

Item G removes the reference to Minn. R. 7035.2585 which listed annual reporting requirements that are not applicable to a yard waste compost facility. The annual report requirement simply states that it is due March 1 of each year which is the MPCA's annual reporting date for solid waste facilities. The annual report must now include the average results of the inert testing requirement in subp. 3, item C.

SUBPART 4. DESIGN REQUIREMENTS FOR A SOLID WASTE COMPOST FACILITY

The current rules contained separate subparts for the required personnel training program, the design requirements, the operation requirements, and an operation and maintenance manual. However, these separate subparts can be better understood if more clearly categorized into two major subparts; the design requirements and the operation requirements. The reorganization of the rules will make it easier for permittees and the general public to understand the rules compost facilities must comply with.

Subpart 4, item B requires the facility to be controlled by a perimeter fence and gate or enclosed structures. Item C requires that the design of the drainage control system comply with Minn. R. 7035.2855, subp. 3, (items C, D, and E) and subp. 3, item D requires the liner design to comply with Minn. R. 7035.2855, subp. 3, item A, subp. 4, and subp 5. In addition, the leachate collection and treatment system in item E, must be designed in accordance to the referenced subpart, 7035.2855. The above design requirements incorporates by reference the design requirements that have always been complied with and included in the facility permits and therefore constitutes no substantive changes. Item G, requires compliance with the revised applicable air quality odor rules in chapter 7029.

SUBPART 5. OPERATION REQUIREMENTS FOR A SOLID WASTE COMPOST FACILITY

The existing requirement for the owner or operator of a compost facility to submit an operation and maintenance manual for approval with the facility permit has been reorganized under the operation requirements instead of remaining as a separate subpart. In addition, the current required personnel training program plan, a leachate management plan and sampling plan are included in this subpart.

The leachate management plan as required in Item F states the information to be included in the plan. It further states that if the leachate is to be recirculated into the compost, it must be added prior to the process to further reduce pathogens (PFRP) so that the compost is not recontaminated or inoculated with pathogens from the leachate.

It is an accepted management method at compost facilities to recirculate the leachate collected. The composting feedstock often needs to have moisture added, as 50 percent water by

weight is the optimum moisture content needed for maximum microbial decomposition. The leachate can provide additional moisture but it is critical not to recontaminant a pile that has undergone pathogen kill. If leachate was produced by run-off water that had flown through raw feedstock it would assimilate any pathogens present in the raw feedstock. It is therefore as necessary to subject the leachate to the high temperatures required in the PFRP process to destroy pathogens and to only allow leachate recirculation prior to the pathogen reduction requirement for the compost.

Item H, is a new requirement requesting that the owner or operator manage the waste to control wind dispersion of any particulate matter. This is necessary to control dust and other air pollution concerns.

A prerequisite for testing accuracy is a stable compost. A stable compost is essential for consistent test results. As the compost matures, the organic matter decreases and the relative concentration of heavy metals increases. If testing occurs before the compost has reached stability, then results may be inaccurate. Therefore, the metal contaminants, PCB's, inerts and parameters listed in item J (4) are required to be analyzed after the compost is mature.

The compost maturity standard test methods used must be described in the sampling plan. Item J (1) states that in addition to the current maturity test method referred to as the ignition-loss analysis test, at least one other test method approved by the commissioner must be used. Test methods (a) - (e) are listed as examples of acceptable maturity tests.

Several methods for evaluating compost stability have recently been published. However, experts agree that there is no single best method. Seed germination tests and various methods of respirometry are most commonly used in the industry. Dewar Self-Heating Test evaluates reheating potential in compost and is used in other states. The carbon nitrogen ratio may give beneficial information when used in conjunction with other test methods. In addition to the above methods, the University of Minnesota has developed a maturity test utilizing earthworms (U of M Z-Test). The proposed rule allows flexibility as it allows for the selection of test methods to be approved in the permit. All maturity tests are required to be reported to the commissioner in the annual report.

Item J (2), references the acceptable test methods for analyzing the metal contaminants and polychlorinated biphenals (PCB's) in the compost.

Item J (3) lists the protocol for determining the inert content of the compost. This test method is recommended by the Composting Council and is included in the document, "Recommended Test Methods for the Examination of Composting and Compost," the Composting Council Standards and Practice Committee, Jan. 1995.

Item J (4) requires that the compost be analyzed for pH, moisture content, particle size, NPK ratio and the soluble salt content. This information should be provided to compost users to help assure successful compost use and overall satisfaction. The parameters are also important for managing potential phytoxicity and proper land applications.

Item J (5) lists the content of the required sampling plan. A compost sampling plan is one of the most critical parts of any program that evaluates the physical and chemical characteristics of compost. A standardized sampling methodology makes it easier for facility staff to produce representative samplings.[2] The owner or operator is required to submit to the commissioner for approval a plan containing the credentials of the persons who collect the samples, a description of the equipment, and the procedures to clean the equipment. In addition, the locations where samples are collected, how the grab samples were collected and processed, and the chain-of-custody and sampling quality assurance and quality control measures are required to be described in the plan.

A great deal of reliance is placed on individual sample results to determine classification of the compost batch and resulting end users. Therefore, it is critical that sample techniques provide precise and accurate data. It is vital that the sample be representative of the total material.

