**Assistance in the Development of an Information Resource on Compost Facility Training for Region 5 States and Operators**

**FINAL REPORT, TASK 01-06**

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## 1.0 Introduction

Under the Resource Conservation and Recovery Act (RCRA) Enforcement, Permitting, and Assistance Contract (REPA) 5, Contract Number EP-W-12-032, Task Order 5524.001, the U.S. Environmental Protection Agency (EPA) tasked Toeroek Associates, Inc. (Toeroek) to assist EPA in developing an information resource on compost facility training needs and opportunities in Region 5 states. This report:

- Summarizes current Region 5 state regulations relating to food scrap composting and requirements for operator training;
- Identifies and describes key components of compost training resources available to Region 5 state agency personnel and compost operators, especially those that accept food waste;
- Provides a summary of interviews with Region 5 compost operators regarding their experiences with available operator training; and
- Identifies key components that address the compost operational issues faced in Region 5.

This report contains seven sections. Section 1.0 introduces the scope of work and outlines the sections of the report. Section 2.0 provides a summary of compost regulatory requirements for Region 5 states and one state from each of the other EPA regions. Section 3.0 compiles compost operator training courses available to Region 5 operators. Section 4.0 summarizes findings from interviews held with Region 5 compost operators, who were identified by EPA Region 5 through their state agency contacts. Section 5.0 provides an analysis of additional issues faced by the compost operators; the issues fall outside of the scope of training programs but were identified in initial interviews with compost operators. Section 6.0 provides a summary of the work performed under this task order, identifies gaps in training that have yet to be addressed, and provides recommendations. Section 7.0 acknowledges the individuals and organizations that contributed to this report.

To support research efforts, references, interview summaries and other supporting documentation were collected and compiled for EPA's records. The records are presented in Appendices A through D, with documents collected for the Summary of Regulatory Requirements presented in Appendix A, the Summary of Compost Operator Training presented in Appendix B, the Summary of Food Scrap Composter Interviews compiled in Appendix C, and Follow-up Interviews presented in Appendix D. The appendices are provided on an electronic disc. The reference documents are identified with a sequential naming format, where the references are numbered sequentially within the appendix in which it is found based on the order in which it was collected. A complete reference, for example, is cited as Ref. A-1, which indicates that it is the first reference for the Summary of Regulatory Requirements, which is found in Appendix A.

## 2.0 State Regulatory Requirements Findings

EPA tasked Toeroek to update a working spreadsheet provided by EPA, entitled Task 1 – State Compost Operations. EPA requested Toeroek to focus its research efforts on Region 5 states and one additional state in the remaining nine EPA regions. The updated table is provided as Attachment 1 –State Regulations Summary Table, which lists each state included in the research of state regulatory regulations. Regulatory information for each state is summarized for the following areas:

- Composting methods;
- Odor control;
- Time until incorporation;
- Temperature/turnings and pathogens;
- Minimum composting/curing time;
- Waste disposal;
- Noise/dust;
- Storage time;
- Recordkeeping/reporting;
- Other operational requirements; and
- Training requirements.

Toeroek focused on regulations pertaining to operator training requirements, but other regulatory concerns such as odor control were also included in the summary table. We also added available links to state statutes and/or regulations for the Region 5 states to the summary table. Electronic copies of state regulations and statutes are found in Appendix A.

Toeroek collected information regarding compost regulations for each state through the US Composting Council's website (http://compostingcouncil.org/state-compost-regulations-map/), additional Google queries and through individual state registers. Additionally, we interviewed representatives of state regulatory agencies for each Region 5 state to confirm the regulatory findings presented for the Region 5 states. Representatives from the following state organizations were contacted:

- Indiana Department of Environmental Management (IDEM);
- Illinois Environmental Protection Agency (Illinois EPA);
- Minnesota Pollution Control Agency (MPCA);
- Ohio Environmental Protection Agency (Ohio EPA);
- Wisconsin Department of Natural Resources (WDNR); and
- Michigan Department of Environmental Quality (MDEQ).

Toeroek also interviewed representatives of Minnesota Composting Council and U.S. Composting Council. These representatives were also interviewed to confirm Toeroek's understand of the state regulations.

## 2.1 Summary of Findings

The findings from Toeroek's review of Region 5 state regulations and interviews with representatives of state environmental programs are presented below.

### 2.1.1 Summary of Regulations

Toeroek reviewed state statutes and regulations to determine whether compost operator training is required by the state and if so, whether the requirements are specific to the management of food scrap wastes. Following the format of a draft summary of regulations table provided by EPA, the state's training requirements were described as either no requirement specified, or general training

requirements. None of the states researched for this regulatory review identified training requirements that were specific to the management of food scrap waste. Table 1 highlights some of the findings for the Region 5 states.

| Table 1: Region 5 State Compost Regulation Summary | |
|---|---|
| **State** | **Composting Regulations and Training Requirements** |
| Illinois | • 35 Illinois Administrative Code (IAC) Section 830 and 832 pertain to landscape composting; landscaping waste mixed with additives, other than water, up to 5-10% by volume is still regulated under 830 and 832.<br>• 35 IAC Section 830.210 describes training for permitted landscape waste compost facilities: the operator must provide training to all personnel and personnel must sign an acknowledgement stating training has been received. According to Illinois EPA representative, this training requirement is considered site specific, does not require external training, and may be satisfied by on the job training.<br>• Illinois EPA does not provide compost operator training and cannot recommend courses.<br>• The Illinois EPA representative indicated that there has been some discussion to address operator training in regulatory requirements but no changes are planned for the immediate future. |
| Indiana | • Regulations are written for landscape composting only. The regulations do not apply to composting operations at a residence or farm that compost vegetative matter (VM) or other types of organic material, composting operations that process less than 2,000 pounds of VM during a year, and temporary stores of VM where only incidental amounts of composting occur before removal.<br>• Composts facilities must register with IDEM by submitting an application that outlines the location and operational plans for the facility. The location of the facility is restricted depending on the hydrology of the area. Additionally, the operators of the facility must have controls in place for noise, dust and odor.<br>• No compost operator training is required.<br>• No compost operator training is provided. |
| Michigan | • Composting regulations apply to landscaping waste only (referred to as landscaping).<br>• Food scraps are categorized as garbage unless they fall under the farm scrap exception Section 11506(1)(h)(i).<br>• There are no training requirements for composting operators.<br>• MDEQ offers a one-day workshop geared towards composting operator beginners.<br>• According to a Michigan composting operator, there are two potential areas of regulatory revisions under consideration:<br>  o Grass may be sent back into landfills.<br>  o Potential to increase MDEQ's role as a licensor and inspector of composting facilities. |
| Minnesota | • New legislation effective December 22, 2014, specifically addresses source |

