CalRecycle

DEPARTMENT OF RESOURCES RECYCLING AND RECOVERY

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May 3, 2010

All Interested Parties:

The Department of Resources Recovery and Recycling's (CalRecycle) contractor California State Polytechnic University, San Luis Obispo (Cal Poly), has finalized the attached report, 'Study on Other States' Regulatory Oversight of Waste and Material Handling Activities Relative to Recycling Centers, Transfer Stations, and Green Material Contamination'.

The Cal Poly study leading to this report was part of the implementation of prior California Integrated Waste Management Board's Strategic Directive 8.3 (SD 8.3). This Directive was established in February 2007 and has guided CalRecycle, formerly the California Integrated Waste Management Board, to review regulations concerning waste management activities to ensure that they are grounded in the best available science, address changing market conditions, and take advantage of developing technologies.

The objectives of the Cal Poly study were: to analyze waste and material handling activities in other states that have been successful in operating with little or no environmental or public health and safety impacts; to provide descriptions of other state models and methods that can be adopted to California; and to provide recommendations for models and methods and best management practices for potential revision of existing regulations and adoption of new regulatory schema, in particular in relation to Three-Part Test and green material contamination rules of the recycling and composting regulations, respectively. The results of the study will support a staff-driven review of current regulations relative to the Three-Part Test and green material contamination and potential revision of those regulations in support of Strategic Directive 8.3. Cal Poly's investigation did not identify any state that made significant use of science and engineering fundamentals, health or safety impacts, risk assessment, or market dynamics, in their development of or as a basis for regulations for recycling or composting. The Cal Poly report includes detailed information on other states' solid waste programs, specifically how recycling and composting activities are regulated.

The report includes a number of recommendations developed by the contractor based on Cal Poly's assessment of other state models. The report will be a valuable reference for informing the analysis and discussion being carried out by CalRecycle and its stakeholder in the effort to further address the methods and models associated with recycling and solid waste handling through the implementation of SD 8.3. CalRecycle staff has categorized the contractor's recommendations in an effort to

identify areas that should be carried forward as part of the current Strategic Directive 8.3 effort. The categories are as follows:

- Report recommendations and supporting analysis that are directly related to the Three Part Test and can be used to inform the discussions as part of the SD 8.3 effort;
- Report recommendations and supporting analysis that are directly related to the management of green material contamination and can be used to inform the discussions as part of the SD 8.3 effort;
- Report recommendations and supporting analysis that have other applications outside of the current regulation review process, and may warrant consideration in the future, but not as part of the current focus of SD 8.3 ;
- Report recommendations and analysis that require much more CalRecycle analysis and may extend beyond current Departmental responsibilities.

It is the intent of CalRecycle staff to only address the recommendations in the first two groups in the near future. The attached tables have been developed to indicate how CalRecycle has grouped the Cal Poly report recommendations.

Ted Rauh, Program Director
Waste Compliance and Mitigation Program
Department of Resources Recycling and Recovery (CalRecycle)

Attachment

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Attachment
CalRecycle Staff Assessment of the Report Recommendations

Report recommendations and supporting analysis that are directly related to the Three Part Test and can be used to inform the discussions as part of the SD 8.3 effort	CalRecycle staff assessment of the utility of the recommendations
Consider review and refinement of excluded activities and materials	Aspects of the definition of a recycling facility that refer to material types can be addressed as part of the SD 8.3 effort
Avoid use of source-separation as sole criterion for exemption	Affirms source –separation as currently one of the criteria for determining exemption from regulation
Use absolute threshold for residual material handling instead of percentage of residual material	The concept of using absolutes versus percentages will be looked at as part of the SD 8.3 effort
For measured material quantities, use weight basis to provide a consistent set of values	Modification to weight basis criteria currently an aspect of the for determining exemption from regulation can be addressed as part of the SD 8.3 effort

Report recommendations and supporting analysis that are directly related to the management of green material contamination and can be used to inform the discussions as part of the SD 8.3 effort	CalRecycle staff assessment of the utility of the recommendations
Maintain 1% green material contamination regulation	Affirms the continued use of the 1% currently part of the green material determination criteria
Enforce direct measurement of 1% green material contamination	Measurement methods can be addressed as part of the SD 8.3 effort
Develop detailed test protocol for determining 1% green material contamination criterion	Test protocols can be addressed as part of the SD 8.3 effort
Develop guidance for compost end use as a function of feedstock	The relationship between the safe use of compost product only and level of feedstock contamination can be addressed as a part of the SD 8.3 effort
Adopt / develop testing procedures for determining the quantity of contaminants and stability of outgoing compost	The relationship between the safe use of compost product only and feedstock can be addressed as a part of the SD 8.3 effort