Item K requires an annual (instead of quarterly reports as required in the original rule) report to be submitted to the commissioner by March 1st of each year. The annual report must include:

(1) the quantity of source separated compostables or solid waste delivered to the facility;

(2) the quantity and general material breakdown of recyclables and rejects removed from the waste;

(3) the sources and quantities of other materials used in the compost process, such as nutrient or bulking agents;

(4) a summary of temperature and retention time for all compost produced verifying that the process to further reduce pathogens is being met in accordance with subp. 5, item I.;

(5) the quantity and classification of all compost produced;

(6) a summary of all lab analysis conducted in accordance with the approved sampling plan under subp. 5, item J;

(7) a record of each Class II compost distribution including the following:

(a) a copy of the information sheet or label accompanying all Class II compost distributions in accordance with subp. 7, item D of the approved distribution plan;

(b) the name of the compost user and a legal description of the application site location, including, the quantity of compost and acreage over which it was distributed;

(c) copies of the letters of notification to the local governments; and

(d) a copy of the U.S.G.S. map of the application site and the surrounding areas showing contours and surface waters.

The original rule did not allow Class II compost to be distributed without prior approval from the MPCA. In order to expedite the distribution process, which is necessary due to Minnesota's short growing season, the authority to determine the end uses of Class II compost

[2] "Sampling Municipal Solid Waste Compost", George Johnson, Steven Crawford, and Steven Stark, Biocycle, December 1993.

has been given to the compost facility operator as requested by a compost industry group in November 1994. Site acceptability criteria and the calculation of application rates will, in the proposed rule, be determined by the facility operator. It is therefore reasonable to require that this information on application rates and sites be reported annually. The MPCA will review, in the annual report, the distribution decisions made and can respond to and correct any environmentally unsound future distributions of the Class II compost.

SUBPART 6. COMPOST CLASSIFICATION

Compost for purposes of classification must be representative of the batch distributed. A representative sample is necessary since as much as 20,000 cubic yards of compost may be represented by a subsample of one gram. Therefore, the compost is required to be classified in accordance with the approved sampling plan under subp. 5, item J.

A stable compost is essential for consistent test results. As feedstocks decompose and the weight of organic matter decreases, the relative concentration of non-volatile inorganic contaminants (i.e., heavy metals) increases. If testing occurs before the compost has reached stability, then testing results may be inaccurate. The point in time when the product is stable enough for accurate test results will vary for each facility and is determined in subp. 5, item J (1). It is, therefore, reasonable to require that the maturity requirement be met prior to testing. All compost must be required to have met the PFRP requirement in subp. 5, item I as well.

On November 25, 1992, EPA promulgated a regulation, 40 CFR, Part 503, to protect public health and the environment from reasonably anticipated adverse effects or certain pollutants in sewage sludge (58 Federal Registar 9248, February 19, 1993). This regulation established requirements for the final use or disposal of sewage sludge when the sludge is applied to the land either to condition the soil or to fertilize crops grown in the soil or the sewage sludge is placed on the land for final disposal.

While exposure data is not currently available to provide information on the potential ecological and human health risks associated with solid waste compost in the environment, the 503 standards are, for the most part, applicable for the following reasons.

The U.S. EPA and the U.S. Department of Agriculture have studied the behavior of these organics on land for over 25 years in thorough, real-world research. Few standards among all that apply to air, land, or water quality have as strong a base in research. The experience of hundreds of municipalities in composting their sludge and in using the compost confirms these results.

For each of a long list of pollutants, every possible pathway from the pollutant was examined. For each pathway, a hypothetical "highly exposed individual" was conceived. Following the pathway used, some highly exposed individuals were people, and some were plants, animals or even microorganisms. For example, the most sensitive person to be affected by the fourth and fifth pathway would be not just a child exposed to dirt, but a child who deliberately eats dirt.

In the hypothetical world of the highly exposed individual, this individual does not move away or change their exposure habits; they receive the same exposure every day for the rest of their 70-year lifetime. Pollutant concentrations and releases near the individual do not change with time.

Many studies show that, in general, heavy metals and other pollutants in soil become much less available to the biology around them -- less "bioavailable" to plants and animals -- over time. If a pollutant is not bioavailable, neither plants nor animals can chemically "digest" the pollutant, and it cannot accumulate inside them. Research clearly shows that as time passes, pollutants are less and less available to plants and animals. Nonetheless, in the EPA standards, bioavailability is assumed to be linear; in other words, the standards use a very conservative assumption that bioavailability of pollutants stays at its beginning rate, and does not lessen.

The "risk reference dose" is a kind of benchmark to measure the relative toxicity of a pollutant. Risk reference doses were used to estimate the lowest amount of a pollutant that the highly exposed individual in each pathway can safely tolerate. However, most of the risk reference doses used for EPA standards were based on studies where the test animal or organism was either fed or injected with pure chemical doses of the pollutants. This very greatly overestimates risk, because when a pollutant is in compost, in soil, or in food, its bioavailability is very much reduced.

Because there are so many variables in composting research -- the kind of soil, the quality of the compost, the plants grown, the health of people living nearby -- the EPA routinely adds "uncertainty factors." Uncertainty factors are an admission that no amount of research can answer all the questions. In the EPA rule, uncertainty factors of from 10 to 10,000 were added to the risk reference doses, depending on the confidence the EPA has in existing data.

In addition to the highly exposed individual, EPA also used an aggregate approach. The aggregate approach looks at how the population as a whole is exposed to pollutants. In 1988, the EPA surveyed thousands of sewage sludge treatment plants for, among many other things, the levels of pollutants in their sludge. Results of this survey are used as a further limit on compost pollutants: they may not exceed the 99th percentile of pollutants found in the sewage sludge survey. In other words, pollutants in compost must be at or below 99 percent of the highest levels found in the nation's sewage sludge. This is used because of the excellent track record of sludge and sludge compost in enhancing the soil without endangering the public or the environment.