| Table 1: Region 5 State Compost Regulation Summary | |
|---|---|
| **State** | **Composting Regulations and Training Requirements** |
| | separated organic wastes (SSOW); food scraps fall under SSOW.<br>• The new regulations also address small site composting (120 cubic yards maximum). No training is required for small scale operations.<br>• Food scraps composting may still be addressed under the previous rules for municipal solid waste (MSW).<br>• Personnel training is required for composting facilities. These training courses must address safety concerns, groundwater contamination, and general operations. All SSOW compost facility operators are required to have 24 contact training hours initially and five hours annually thereafter for continuing education.<br>• Courses must be approved by the Commissioner to satisfy the personnel training requirement, although no certification program has been developed.<br>• The required 24 contact hours can be met by:<br>  o Attending the annual Midwest Composting School training. This three-day training is held at a different Midwestern city each year.<br>  o Attending US Composting Council training courses. |
| Ohio | • The owner or operator of a composting facility must ensure a certified operator is in charge of the operation and maintenance of the composting facility. The Certified operator must be trained per Chapter 3734 of the Revised Code.<br>• Regulations indicate specific composting operator training, but Ohio EPA has not established a certified training course yet.<br>• According to an Ohio EPA representative, Ohio EPA is organizing a work group to address issues that are specific to food scrap composting (Class II facilities).<br>• The Ohio State University Extension offers a comprehensive, two-day course that includes the science of composting, lab exercises, and general discussion of feedstock. |
| Wisconsin | • Composting regulations apply to food scraps as well as yard, farm, source separated compostable materials.<br><br>There are no training requirements for composting operators of any feedstock (does not apply to biosolids). |

### 2.1.2 Summary of Region 5 State Agency Interviews

Toeroek held interviews with representatives from state regulatory agencies for the Region 5 states between March 12 and April 29, 2015. The interviews were held to confirm and clarify Toeroek's understanding of regulations relative to training requirements, and discuss any potential upcoming changes to the regulations. Representatives of the state agencies confirmed our understanding that there is no compost operator training requirement in Illinois[1], Indiana, Michigan, and Wisconsin. In Illinois, the state agency representative indicated that some at Illinois EPA may support revision of the

[1] Under 830.210, the "operator" must know how to compost and how their specific operation is to run. External training, such as training courses or workshops, is not required. On the job training may satisfy this requirement.

legislation to address training requirements, but there has been no recent progress on this issue (Ref.A-22). Minnesota and Ohio require a certain degree of operator training as discussed below.

Minnesota regulations require compost facilities to institute a personnel training program that addresses state composting operation regulations (Ref. A-14). MPCA also requires operators at SSOW facilities to initially complete a 24-hour training program and five hours of annual training in subsequent years, but the training requirement is not specific to food scrap waste. The 24-hour training may be met through workshops provided by the Midwest Composting School or the U.S. Composting Council, both of which are held on a yearly basis at multiple locations. The MPCA does not currently have a list of courses that counts towards the annual five-hour annual course requirement; however, the MPCA representative stated they are working on a list and courses sponsored by the Minnesota Composting Council or nearby state colleges and universities may be completed to fulfill the requirement. MPCA is considering recognizing webinars as a means to fulfill the requirement; but to date, MPCA has not developed a system by which the training courses can be evaluated and approved to meet state training requirements (Ref. A-22, Ref. A-24).

Ohio regulations stipulate that a composting facility must be owned or operated by a certified operator, and that operators must be trained to meet state regulations (Ref. A-6). The Ohio EPA representative stated that training is a requirement to certify operators, but no certification course is currently offered by the state of Ohio. Ohio EPA is currently organizing a work group that will focus on implementing certified operator training and providing technical assistance to facilities that accept food scraps as a feedstock (Ref. A-22).

Several state agency contacts confirmed that general training courses likely incorporate information to address food scrap wastes in their general topics; for example, the MPCA representative confirmed that an eight-hour session of the U.S. Composting Council course regarding feedstock management included relevant food scrap management issues and techniques (Ref. A-22).

### 2.1.3 Additional Findings

This section summarizes additional findings about composting operations, how operations are regulated, and what regulatory changes may come about in the future. IDEM and MDEQ representatives indicated that compost regulations are written for landscape waste only. In Michigan, food scraps are categorized as garbage unless they fall under a farm scrap exemption (Ref. A-22).

In Michigan, there is discussion of changes to Enrolled Senate Bill No. 513, Section 11521, Subsection 1, regulation in the near future with regard to the composting industry. Currently, landfills may not accept landscape waste; however, some composters have accumulated large stockpiles of landscape waste and the supply of landscape waste exceeds the demand for its use. The waste management industry is lobbying for regulation change that allows landscape waste to be sent to landfills. Secondly, there is a push by landfill lobby groups to increase MDEQ's role as a licensor and inspector of composting facilities. According to a MDEQ representative, these topics have come up for discussion in the legislature multiple times within the last ten years (Ref. A-22).