Much of the data used in forming these EPA standards came from uncomposted sewage sludge used on land. There is substantial evidence that composting the sludge ties up pollutants even more, making them less bioavailable. In fact, composting is acknowledged as a good way to neutralize some hazardous wastes: in recent years the U.S. Army used composting to neutralize explosives and leachate from munitions. Compost is also used to rehabilitate old mines, to treat petroleum wastes, and to lessen fertilizer run-off from farms.

The EPA regulations for land application of sludge and sludge composts are very conservative, and very protective of public and environmental health. Layer upon layer upon layer of safety factors have been used to distance the public and the environmental from any possible harm due to compost use. The MPCA Class I compost parameter limits (with the exception of mercury) and the Class II cumulative and annual pollutant loading rates are those listed in the 503 regulations. If the compost is Class II, then one of two types of pollutant loading rates must be followed: cumulative pollutant loading rates, which apply to bulk compost being applied to the land and annual pollutant loading rates, which apply only to the application of Class II compost which is sold or given away in a bag or other container. It is also required that Class II compost meet the PCB concentration limit of 6 mg/kg which is the Class I limit. EPA requires cleanup of "Superfund" sites to a PCB level of 10 mg/kg. It is reasonable to require all compost marketed to achieve lower PCB levels than previously contaminated superfund sites.

A cumulative pollutant loading rate, measured in pounds/acre of land, is the maximum amount of an inorganic pollutant that can be applied to an acre of land. The loading rates are equivalent to the risk-based pollutant limits in 40 CFR Part 503 rule, with again, a lower limit for mercury.

For sewage sludge sold or given away in a bag or other container for land application, EPA calculated an annual pollutant rate. It is appropriate to utilize these rates for Class II compost as the metals of concern are identical and the organic soil amendments are comparable. An annual pollutant loading rate, measured in pounds/acres of land, is the maximum amount of a pollutant that can be applied to an area of land in any one year. The annual pollutant loading rates were calculated by EPA by dividing the cumulative pollutant loading rates by an assumed site life of 20 years. The EPA concluded that 20 years is a conservative assumption, because sewage sludge sold or given away in a bag or other container will probably be applied to a lawn, home garden or a public contact site, and will probably not be applied longer than 20 years, particularly 20 consecutive years.

The contaminant level for mercury was not modified from the original rule for Class I compost for two reasons. First, the existing data demonstrates that this concentration is achievable by the existing facilities. Second, mercury is a pollutant with significant impacts on the environment and public health even at very low ambient levels, and must be reduced in the environment to the greatest extent possible. Staff considered keeping the 40 CFR Part 503 level of 17 mg./kg. of mercury and requiring a mercury separation plan to be implemented. The potential costs of implementing the plan and objections from compost operators caused staff to reject the plan and keep the mercury standard at the present Class I level.

Uses of mercury include barometers, thermometers, hydrometers, pyrometers, mercury arc lamps, switches, fluorescent lamps, mercury boilers, the manufacture of mercury salts, mirrors, as a catalyst in the oxidation of organic compounds, in extracting gold and silver from ores, electrical rectifiers, as a cathode in electrolysis/electroanalysis, in the manufacture of pulp and paper, in batteries, in amalgams, as a laboratory reagent, as a lubricant, in caulks and coatings, as a slimicide and in pharmaceutical and agricultural chemicals. Mercury is also found in other products as a process contaminant.

In January 1991, a national study (Kearney and Franklin 1991) was completed that identified the products that contain mercury that are found in municipal solid waste. Household batteries, electric lighting components, thermometers, thermostats and pigments are the primary sources of mercury in the municipal solid waste stream. The results are shown in Table 1.

Table 1.
Discards of Mercury in Products in the Municipal
Solid Waste Stream, Short Tons

Product	1989	2000
Household Batteries		
Alkaline	443.6	0.0
Mercury Zinc	182.5	101.8
Others	5.8	0.0
Subtotal	**631.9**	**101.8**
Electric Lighting		
Fluorescent Lamps	32.9	46.2
High Intensity Lamps	0.8	0.7
Subtotal	**33.7**	**46.9**
Fever Thermometers	16.3	16.8
Thermostats	11.2	10.3
Pigments	10.0	1.5
Dental Uses	4.0	2.3
Special Paper Coating	1.0	0.0
Mercury Light Switches	.4	1.9
TOTAL	**708.5**	**181.5**

Mercury discards in MSW appear to have peaked in 1986, and appear to be declining in response to widespread pressures to reduce the use of toxic metals in consumer products.

While the overall use of mercury is declining, from recent sales trends of batteries, Kearney and Franklin predict that batteries will remain the primary source of mercury in the waste stream.

By 1999, it is expected that all household batteries sold (except mercury zinc batteries) would be mercury free. Alkaline and nickel cadmium batteries will become the dominant portable energy source of

the future. The mercury from batteries disposed of in the waste stream in the year 2000 is expected to be entirely from mercury zinc batteries. These batteries are used in transistorized equipment, hearing aids, electronic watches, pocket calculators, cameras, radios, smoke detectors, garage door openers, and tape recorders.

In Minnesota, the Legislature has taken steps to minimize the amount of mercury that is disposed of in the solid waste streams. During the 1990, 1991, and 1992 Legislative sessions, restrictions on the manufacture of batteries with mercury were developed, and collection programs for batteries with mercury were required of the battery manufacturers that sell the batteries in Minnesota.