## 2.2 Issues and Concerns

Each of the Region 5 states has a similar set of challenges with regard to the regulation and development of compost operator training programs. Ohio and Minnesota share similar concerns in that training is required for compost operators, but a validation system to ensure the course meets the state requirement has not yet been fully established, the required courses are not currently available in the states, and there is no means to evaluate out-of-state courses or track operator participation. States that may be considering instituting a training requirement, like Illinois, will have similar concerns to resolve.

## 3.0 Compost Operator Training Courses

EPA tasked Toeroek to identify compost operator training programs that are available and accessible to individuals located in the Region 5 states. While additional training programs outside of the Region 5 states exist and some are included in the discussion below, this research was not intended to be a comprehensive list of all available training courses in the United States. The research focused on operator training programs that are reasonably accessible and that generally focus on issues and concerns facing operators in Region 5 states.

Toeroek researched available compost operator training programs through:

- Interviewing training providers;
- Interviewing state regulatory program representatives;
- Researching online state agency and composting organizations' websites; and
- Contacting course providers via email and over the phone for more information.

Toeroek interviewed state regulatory agency representatives and educational leaders from the Midwest Composting School, Minnesota Composting Council and the US Composting Council to gather information about available courses and course content. Information collected on training courses is summarized in Attachment 2, the Compost Operator Training Summary Table.

When available, Toeroek obtained a syllabus or course description for identified courses, and in some cases course providers provided copies of the course presentation. The collected references are presented in Appendix B.

## 3.1 Summary of Findings

Attachment 2 identifies training opportunities (course, workshop, webinar) and summarizes information gathered for each training course for the following fields:

- Training course name;
- Provider;
- Frequency offered;
- Date of the most recent training or next offered date, if available;
- Location;
- Estimated costs;
- Food scrap composting topics addressed;

- Course length;
- Course description;
- Continuing education credit offered;
- Comments; and
- Web links and/or references.

Further, Toeroek identified ten topics relating to compost facility operations, which are also relevant to food scrap composting operations. The topics were identified through Internet research, review of regulatory requirements, and discussions with training provider representatives and EPA. We then reviewed available information regarding the courses, either by obtaining training syllabi, reviewing course promotional materials or conducting interviews to determine, if possible, whether the identified courses addressed these topics. The training topics include:

- Odor control;
- Leachate management;
- Best Management Practices (BMPs);
- Target moisture;
- Target porosity;
- Compost sampling;
- Fire suppression;
- Carbon to nitrogen (C:N) ratio;
- Pathogen control; and
- Cold weather composting.

Toeroek identified 25 different training offerings presented by 17 organizations, which vary in format, content, and length. The training opportunities include multi-day classroom and field courses, brief webinars, and multi-day conferences. According to training providers and participants, the advantage of the longer, multi-day training courses provide the opportunity for hands-on or field training, while webinars are best suited to tackle shorter, more discrete topics. Training costs vary from free to more than $1,000. As expected, courses that have a classroom component are generally more costly than webinars. Fifteen of the courses are offered in the Region 5 states or adjacent states or are available online, and ten are offered outside of Region 5 and adjacent states. Table 2 breaks down the number of courses from the 25 training opportunities evaluated that cover each of the identified topics. Five of the training courses evaluated either did not have any information available about the topics that were covered, or the topics change each time the training event is offered.

**Table 2: Summary of Topics Covered by Courses**

| Operational Topics | Number of Courses Covering Topic |
|---|---|
| Odor Control | 17 |
| Leachate Management | 12 |
| Best Management Practices | 20 |
| Achieving Target Moisture | 13 |
| Achieving Target Porosity | 10 |
| Compost Sampling Methodology | 12 |

| Table 2: Summary of Topics Covered by Courses | |
|---|---|
| **Operational Topics** | **Number of Courses Covering Topic** |
| Fire Suppression | 7 |
| Carbon to Nitrogen Ratio | 13 |
| Pathogen Control | 6 |
| Temperature Control | 9 |
| Cold Weather Composting | 1 |

Additional training information from previously offered courses was provided for this report by Ms. Ginny Black of the Minnesota Composting Council. This training information is from 2003 and 2009 and is included as Ref. B-32 through Ref. B-53 in Appendix B. The training material provides an overview of a broad range of topics that relate to the composting industry and provides examples of materials typically covered in general compost operator training. The following topics were covered in the provided training material:

- Basic composting concepts;
- Biology of composting;
- Field exercises;
- Stormwater quality and retention;
- Erosion/sediment control;
- Sample collection from compost piles;
- Regulatory requirements;
- Benefits, uses and markets for compost;
- Physical modeling of the composting environment;
- Troubleshooting;
- Laboratory analyses;
- End use quality;
- Composting technologies;
- Compost engineering design; and
- Environmental impacts of compost application on construction sites.

### 3.2 Issues and Concerns

In Toeroek's research and discussions with individuals in the compost education industry, individuals from state regulatory agencies, and compost operators, several issues were noted that may represent areas of potential improvement for training program coordinators and state regulators. These include:

- There is no system for course validation by Region 5 states with training requirements (Minnesota and Ohio). For example, Minnesota does not currently evaluate training courses to ensure they meet the state's requirements for the initial 24-hour training requirement or the 5 hours of annual continuing education, although they have stated the Midwest Composting School or US Composting Council annual courses are acceptable. Compost operators may be

more willing to participate in training if they are certain their costs and time will be expended for a course that will meet the state training requirements.