In addition, in 1991, a ban on deliberate introduction of heavy metals, including mercury was enacted for inks, dyes, paints, pigments and fungicides. The ban is intended to reduce the availability of heavy metals in the solid waste stream used by facilities. The ban takes effect July 1, 1998.

Items containing mercury other than batteries are banned from the waste stream. Thermostats, thermometers, electric switches, appliances, medical or scientific instruments, and fluorescent or high intensity discharge lamps, lighting fixtures or hardware from which mercury has not been removed may no longer be placed in the municipal waste stream. Products that contain mercury must be labeled, and those products currently containing mercury must be reused, recycled, or otherwise managed to ensure that the mercury is not placed in the solid waste stream or wastewater disposal systems. (Minn. Stat. 115A.932)

Minnesota's county solid waste programs are incorporating these various bans into their solid waste management plans. Public education is necessary to ensure that the bans are known and implemented. With the statutory bans on mercury in the waste stream, it is expected that the amount of mercury disposed of will decrease substantially. A corresponding reduction in mercury emissions will occur over the next several years, as these educational programs are developed and implemented.

Because waste generators identify sources of mercury in their waste stream, collect, store and dispose of these wastes, there will be a corresponding interest in finding a replacement to that product or material. Increased pressures to minimize the use of mercury in products will also result. These two activities will result in a long-term, overall reduction in mercury in the waste stream and as a result, reduce emissions from facilities.

The permit applicant also has control in identifying and removing the wastes that contain mercury. Further, because statute prohibits the disposal of mercury in the solid waste stream, the permit applicant will be complying with state law by removing mercury containing wastes. It is reasonable to retain the present allowable Class I compost mercury level of 5 ppm to encourage this activity.

The allowable Class I concentration of PCB was changed from 1 mg./kg. to 6 mg./kg. MPCA staff feels this is reasonable on the basis of research by Chaney and Ryan[3] that stated the allowable polychlorinated biphenyl (PCB) concentration in compost would be 6.1 mg./kg. dry

[3] "Heavy Metals and Toxic Organic Pollutants in MSW-Composts: Research Results on Phytoavailability, Bioavailability, Fate, Etc." Rufus Chaney and James Ryan, Science and Engineering of Composting, pgs. 451-489. 1994.

weight in order to protect one to six year old children who consume .2 g compost per day for five years (and assuming 100 percent bioavailability).

In addition, the Code of Federal Regulations, Parts 100-169, April 1, 1995, lists allowable PCB levels of 10 mg./kg. in paper food - packaging material intended for or used with human food. In poultry, 3 mg./kg. are allowed. In light of the above tolerances, 6 mg./kg. in a soil amendment that will be spread approximately one inch deep on a farm or garden soil and incorporated into the top 6" layer of soil is reasonable.

Subpart 6, item B (2) requires that Class II compost will contain ≤ 4 percent inert materials that are > 4 mm. MPCA staff added an inert limit for Class II in addition to a class I limit of ≤ 3 percent inerts > 4 mm in subp. 6, item A (2) because at that point, littering will be a concern. If the inert compost of a Class II is substantial, (i.e., over the Class II standard) then the material needs to be landfilled.

SUBPART 7. COMPOST DISTRIBUTION AND END USE.

A compost distribution plan is required to be submitted with the permit application. Class II compost must be distributed with an information sheet or label. The information must state at a minimum:

(1) name and address of generator;
(2) a statement from the generator certifying that the compost meets the Class II classification standards under subp. 6, item B. The classifications standards must be provided;
(3) a list of best management practices to use when applying the compost;
(4) the annual or cumulative application rate calculated in accordance with testing and reporting methods approved under subp. 5, item J (6);
(5) the compost maturity tested and reported in accordance with subp. 5, item J (1);
(6) the compost inert content tested and reported in accordance with subp. 5, item J (3);
(7) a statement of the compost parameter values tested and reported in accordance with subp. 5, item J (4).

Approval, in the original compost rule, was required from the commissioner for distribution of a Class II compost, and was based on a list of characteristics. This pre-approval requirement, more than any other, had been listed by compost producers as detrimental to marketing their product. The approval process caused a delay of several weeks to several months and prevented the acceptance and use of the compost by farmers, in particular. Fields, for example, were often planted by the time MPCA approval was obtained.

Each facility is required to report application site information for Class II compost distribution in the annual reports. The proposed rule also now includes cumulative pollutant loading rates for a Class II compost and annual pollutant loading rates. A list of compost characteristics must be considered in determining appropriate distribution of the compost. It seems appropriate; therefore, given the loading rates, list of characteristics, operator training

requirements, a customer information sheet or label and annual reporting requirements to allow compost operators to determine the end use of their product. As long as the compost is distributed in compliance with the regulations and best management practices, it is reasonable that the operator market the compost within the narrow window of opportunity that exists.

V. OTHER RULEMAKING REQUIREMENTS

A. Description of Classes of Persons Affected

Minn. Stat. 14.131 requires that an agency include in its Statement of Need and Reasonableness a description of the classes of persons who probably will be affected by the proposed amended rules, including classes that will bear the costs of the proposed rule and classes that will benefit from the proposed rule.

In general, the proposed rule amendments affect all classes of persons who prepare, distribute or land apply compost in Minnesota. This potentially includes small and large municipalities or political subdivisions and private persons. Persons who will benefit from the rule amendments include the general population of the State of Minnesota who will be protected from possible water contamination while at the same time encouraging the beneficial use (recycling) of compost.