- No Region 5 state offers a list of available or approved training courses. An example of a useful listing of approved compost operator training programs is provided at the State of Vermont's Department of Environmental Conservation website http://www.anr.state.vt.us/dec/wastediv/solid/documents/ApprovedTraining.pdf. The list identifies upcoming courses that if completed, will meet Vermont requirements. A copy of this listing is found at Ref B-54.
- Region 5 states that require training have varied regulatory requirements toward the tracking of participation in operator training courses (i.e., requiring the facilities to keep records, or track by agency). One state, outside of Region5, that does have a program is Iowa: compost operators are required to take a Compost Operators Training Course and then complete and return the Compost Facility Operator Application to the Department of Natural Resources. The trainee must also include proof that the required course was completed.
    - Ohio EPA does not regulate the tracking of compost operator training fulfillment (Ref. A-6 and Ref. A-23);
    - MCPA must submit a personnel training program plan to the commissioner of the MCPA, and include the training and experience qualifications of individuals who collect compost samples (Ref. A-14); and
    - Illinois EPA requires that compost operators maintain a record all personnel trained at their facility, the record must include a signed acknowledgement from personnel of the training they have received (Ref. A-2).
- Based on interviews and review of the current training options, courses that are provided for national audiences may not address some of the concerns that apply only to operators in similar geographic and climatic regions of the country. In addition, regional courses may address some of operational practices that are unique to a certain geographic area, such as seasonal changes in temperature, water and feedstock availability but may not address individual state regulations adequately.
- Some composting operators expressed disappointment that available courses were targeted to large, municipal sites while other operators thought the course content was too basic, and designed for small, first time operators. Operators may benefit from attending courses that are specific to concerns they face at their facility, rather than a "one size fits all" approach.
- Several operators expressed that networking with other attendees at the course served to be more educational than some course presentations. Some operators expressed the view that course presenters were reluctant to share trade secrets.

## 4.0 Food Scrap Compost Operator Interviews

EPA requested that Toeroek interview compost operators regarding operations at their facility and their perceptions of previously attended operator training courses. EPA provided a list of nine Region 5 operators that would potentially be willing to participate in this study. The interviews specifically

addressed the course accessibility, content and quality of available training programs and the application of information received at training courses to daily operations at their facility.

Toeroek initially reached out to potential participants through a phone call and a subsequent email that provided an overview of the purpose of and expectations for the interview. Six of the nine individuals agreed to participate and were emailed an interview guide to help them prepare for the call (Ref. C-7). Interviews were conducted by telephone from June 1, to June 15, 2015.

### 4.1 Summary of Findings

Summaries of the interviewee responses are provided as References C-1 through C-6, as indicated in Table 3 - Overview of Facilities Represented in Interviews. The facilities are located in four of the six Region 5 states (Illinois, Michigan, Minnesota and Wisconsin), and represent small, farm-based operations as well as urban corporate facilities. The interviewees were all senior managers or owners of their facilities, with many years of experience. All facilities represented by the participants have been in operation for over a decade, and all currently accept food scraps as feedstock. The food scraps feedstock comes from various sources depending on the nature of each facility's operations. The sources included grocery stores, restaurants, cafeterias, breweries, and food processing facilities as well as residential collection of food scraps commingled with yard wastes.

**Table 3: Overview of Facilities Represented in Interviews**

| Facility ID | Facility Location | Approx. Years of Operation/Years Accepting Food Waste | Size of Facility | Food Scrap Contribution | Reference |
|---|---|---|---|---|---|
| Facility 1 | Belleville, IL | 19 / 4 - 5 | 45 acres | Up to 20% | C-1 |
| Facility 2 | Wausau, WI | 20 – 21 / 3 | 15 acres | Less than 5% | C-2 |
| Facility 3 | Ann Arbor, MI | 25 / 1.5 | 28 acres | 10% | C-3 |
| Facility 4 | South Lyon, MI | 21 / 7 | 16 acres | 16.5% | C-4 |
| Facility 5 | Grand Rapids, MI | 15 / 6 | 50 acres | 20-23% | C-5 |
| Facility 6 | Duluth, MN | 14 / 14 | 7,900 tons[2] | 40% | C-6 |

#### 4.1.1 Operating Concerns

Table 4 - Summary of Primary Operating Concerns summarizes interviewee responses regarding their primary operating concerns. This information is useful in validating existing training topics and the identification of additional training needs discussed more fully in Section 4.1.2. The interviewees indicated that odor control is the most commonly reported operating concern with four separate facilities describing this issue. While this was the most widely reported issue, respondents indicated that they were readily able to manage the problem and the significance of the issue is often related to site location (distance to nearest neighbors). Separating non-biodegradable contaminants, such as glass and plastic, is the second most common operating concern, with three facilities reporting this topic of

[2] Interviewee responded with tons of compost accepted each month, rather than acreage; they were subsequently not available for comment on facility acreage.

concern. This issue seemed to be a less manageable nuisance for operators, and is typically addressed through the use of equipment that helps separate out contaminants, and through education of the feedstock supplier.

A total of two facilities reported the following primary operating concerns: standing water and leachate management, scavenging wildlife, finding transporters of feedstock, and litter and blowing trash. The least reported issues in this survey were challenges incorporating feedstock during cold winter months and managing a compost facility with limited space.

| Table 4: Summary of Primary Operating Concerns | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Operational Concerns** | **Facility 1** | **Facility 2** | **Facility 3** | **Facility 4** | **Facility 5** | **Facility 6** | **Total Facilities** |
| Odor Control | x | x | | x | | x | 4 |
| Separating Non-Biodegradable Contaminants | x | | x | | | x | 3 |
| Standing Water and Leaching | x | | | | x | | 2 |
| Wildlife Scavengers | x | | | | x | | 2 |
| Finding Transporters to Bring Waste to Facility | | | | x | | x | 2 |
| Litter and Blowing Trash | | | | x | | x | 2 |
| Temperature Challenges in Winter Months | | x | | | | | 1 |
| Limited Space | | | | | | x | 1 |

All of the participants were asked if internal inspection checklists were used to manage their facility. Two operators reported that their facility utilizes an internal inspection checklist in the management of their facility. One operator then provided a copy of the checklist, which is included as Ref. C-8. The checklist includes a compliance/inspection checklist, as well as a daily log to document:

- Weather condition;
- Temperatures and oxygen reading;
- Organics receipts;
- Equipment inspections;
- Site maintenance;
- Windrow work; and
- Compost sampling.