B. Costs of Implementation

Minn. Stat. 14.131 requires that an agency include in its Statement of Need and Reasonableness a description of the probable costs to it and to any other agency of the implementation and enforcement of the proposed rule amendments and any anticipated effect on state revenues.

Since the MPCA already has compost rule amendments in place and these rule amendments will not increase the workload, there are no anticipated significant changes in costs associated with the proposed new rule amendments. The proposed new rule amendments should not affect state revenues or other agencies in any significant manner.

C. Less Costly Methods

Minn. Stat. 14.131 requires that an agency include in its Statement of Need and Reasonableness a discussion of whether there are less costly methods or less intrusive methods for achieving the purpose of the proposed rule.

The existing rule and proposed new amended rule are based on minimum requirements to protect the environment while composting yard waste and solid waste. The requirement for a solid waste compost facility to provide quarterly operating reports and to seek prior approval from the commissioner to distribute Class II compost has been deleted. It is anticipated that some cost savings to the operator will result due to these changes. In light of this, the MPCA

concludes that there are no less costly or intrusive methods of achieving the purposes of the proposed rule amendments.

D. Other Methods

Minn. Stat. 14.131 requires that an agency include in its Statement of Need and Reasonableness a description of any alternative methods for achieving the purpose of the proposed rule that were seriously considered by the MPCA and the reasons why they were rejected in favor of the proposed rule.

The MPCA did consider adopting the 40 CFR Part 503 level of mercury for Class I compost and requiring a mercury separation plan to be implemented. The potential costs of the plan ($50,000 - $100,000) and the objections from operators caused staff to reject the plan and keep the present, lower standard for mercury.

E. Costs of Implementation

Minn. Stat. 14.131 requires that an agency include in its Statement of Need and Reasonableness a discussion of the probable costs of complying with the proposed amended rule.

In order to assess costs associated with the proposed amended rule, it is necessary to look at the changes made to the existing rules. Changes to the existing rule do not significantly affect current operating costs.

In fact, review of the proposed new and modified provisions to the existing rule indicate that many of the current costs of compliance will be reduced upon adoption of the proposed rules. This is summarized above under paragraphs C and D above.

F. Comparison of Federal and State Requirements

Minn. Stat. 14.131 requires that an agency include in its Statement of Need and Reasonableness an assessment of any differences between the proposed amended rule and existing federal regulations and a specific analysis of the need for and reasonableness of each difference.

There are no existing federal compost regulations.

G. Fiscal and Policy Concerns

Minn. Stat. 14.131 requires that an agency include in its Statement of Need and Reasonableness a discussion of any fiscal and policy concerns raised during the review process for rules setting, adjusting, or establishing regulatory, licensure, or other charges for goods and services.

The proposed rule amendment does not set, adjust or establish regulatory, licensure or other charges for goods and services.

H. Costs of Implementation

Minn. Stat. 14.131 requires that an agency include in its Statement of Need and Reasonableness a description of its effort to provide additional notification to persons or classes of persons who may be affected by the proposed rule or must explain why these efforts were not made.

The MPCA believes its regular means of notice, including publication in the State Register and the creation of an Advisory Committee, have adequately placed all persons regulated by the rules on notice of this rulemaking.

VI. CONSIDERATION OF ECONOMIC FACTORS

In exercising its powers, the MPCA is required by Minnesota Statutes, section 116.07, subdivision 6, to give due consideration to economic factors. The statute provides:

> In exercising all its powers, the pollution control agency shall give due consideration to the establishment, maintenance, operation, and expansion of business, commerce, trade, industry, traffic, and other economic factors and other material matters affecting the feasibility and practicability of any proposed action, including, but not limited to, the burden on a municipality of any tax which may result therefrom, and shall take or provide for such action as may be reasonable, feasible, and practical under the circumstances.

In proposing these rule amendments, the MPCA has given due consideration to available information as to any economic impacts the proposed rule amendment would have. These compost facility rule amendments do not have a significant economic impact on municipalities, businesses, or organizations.

VII. IMPACT ON FARMING OPERATIONS

Minnesota Statutes, section 116.07, subdivision 4, requires that if a proposed rule affects farming operations, the MPCA must provide a copy of the proposed rule and a statement of the effect of the proposed rule on farming operations to the Commissioner of Agriculture for review and comment. The amendments to the rules affecting Minnesota compost facilities do not have a direct affect on farming operations in Minnesota. It is anticipated that the markets for compost, as a result of the rule changes, will expand, including the use by farmers of the material as a soil amendment.

VIII. REVIEW BY COMMISSIONER OF TRANSPORTATION

Minnesota Statutes, section 174.05, requires the MPCA to inform the Commissioner of Transportation of all rulemakings that concern transportation, and requires the Commissioner of Transportation to prepare a written review of the rules. The amendments to the compost facility rules do not impact transportation in Minnesota.

IX. CONCLUSION

Based on the foregoing, the proposed amendments to Minn. R. 7035.2835, now renumbered as Minn. R. 7035.2836, are both needed and reasonable.

Dated: 5/22, 1996 Kristen Applegate

for Charles W. Williams, Commissioner

This statement of need and reasonableness can be made available in other formats, including Braille, large print, and audio tape.

TDD: (612) 297-5353 or 1-800-627-3529.