### 4.1.2 Training Comments and Concerns

Five out of the six interviewees have participated in at least one compost operator training course. Participants were asked questions about what they would like to see at training courses in general, and more specific questions regarding training courses they have already attended. The interview questions

and summary of the responses are broken down into two categories: general questions regarding overall views on operator training (Table 5), and specific questions regarding three training courses attended (Table 6).

**General Training Questions**

The interview responses regarding general training questions are summarized in Table 5. The responses for all participants have been grouped together by question.

| Table 5: Summary of General Training Questions | |
|---|---|
| **Question:** | **Answers:** |
| What training topics are most relevant to food scrap composting? | • Sampling methodology, for feedstock, compost and end product (Ref. C-1)<br>• Discussion of experiences and lessons learned by networking with other attendees (Ref. C-1)<br>• The science of why and how composting works (Ref. C-3)<br>• Clear-cut guidance of what are good sources of carbon and nitrogen (Ref. C-4)<br>• Moisture level control (Ref. C-4)<br>• Training to specific state regulations (Ref. C-6)<br>• Coverage of composting in its entirety and characteristics of food waste in the decomposition process (Ref. C-6)<br>• Collection and transportation of food scraps (Ref. C-6) |
| What topics would you most like to see covered in a training course? | • Broad training topics to address everything from start-up to finished products (Ref. C-1)<br>• An overview of styles of equipment used in the composting industry (Ref. C-2)<br>• Composting basics (the why and how) (Ref. C-3)<br>• Methods of composting without a cement pad to prevent leaching and methods of controlling blowing trash (Ref. C-4)<br>• Permitting and funding (Ref. C-6)<br>• Practical compost processing for low-tech, small facilities (Ref. C-6) |
| How did you apply what you learned at training to operations at your facility? | • Utilized improved testing procedures (Ref. C-1)<br>• Applied better methodology for dealing with pests (Ref. C-1)<br>• Utilized recipes for good composting (Ref. C-3)<br>• Applied better understanding of the seasonal variability of composting (Ref. C-3)<br>• Shared course literature with staff at their facility for educational purposes (Ref. C-6) |
| What is the most effective method of training? | • Classroom where participation is encouraged (Ref. C-1; Ref. C-2; Ref. C-3; Ref. C-4; Ref. C-6)<br>• Text and reference materials (Ref. C-3) |

| Table 5: Summary of General Training Questions | |
|---|---|
| **Question:** | **Answers:** |
| | • Networking (Ref. C-1; Ref. C-4; Ref. C-5; Ref. C-6) |
| Would you send your lower level employees to operator training? (one participant was not asked this question as it was developed after the interview process began) | • Yes, if training looked like it would improve operations at the facility and if it were affordable based on the company's budget (Ref. C-2; Ref. C-6).<br>• Yes, many of the participants already send their lower level employees to operator training courses (Ref. C-3; Ref. C-4).<br>• No, lower-level employee turnover rate is high, and therefore would not be cost effective (Ref. C-5).<br>• Yes, if it was warranted, but if you hire the right person, it is not difficult to train employee on site (Ref. C-1) |

**Specific Training Questions**

Interview responses regarding questions asked about specific training courses that were attended by interviewees are summarized in Table 6. The interviewees had attended three separate training courses offered over recent years: the US Composting Councils Compost Operator Training Course, the MDEQ's Michigan Operator Course, and the Midwest Composting School. Interviewees were asked about the most valuable and least valuable components of training and specific questions regarding topics that were covered. In each column for specific topics coverage, a total is provided for the number of interviewees that indicated the topic was covered in the course on some level.

| Table 6: Summary of Attended Training | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provider: Course Name | Most Valuable Component of Training | Topics Missing from Training | Number of Interviewees Attended | What topics were covered? | | | | | | | | | | |
| | | | | Odors | Stormwater Management | BMPs | Target Moisture | Porosity | Sampling | Fire Suppression | Achieving Ideal C:N | Pathogen Contamination | Cold Weather Composting |
| U.S. Composting Council: Compost Operator Training Course | • Receiving instruction on testing protocols (Ref. C-1)<br>• Networking (Ref. C-5) | • Feedstock recipes were not provided for large scale composting (Ref. C-1)<br>• More practical, in-depth training from non-competitors (Ref. C-5) | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 0 |
| MDEQ: Michigan Operator Workshop | • Health and Safety Coverage (Ref. C-3)<br>• Networking (Ref. C-4; Ref. C-5) | • Hands-on experience for composting equipment and mechanics (Ref. C-3)<br>• More free time for networking and practical information about accepting food scraps (Ref. C-4)<br>• More practical, in-depth training from non-competitors (Ref. C-5) | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | 2 |
| Midwest Composting School | • Networking (Ref. C-6)[3] | • No response (Ref. C-6)[1] | 1 | | | | | | | | | | |

[3] Respondent stated that topics change every year, and couldn't recall what specific topics were covered (Ref. C-6).

### 4.1.3 Additional Training Resources

On the job training (OJT) was identified as an important means of employee training, especially by facilities that experience high turnover (Ref. C-6). While some operators acknowledged OJT was informal, other interviewees reported more formal programs. For example, one company holds weekly "Toolbox" meetings with all employees to discuss safety, new techniques and operational issues as a means to provide OJT (Ref. C-1). Another interviewee reported that his company sponsors an annual training workshop, which is incorporated into a corporate meeting. Approximately 50% of the meeting is devoted to operations (training) while the remainder is marketing and business issues (Ref. C-3).

A few of the participants identified reference books that they have found to be valuable training resources. These books include:

- *Compost Operations Guide: Best Management Practices for Commercial Site Compost Operations* (Ref. C-3; Ref. C-4). A hyperlink to the Compost Operations Guide is posted on the MDEQ website (http://www.michigan.gov/documents/deq/deq-oea-compostoperatorguidebook_488399_7.pdf).
- *On-Farm Composting Handbook*. This book is available for purchase from Plant and Life Sciences Publishing, for $25.00 (Ref. C-9).

## 4.2 Issues and Concerns

Throughout the interview process participants identified the most important components of training opportunities or brought up a number of areas for potential improvement in training, including:

- Target subject material to meet audience needs. This may be difficult because of the range in types, size, and experience level of facilities, but this could be met through breakout sessions or work groups (Ref. C-3). While some interviewees felt separate courses should be provided to meet the specific target audience, others felt there was value in the networking opportunity from a mixed audience.
- Provide training opportunities that can promote networking (Ref. C-1, Ref. C-2, Ref. C-4, Ref. C-5, Ref. C-6).
- Provide trainers who have hands-on experience but are willing to share information rather than protect trade secrets (Ref. C-2, Ref. C-3, and Ref. C-5).
- Address state-specific regulations in training, including permitting requirements (Ref. C-6).

## 5.0 Follow-Up Interviews

As previously stated, Toeroek interviewed six compost facility operators and/or owners. During the interviews, some of the compost operators described additional issues that they face that fall outside of the interviews' main focus of training in the composting industry. This section seeks to further expand upon the information captured in the initial interviews by defining the concerns and the magnitude of their impact on individual operators and on the composting industry in general.

Information captured from the initial interviews was summarized, focusing specifically on areas of concern for individuals working in the composting industry. The identified issues were consolidated into three main topics: feedstock concerns, transportation issues, and standardized regulation for variable sized operations. Potential solutions were also identified for each concern. Toeroek crafted questions that were designed to further investigate these topics, particularly how prevalent the issues are, to what degree they affect operations and to understand what solutions may exist to overcome these obstacles. Toeroek re-contacted the six participants via email to request a second interview. Of the six original participants, three individuals were available to participate in a follow-up interview; the remaining three either declined or did not respond. Toeroek provided an interview guide to the participants prior to the time of the interview. Toeroek summarized the results of the interview in the following sections of this report.

## 5.1 Summary of Findings

Each topic is discussed below, as a compilation of the information gathered from the respondents during interviews conducted August 19 through August 24, 2015.

### 5.1.1 Feedstock Concerns

**General Variability in Feedstock Quality**

All responding compost operators confirmed that there is variation in the quality of feedstock they receive; however, this variation is not unexpected and does not tend to have a significant impact on their operations. Food scrap wastes can be more variable (i.e., too wet), but often variation is the result of seasonal or weather conditions. The variation impacts some operations more than others; food scraps wastes that are mixed at the curbside with yard wastes tend to be more consistent than post-consumer third party food scrap wastes (i.e., that picked up from grocery stores or restaurants). The respondents stated it is part of the business and awareness of the quality of feedstock is an important part of the operations. As operators, they are generally able to manage the variability in feedstock such that they do not believe redefinition of acceptable materials is needed (Ref. D-1; Ref. D-2; Ref. D-3).

Solutions to the operational issues resulting from variability include operational adjustments, such as the use of irrigation ponds or other means to water materials that are too dry, or the addition of drier feedstock to address materials that are too wet (Ref. D-2). Feedstock problems most commonly occur with new customers, with the respondents resolving this concern through educating the suppliers (Ref. D-1, Ref. D-3).

**Plastics or Other Non-degradable Contaminants in Feed Stock**

Plastics, glass and non-compostable materials, such as railroad ties and tree stumps, were reported as the most common non-compostable contaminants at the compost facility. Plastics are the biggest concern in food scrap wastes from sources such as grocers. One facility estimates that 75% of the contaminants are packaging from foodstuffs (Ref. D-1), while two others indicated their biggest problem currently is the identification stickers applied to fruits and vegetables at the grocers (i.e., the labels that identify the specific charge code for the respective produce). Although small, typically about one-half

inch in size, these stickers do not decompose and cannot be captured and removed by any equipment (Ref. D-1 and Ref. D-2).

Solutions for the prevention or management of non-compostable contaminants vary by type of facility, with an important factor being education of the suppliers at the front end of the process. For example, one facility utilizes a "Feedstock Coordinator," who interfaces with the feedstock providers and the compost facility staff to define and monitor acceptable feedstock. If problems are identified in a shipment, the Feedstock Coordinator communicates with the provider to educate them and ensure that they understand what the problems are so that they will not continue to happen (Ref. D-1). Another facility, which allows suppliers to drop off wastes at their site, posts warning signs to educate suppliers on the quality required for acceptable feedstock. They have found other contractors bringing feedstock to the yard help to voluntarily "police" the drop-off area to ensure the site remains open and accessible to them (Ref. D-2).

For materials picked up in a residential curbside pick-up program, the respondent reports that the haulers are trained to identify problems and will not pick up the bins if they see non-compostable contamination, such as plastic or glass in the bins. The haulers place a note on the bin to inform the residents why it is not picked up. One respondent indicated that in Ann Arbor, Michigan, there is an active, on-going public awareness program to educate the residents on the City of Ann Arbor's website. The city hosts an educational composting webpage that provides general guidelines to identify acceptable materials. The respondent states that this education program has been effective and their feedstocks are relatively free of non-compostable contamination (Ref. D-3).

Process equipment is utilized to clean-out the contaminants at the back end of the process if the contaminants have entered the process, or contaminants may be required to be removed manually. One facility has recently purchased a depackaging machine to be used at their site. If suppliers choose to provide feedstock in plastic packaging, they will use the depackaging machine to separate out the plastics. This facility also utilizes specialized equipment (called a "Hurricane") to aid in plastics removal (Ref. D-1). Another facility reports that they utilize a slow speed shredder at the back end of their process, which allows easier manual removal of the non-compostable contaminants (Ref. D-3). Whether separated out by mechanical or manual methods, the additional cost to send the non-compostable contaminants to a landfill will be passed on to the supplier. Alternatively, if the feedstock brought to a facility by a food scrap generator is found to be unacceptable, the generator may be asked to return to the compost facility to retrieve the materials (Ref. D-1).