APPEAL FOR MODIFICATION TO REGULATIONS AND POLICY CONCERNING CLASSIFICATION AND DISTRIBUTION OF MUNICIPAL SOLID WASTE COMPOST

PRESENTED BY

MINNESOTA MSW COMPOST OPERATORS ASSOCIATION

DECEMBER 1994

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1.0 INTRODUCTION

The Minnesota Legislature adopted The Waste Management Act and Related Acts and Laws which outline progressive goals and objectives for management, processing, and disposal of solid waste. Pursuant to the provisions of this legislation, many Minnesota counties have undertaken processing of mixed municipal solid waste (MSW). Eight facilities were constructed throughout the State for the purpose of materials recovery and composting.

A number of supporting provisions were structured to entice development of such facilities. Among these provisions, counties were given the authority to designate that waste generated within their service area would be delivered to a particular facility. In this way, a facility could be financed with the assurance of revenues derived from the processing of all the waste generated within that service area. In some cases, public facilities were funded with bonds backed by designation.

It was determined at the legislative level that waste would no longer be directly landfilled in Minnesota. All waste would be processed in some fashion. This is a noble goal which addresses the reality that natural resources and landfill space should be conserved. Counties were told by the State as they developed their solid waste plans that processing was a must and that plans which featured "landfill only" as a destination for waste would not be approved. Furthermore, landfills planned to receive unprocessed MSW would not be permitted.

Counties were encouraged to cooperate in managing solid waste. Regionalized facilities would allow counties to derive the benefits of economics of scale. A number of the facilities constructed serve two or more counties.

Many counties proceeded in good faith to construct waste processing facilities with millions of public dollars from State grants and local taxpayers. These facilities represent some of the best in emerging technologies for the processing of MSW. Minnesota MSW Composters have led the nation in pioneering the evolving field of materials recovery and composting of municipal solid waste.

Yes, these facilities had barely opened when the troubles began. Some of these problems were of a technical nature. Control of odors and improving product quality are a few of the challenges which have been faced by the industry. Many facilities have been the object of public criticism because of the high cost of operation and construction which people see reflected in their tax or garbage bills. Adding to the list of troubles are vague and burdensome regulations which govern the distribution and use of the compost produced.

In the landmark Martin-Faribault court decision, the judiciary ruled on appeal that designation was an impediment to interstate commerce. This has resulted in the collapse of designation as a reliable means of securing waste delivery and projecting facility revenues. Similarly, courts in other states have failed to uphold state and local governmental authority to control the flow of waste. Those who argue that waste is merely an item of commerce have apparently succeeded in clamoring loudly enough to overshadow the public health and environmental protection concerns related to the management of solid waste. Without designation, progress in development of composting facilities has essentially been stifled.

With the collapse of designation and the financial underpinnings it would provide, counties could no longer be forced to process waste. Many "landfill only" solid waste plans have been approved. Re-permitted landfill expansions or new landfills planned to

receive unprocessed MSW have been permitted and constructed. By far, landfilling is the least costly means of waste disposal. As market conditions presently exist, it simply has not been possible for MSW composting facilities to compete for waste delivery with a nearby landfill.

The State of Minnesota wisely sought to promote composting as a way to abate the volume and impacts of landfilled waste. This course is worthwhile and should be pursued. Many of the problems facing the MSW composting industry in this state could be remedied with support from the same State government which set forth initiatives for construction of these facilities. Without this support the future of these facilities may be in jeopardy. The largest of these, the East Central Materials Recovery Facility, closed in April 1994 due to financial reasons after only three and a half years of operation.

2.0 REGULATION AND CLASSIFICATION

Current Regulations

In an effort to provide regulations which would serve to assure environmentally sound practices for distribution of compost, the State incorporated standards for MSW compost in Chapter 7035 of the Solid Waste Rules. These standards were based in part on the 1979 sewage sludge regulations. While well intentioned, these regulations are outdated and in need of revision. Apparently, these thresholds were intended as trial standards, and the intent was to revisit and possibly revise the standards after some operational history was available.

The regulations divide MSW compost into two classes. Class I compost as defined in the rules can be used without restriction. Class II compost can be distributed only upon

approval of the MPCA. Problems arise in that the parameters used to distinguish Class I from Class II compost are highly restrictive as compared with other regulations of these compounds. For example, limits for PCBs in Class I compost are only one part per million (ppm), which incidentally is the usual method detection limit for analytical testing. This means that any compost which contains more than 1 ppm PCBs is considered Class II compost. Considering that some food products can contain 2 to 3 ppm, and that food packaging materials may contain up to 10 ppm, it seems unreasonable to set limits for compost at only 1 ppm. The Appendix of this document contains articles provided by the Food and Drug Administration (FDA) which discuss the limits for various foods and related items.

Clean Water Act Biosolids Regulation

Biosolids from wastewater treatment are treated with less restrictive regulations at the Federal level. The Clean Water Act Section 503 establishes limits for metals in biosolids (sewage sludge) which are generally higher than those allowed for compost. A comparison of standards for Class 1 compost and standards for biosolids set forth in the 503 regulations is shown on the table below. The 503 Standards do not contain limits for PCBs, since these were not found to be a significant concern with respect to potential exposure and health risk.