When asked if compostable plastics would help to resolve this issue, the answers were somewhat mixed. For the primary concern reported, that of the non-biodegradable produce identification stickers, it would help to utilize compostable plastics. The stickers are too small to be removed mechanical or manually, and are ending up in product. Therefore, the respondents conclude that use of biodegradable material is the best solution, if a cost-effective material can be developed. Similarly, the use of compostable bags for feedstock collection would be helpful (Ref. D-1 and Ref. D-2).

For larger plastics, use of compostable plastics may become problematic if they are mixed with standard plastics. It may be difficult to readily see the difference during feedstock inspections, and would require additional training and labor resulting in increased operating costs. The respondents were not certain of

the economics of the compostable plastics (i.e., are they available and affordable to the suppliers) but suggested that working with the suppliers of bio-compostables to indicate what products are needed in the composting industry is essential (Ref. D-3).

### 5.1.2 Transportation Issues

The mode of transporting feedstock to the compost facilities represented in this follow-up study varied. Some of the transportation scenarios include:

- Facility operates its own fleet of specialized trucks for food waste pickup; yard wastes are hauled by an outside party (Ref. D-1).
- Suppliers drop off yard waste feedstock at the compost yard (Ref. D-2).
- Suppliers hire transporter to bring food wastes to the compost yard (Ref. D-2).
- The City provides collection of food waste, commingled with yard waste from its residential collection (Ref. D-3).

As expected, issues from these differing methods vary; however, with one exception the primary issue of concern is the transportation costs based on distance traveled and cost of fuel. Therefore, the location of the compost facility relative to the source of feedstock is a critical variable. The transportation costs are either born by the supplier or added to the price charged to the supplier in the price per yard tipping fee (Ref. D-1).

Although raised as an issue during the first round of interviews, only one respondent in the follow-up interviews had a concern with the availability of the haulers. He stated that transportation has not historically been an issue; but the recent discovery of an invasive species in the area called the "Jumping Worm" has resulted in the need to find new sources of leaves from a non-impacted area at a greater distance to his facility and also in the need to find new transporters (Ref. D-2). More discussion on this issue is provided in Section 5.2 – Other Concerns.

### 5.1.3 Standardized Regulations for Variable Size Operations

Interviewees in our initial study raised a concern that regulations do not address small and large facilities in a manner that accounts for the issues that exist for a facility based on the size of operation. Respondents in the follow-up study agreed. Respondents expressed concerns that small facilities cannot be expected to meet the same permitting standards as large facilities. Other respondents believe that without the same regulatory standards applied to all operations, the smaller operators are at a competitive advantage and are not monitored to the same degree (Ref. D-2). One respondent stated that the challenge is to create common sense regulations that are protective of the environment but not targeted towards one level of operations (Ref. D-3).

Depending on the changes to regulations, the consensus among respondents was that changes in regulations will likely increase the cost to comply, including the initial capital investment and overall operating costs, such that it may put smaller operations out of business (or impede entry to the industry). In general, the respondents reported that for operations that are privately owned, there

would be significant impacts on the bottom line, thereby increasing costs of the final end product through trickle down (Ref. D-2 and Ref. D-3).

The suppliers of feedstock may find the economics of composting no longer viable if they are required to pay more to the composting facilities to accept their materials. If regulatory changes result in increased operating costs for operators, the increased costs are passed along to suppliers and consumers. One interview participant is of the opinion that regulations need to be written so that that they do not provide a barrier to entry for smaller interested composting operators, because the economic costs involved with establishing an operation would be too great to bear (Ref. D-3). Additionally, another interviewee indicated that regulatory oversight should be the same for all parties. Individuals who do not receive as much oversight may operate out of compliance, which can damage the whole image of the composting industry (Ref. D-2).

Compost facility neighbors can be negatively impacted by poor facility management, such from odors or leachate/runoff concerns. Any changes to regulations that might not be as protective of the environment or air quality would not be acceptable to the general public.

In conclusion, there is a concern with compost facility operators that small operations may be regulated differently than large, with the impact or magnitude depending on the perspective of the stakeholder and the specific regulation. There is a general consensus that any change to regulation should be fully considered with regard to how it will impact each stakeholder in the composting industry. Regulations should be written in a common sense way that considers the implied costs that will be passed on to operators, suppliers and end-product users, while maximizing protection of the environment and the public's health.

### 5.2 Other Concerns

One respondent elaborated on a concern that had not been raised in earlier interviews – the impact of invasive species (Ref. D-2). Historic examples include certain aphids, beetles, and the Emerald Ash Borer, which have resulted in restrictions in the composting industry. More recently, the Jumping Worm (*Amynthas agrestis.)* has been reported in 14 Wisconsin counties — including Sheboygan, Jefferson, Waukesha, Milwaukee and Racine counties. The worm, also known as the Crazy Worm, is reported to damage the soil conditions, by disrupting the natural decomposition of leaf litter on the forest. Accordingly, the respondent's facility no longer accepts leaf waste from two nearby counties where the Jumping Worms are found. Additional information on this invasive species can be found at:

- http://dnr.wi.gov/topic/invasives/documents/JumpingWormFactSheet.pdf
- http://fox6now.com/2015/06/25/jumping-worms-invade-wisconsin-dnr-warns-the-risk-of-crazy-species-spreading/
- http://news.discovery.com/earth/plants/invasive-jumping-earthworm-found-in-the-midwest-140719.htm

Leaf feedstock is essential to the composting process because it provides a dry, carbon-rich feedstock that is well balanced through mixing with wet, nitrogen-rich food scrap feedstock. Operating costs increase as the operator must travel farther to find a source of leaf feedstock to avoid the worm and to prevent spreading of this invasive species. The respondent expressed a need for greater information to raise awareness of the concern and to educate compost operators on the need for changes to process operations to prevent spread of the worms through their inadvertent presence in their product (Ref. D-2).