CWA 503 STANDARDS vs. MINNESOTA CLASS 1 COMPOST STANDARDS

Monthly Average Concentrations (mg/kg)

Substance	CWA 503	Minnesota Class 1
Arsenic	41	N/A
Cadmium	39	10
Chromium	1200	1000
Copper	1500	500
Lead	300	500
Mercury	17	5
Molybdenum	18	N/A
Nickel	420	100
Selenium	36	N/A
Zinc	2800	1000
PCBs	N/A	1

Much discussion and debate has occurred on the subject of PCB testing. Due to the complex nature of the compost matrix, interference is suspected as a cause of false positive PCB detections. Contaminants such as fats and sulphur can obscure conclusive test results, yielding higher numeric values than are actually present. Compounding this problem is inconsistent laboratory protocol. The result is lack of repeatability and accuracy. Detection limits vary according to the method used. Analytical laboratories generally do not calibrate to a standard MSW compost matrix. There should be agreement between State agencies and commercial laboratories as to consistent protocols which can repeatedly measure PCBs.

Research into the true health risk potential for PCBs and other chlorinated pollutants is ongoing. It is important to note that there are many compounds which comprise the family of PCB compounds. Not all of these are equally toxic. To account for this in health effect studies, EPA researchers classify such compounds with respect to toxicity equivalent (TEQ). As with dioxins and furans, these compounds are assigned TEQ based on comparison with 2,3,7,8-TCDD, the most toxic of the dioxins. Of the 209 PCB congeners, 11 are considered to be of sufficiently high toxicity equivalent to warrant classification as a dioxin. In common perception PCBs may not be distinguished by type or relative toxicity. The reality is that there are important distinctions between the various congeners.

The Appendix of this document contains a news article reproduced from a September, 1994 issue of "Science News" magazine which discusses classification of these compounds. This article also contains a background discussion of the nature of biochemical mechanisms of concern relative to potential health risk.

Currently, MSW compost is analyzed for the seven most prevalent PCB congeners manufactured in the United States and thought to be potentially present in waste. PCBs are no longer manufactured in this country and are expected to diminish in the waste stream. This determination was made based upon a national survey of sludge quality. This study found low to non-detectable levels of PCB's in most sludges. These levels found in the sludge survey were comparable to those found in Minnesota MSW composts and were not sufficiently high to warrant regulation.

The compost matrix provides cellulosic fiber and organic material which immobilize solids more effectively than sludge. A study of compost utilization as a soil amendment for crops was conducted by the University of Minnesota under the direction of the

Minnesota Office of Environmental Assistance. This study includes data on the relative leachability of MSW compost as compared to biosolids. Data from this study indicates that MSW compost exhibits comparable or lesser leachability of contaminants. Selected information from this study is contained in the Appendix.

This research indicates that the wealth of information generated in the course of development of the 503 regulations applies well to MSW compost. Allowable contaminant levels established for biosolids can be translated to Class 1 compost. With such standards a greater percentage of Minnesota MSW composts could be utilized without regulatory restriction. The 503 regulations are based upon the best available data concerning health risk associated with common contaminants found in biosolids.

The Appendix also contains data obtained from a comparison study performed by Midwest Analytical Services of Cambridge, Minnesota, as presented in the Land Application Seminar hosted by MPCA in June, 1994. Data from this study indicates that relative to total metals content, significantly lower levels of metals become available as indicated by the Toxic Characteristic Leachating Procedure (TCLP) and the Extraction Procedure for Toxicity (EP Tox) extraction tests.

This nonscientifically-based threshold has caused much of the MSW compost produced in the State to be classified as Class 2. Potential users are often less interested in the scientific and regulatory background surrounding the classification issue, but rather tend to be put off on the notion of using a "contaminated" product. While additional study is needed on this topic it seems reasonable to raise allowable limits on PCBs in MSW compost to 9 ppm.

Given the body of research and health risk information promulgated in support of the Clean Water Act Section 503 regulations for biosolids, the following limits are proposed as standards for Class 1 MSW compost.

PROPOSED STANDARDS FOR MINNESOTA CLASS 1 COMPOST

Substance	Average Concentration (mg/kg)
Arsenic	41
Cadmium	39
Chromium	1200
Copper	1500
Lead	300
Mercury	17
Molybdenum	18
Nickel	420
Selenium	36
Zinc	2800
PCBs	9

Biosolids Co-Composting

Although composting is being promoted as a means of reducing pathogens and managing sewage sludge, MSW compost which contained sewage sludge as a feed-stock is automatically classified as Class II regardless of the results of analytical testing. This regulation is a barrier both to composting of MSW and progressive management of sludge. The addition of sewage sludge provides a much needed nitrogen source for MSW

compost feedstock. Composting which has been properly conducted, giving attention to adequate temperatures for pathogen reduction, produces a product which could be distributed without restriction provided that contaminant levels are low.

The 503 regulations provide for unrestricted distribution of "clean" biosolids. That is, biosolids having contaminant levels below those identified in the 503 standards can be applied without permitting and tracking. The possibility for allowing the incorporation of biosolids in MSW compost should be explored by the MPCA. In addition to providing an important source of nitrogen for composting of MSW, such practices would provide more options for management of biosolids.

3.0 APPLICATION SITES AND MANAGEMENT PRACTICES

Beneficial Use

Erosion control is an issue of increasing importance as we come to understand the detrimental effects of soil particle transport and nonpoint source pollution from watersheds. This applies especially in the agricultural setting where large areas of open land are cultivated and dosed with chemical fertilizers and pesticides. Recent studies document the degradation of the Minnesota River and the presence of Atrazine (a common herbicide applied to corn) in the Great Lakes. These studies demonstrate the need for improved management of agricultural lands. Continued efforts to improve practices for application of agricultural chemicals and erosion control are needed.