## 6.0 Summary and Recommendations

A summary of findings and recommendations for each of the research areas (Region 5 States' Regulatory Requirements, Training Course Availability, Operator Interviews and Follow-up Interviews) are presented below.

### 6.1 Region 5 State's Regulatory Requirements for Food Scrap Waste Training

Region 5 states do not currently require compost operator training specific to food scrap waste management. Minnesota and Ohio require general compost operator training. New Minnesota regulations require operators to take an initial 24-hour training course and five hours of continuing education work annually thereafter. While MPCA is developing a list of approved courses, they currently do not offer internal training for compost operators or a process for the approval of courses that meet the new requirements. MPCA does not yet have a written procedure or approval list available at this time, but according to the MPCA representative they plan to generate a list. Ohio requires that a certified operator manages the facility, with specific training needed to meet certification requirements but no certification course is currently offered.

Recommendations include:

- States currently without requirements for basic compost operator training may wish to add them. Addressing food scrap waste management in the training requirements and expansion of training to all operating personnel warrants consideration.
- A communication tool is needed to ensure compost operators know what courses are approved and meet state requirements. States should consider posting on their website a list of available courses that meet their requirements.
- States could develop a basic on-line or workshop compost operating training course that meets any current requirements, and addresses food waste management and issues of concern to compost operations in the state.
- A recordkeeping system to track and document educational requirements are met by compost operators should be required; this could be most easily addressed by adding training and record keeping requirements to the permitting or licensing program.

## 6.2 Availability of Compost Operator and Food Scrap Waste Training

Toeroek identified several compost operating training courses that are available to Region 5 compost operators. The most well-known and comprehensive courses are those offered by the US Composting Council (5-day) and Midwest Composting School (3-day). No Region 5 state provides a list of approved or available classes in their state. The US Composting Council composting course offers national-level training courses which are five days and provide hands-on field experience. It is offered in multiple, locations each year usually on the east or west coast. Midwest Composting School is presented annually in the one of the Midwest states. Solid Waste Association of North America (SWANA) holds trainings quarterly along the east coast, most frequently Silver Springs, Maryland and Orlando, Florida. BioCycle holds two conferences annually, one at a location on the west coast, and one at location on the east coast. These conferences usually include a preconference workshop that is similar to training, and exhibits and presentations sessions that describes research or upcoming technology that is new to the industry. The State of Michigan routinely offers a one-day workshop that is targeted towards beginners. More local courses and workshops are available from colleges, universities, state compost councils and trade associations; e.g., Ohio State University Extension offers a comprehensive, two-day course.

Recommendations include:

- More local, affordable courses are needed to address state and regional specific operations and regulations.
- Information on the currently available courses indicates most of the important operational issues are covered, although food scrap wastes do not appear to be addressed as a separate topic based on the available courses evaluated. Several state agency contacts indicated that food scrap waste management concerns can be addressed under more general topics in available training courses.
- States can raise awareness about available training courses by maintaining a list on the Agency's website and partner with local trade associations, universities and extension groups to implement workshops targeted to specific audiences or topics including food waste.
- Local compost councils and organizations can take a lead in communicating about available courses, through newsletter, social media and email communications.

## 6.3 Operator Interview Findings

Through discussion with six Region 5 compost operators, we found that most of the important subject matter desired by compost operators is included in the currently available training. Most facilities are open to sending all of their operating staff to training on at least a scheduled basis if not annually. One interviewee indicated that high turnover rates at his facility made off-site training not cost-effective. Operators indicated classroom training with hands-on experience was the most preferred training method, with webinars viewed as not being suitable for as wide of an audience. Many interviewees remarked on the high importance of networking as an education method for operators.

Specific recommendations to meet training needs include:

- Target training to a specific type of facility; provide break-out sessions, if necessary, to provide more focus to small operator needs and address state-specific issues or regional-specific concerns (e.g., cold weather composting issues).
- Design courses to maximize opportunities for networking and learning from other operators.
- Look to provide workshops on timely issues, such as mortality composting and invasive species.
- Seek trainers with the liberty to fully discuss operations without restriction of protecting trade secrets.

### 6.4 Follow-Up Interviews

Toeroek explored four additional topics, unrelated to composter training based on information provided by some interviewees. These included variability in feedstock quality, non-compostable contaminants in feedstocks, issues with transportation of materials from the supplier to the facility, and the concern over non-standardized regulations. Additionally one respondent identified concerns over invasive species, such as the Jumping Worm, which has the potential to negatively impact the composting industry. The four topics are summarized below:

- The respondents agreed that variation in feedstock is the nature of composting. The variation is best managed through education of the supplier and by adjusting the process operations to address the variation. Because this general topic is addressed in most compost operator training courses, no further action is recommended.
- Plastic is the most prevalent non-compostable contaminant in food scrap wastes. With properly educated suppliers, more consistent, high quality feedstock can be obtained. The respondents felt that compostable plastics (such as food containers) would be desirable but may not be cost effective if the cost of the plastic is too high and additional labor is necessary to inspect incoming feedstock containing mixed plastics.
- Plastic produce identification stickers, applied to fruits and vegetables in grocery stores, pose a significant problem because they do not degrade and they are too small to remove manually or mechanically. Further education of the food industry and individual suppliers is needed to foster the development of biodegradable stickers or removal of the stickers from the food scrap wastes.
- While the need for leveling the playing field is a long standing concern among large and small operators, an open dialogue is needed to evaluate regulatory needs and operator concerns. A common-sense regulatory approach that creates a fair playing field for all operators would benefit current operators and individuals interested in entering into the industry.
- Invasive species can quickly and severely impact process operations and the availability of feedstock with the potential ramifications to operating costs. There is a need for greater information to raise awareness of the concern and to educate compost operators on the need for changes to process operations to prevent spread of the invasive species through their

inadvertent presence in their product. States may wish to provide information on websites or through social media, send out alerts by way of state compost councils, colleges and universities, or host seminars to address process concerns.

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