MSW compost has proven to be a valuable tool in this effort. The fibric matrix and organic carbon act together to hold moisture in the soil, immobilize soil particles and hold nutrients in the rooting zone. Erosion control and moisture holding capacity are effects

which are readily observable. Measurable reductions in the amounts of nitrogen addition needed are documented in the study conducted by the University of Minnesota under the direction of the Minnesota Office of Environmental Assistance. Excerpts from this study showing the reduction in nitrogen for comparable yields with MSW compost is included in the Appendix. These effects are due primarily to the high content of organic carbon and cellulosic fiber.

While such benefits are known, additional research is needed to increase this body of knowledge and develop a comprehensive set of best management practices. Additional data is needed to build a program for determining optimal application rates in consideration of other inputs and crop characteristics.

Through experience over the operating history of these facilities much has been learned with regard to appropriate application sites and rates. Available research data has been used to verify crop response and other effects including nitrate movement in the root zone, erosion control and plant disease suppression.

The benefit in using MSW compost as a soil amendment for corn is well documented. Limited data indicates no detectable plant uptake of PCBs from compost applied as a soil amendment. Samples of plant tissue collected during the University of Minnesota study are available for additional testing.

Application Site Approval

New federal regulations will provide for unrestricted use of "clean" biosolids as defined by the 503 standards. Given the similarity of leaching characteristics these standards should be applied to MSW compost, allowing for unrestricted use.

Currently, approval for the distribution of Class II compost must be obtained on a site-by-site basis. While not well defined in the Solid Waste Rules, this has evolved into a process similar to that employed for evaluation of potential sites for land application of sewage sludge. This is problematic in that compost is different with respect to physical mobility of the material.

Uses which may be inappropriate for sludges may be suitable for compost application. For example, sewage sludge should not be applied on a slope or erodible area, but compost is ideal for such an application because it serves as an excellent mulch to reduce both wind and water erosion.

The process of site approval as it has existed to date is cumbersome, requiring that extensive mapping and soils data be collected and submitted to the MPCA for review. Often, the review process has taken weeks to months. When considering agricultural lands for application, protracted review can destroy the feasibility of distribution within the limited window of opportunity before planting or after harvest. Potential sites may not be available by the time approval is obtained.

Agricultural application rates in tons per acre can be selected based upon the soils, crops and compost characteristics. The suitability of other proposed uses can be determined based upon site criteria and application guidelines. Compost distributors have worked with staff at the MPCA to develop a set of guidelines for application sites. These guidelines consider site characteristics including soil type and texture, proximity to water bodies and land use. It is proposed that these guidelines be adopted as adequate control of application sites. Each facility distributing compost would report application site information along with Class II compost distribution information as part of the annual reports currently submitted by each facility.

4.0 PUBLIC POLICY RATIONALE

Amending current regulations to attain conformity with comparable standards for foods and biosolids will facilitate more efficient distribution of MSW compost. MPCA policy and rules must fit the realities of MSW composting if existing facilities are to survive.

Already we are seeing a propensity for a return to landfilling, a "cheaper" alternative. Counties who "did the right thing" by following the direction of the Waste Management Act have endured ever eroding support at the State level. The hierarchy of preference for waste management as amended in 1993 placed MSW composting just above landfilling, a demotion below the other more favorable options of waste reduction, recycling, and composting of source separated yard wastes and food wastes. These other types of projects are worthy. However, approximately fifty million public dollars have already been spent to construct mixed waste composting facilities. These public investments deserve the full support of the State government who pushed for their inception.

With the adoption of the Clean Water Act 503 regulations, federal standards more accurately reflect public health and environmental risk associated with land application of biosolids. These standards are based upon an exhaustive thirteen-year study of exposure pathways and multiple variables pertinent to health risk. Given this, these standards can be applied to MSW compost to recycle nutrients.

5.0 SUGGESTED ADMINISTRATIVE IMPROVEMENTS

Administrative changes could greatly improve recovered resource utilization via efficient management of MSW compost. Specific recommendations presented below are based

upon problems encountered throughout the operational history of Minnesota composting. The greatest need is for a single staff person at the MPCA to address composting issues. This staff person must be capable of and responsible for regulatory activities as follows:

- One dedicated staff person shall be charged with administering application site permits along with other issues related only to MSW compost.

- This person shall be responsible for receipt and dissemination of all information pertinent to facility operations and compost distribution.

- This person shall have a working knowledge of composting and compost facility permitting and operational issues.

- This person shall have a working knowledge of soil science or agronomic background as it relates to compost utilization.

- This person shall serve as a liaison with the Minnesota Office of Environmental Assistance with regard to MSW composting issues.

Having a single person charged with these responsibilities will provide a focal point for communication and reporting. This would facilitate consistent interpretation of the rules and timely response to inquiries.

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SUMMARY OF CONCERNS

Utilization of MSW compost returns resources to the environment, completing the natural cycle and providing other benefits.

Current standards for classification of MSW compost should be revised to reflect current information obtained from experience and research.

Current procedures for approval of application sites are inconsistent and protracted and have proven to be an impediment to beneficial use of compost.

Communications and reporting procedures could be improved by designating one staff person at the MPCA to address all issues related to compost facilities and compost utilization.

Regulatory and administrative reforms are needed to protect the public investment in MSW composting facilities and the bond rating of public entities who funded these facilities.

The Minnesota MSW Compost Operators Association is an ad hoc affiliation of personnel from several MSW composting facilities in Minnesota who have met to discuss operational matters and who have conferred on the contents of this document.

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