Report recommendations and supporting analysis that have other applications outside of the current regulation review process, and may warrant consideration in the future, but not as part of the current focus of SD 8.3	CalRecycle staff assessment of the utility of the recommendations
Regulate the duration for putrescible material storage and handling to less than 24 hours	Can be looked at in the context of best management practices for solid waste transfer processing facilities in the future, and could also be a consideration when evaluating the general tier structure for transfer and processing activities including facilities utilizing processes for conversion of waste to energy and the production of fuels from waste. For example, tiers could be constructed with the least amount of permit process and agency review being assigned to facilities that employ state of the art technology and best management practices.
Avoid using total facility throughput as a threshold for exemption	
Consider requirement for indoor operations	
Avoid the use of composite criteria if not developed using scientific basis or risk analysis approaches	
Increased regulations be used for siting operations in relation to impact to the natural and developed environment	
Include regulatory provisions for post-closure plans for permitted facilities	

Report recommendations and analysis that require much more CalRecycle analysis and may extend beyond current Departmental responsibilities	**CalRecycle staff assessment of the utility of the recommendations**
Transfer/Processing	Recommendations are much broader than transfer/processing facility requirements and would need to be evaluated relative to the universe of solid waste regulatory requirements. Recommendations could be utilized at some time in the future when larger scale adjustments of CalRecycle responsibilities might be considered.
Promote timely modifications to permits for advancing recycling technology at operational facilities	
Investigate options for preventing illegal activities from occurring	
Maintain some level of regulatory oversight for entire recycling process, including generators	
Require proper documentation and identification for transactions involving recycled materials	
Promote educational programs that include on-site components at operational facilities	
Green Material Handling	Recommendations are much broader than green material handling requirements and would need to be evaluated relative to the universe of solid waste regulatory requirements. Recommendations could be utilized at some time in the future when larger scale adjustments of CalRecycle responsibilities might be considered.
Avoid using composite criteria such as combined composted material type and total facility capacity as criterion for exemption	
Consider review and refinement of excluded activities	
Provide exemptions for only backyard, on-site residential operations	
For measured material quantities, use weight basis to provide a consistent set of values	
Adopt a classification system for feedstock	
Better regulate sampling requirements for outgoing compost as a function of the type of feedstock	
Lower the concentration limit for metals and pathogens in line with other states and Europe	
Implement labeling requirements	
Avoid the use of multipart tier criteria if not developed using scientific basis or risk analysis approaches	
Increased regulations be used for design and operation of composting facilities to promote better environmental protection	
Include regulatory provisions for post-closure plans for permitted facilities	

California Department of
Resources Recycling and Recovery

FEBRUARY 2010

Contractor's Report

Study on Other States' Regulatory Oversight of Waste and Material Handling Activities Relative to Recycling Centers, Transfer Stations, and Green Material Contamination

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1. Executive Summary

This investigation was conducted to assess other states' regulatory oversight of waste and material handling activities with regard to recycling and composting operations. The objectives of the project were: to analyze waste and material handling activities in other states that have been successful in operating with little or no environmental or public health and safety impacts; to provide descriptions of other states models and methods that can be adopted to California; and to provide recommendations for models and methods and best management practices for potential revision of existing regulations and adoption of new regulatory schema, in particular in relation to Three-Part Test and green material contamination rules of the recycling and composting regulations, respectively. The results of the study will support a staff-driven review of current regulations relative to the Three-Part Test and green material contamination and potential revision of those regulations in support of Strategic Directive 8.3.

The analyses conducted for the investigation consisted of detailed description of the models, methods, and best management practices used in other states; how the models and methods are applied in other states; and recommendations specifically applicable to California with regard to recycling and composting regulations including potential adoption in California and effects on current infrastructure. The main components of the study included:

- Identification of contacts in all 50 states for recycling and composting;
- Administration of surveys to all 50 states;
- Lead-up and follow-up (i.e., pre and post-survey) communication with state representatives;
- Development of database of other states' regulations for recycling and composting;
- Analysis and interpretation of survey results;
- Site visits to recycling and composting facilities in California;
- Detailed description and comparison of state regulations for recycling and composting;
- Analysis of current management practices in California used to maintain compliance with Three-Part Test and green material contamination;
- Identification of best management practices in other states;
- Analysis of whether and how each model and method was based in current science, market dynamics, new technologies, and also whether the models and methods were developed using scientific analysis and risk assessment approaches; and
- Development of recommendations for models, methods, and best management practices that can be adopted in California and identification of the impact of the recommendations on the current infrastructure.

Web-based surveys were developed using Survey Crafter Professional 4.0 software. The recycling survey included a total of 44 questions related to: background information on state level waste management and recycling; status of recycling regulations with respect to municipal solid waste and composting regulations; specific details of recycling regulations; specific details regarding type, properties, amount, and storage of materials handled by recycling activities; initial development of the regulations; level of rigor and flexibility of regulations; enforcement and reporting requirements; and efficiency and level of satisfaction with regulations and modifications to regulations. The composting survey included a total of 39 questions related to: background information regarding composting and composting related definitions; status of composting regulations; specific details of composting regulations including feedstock specific provisions and description of regulatory framework with respect to municipal solid waste regulations; specific details regarding type, properties, and amount of materials handled by composting activities; outgoing materials and storage of materials; type of composting facilities; initial development of the regulations; level of rigor of regulations; enforcement and reporting requirements; and efficiency and level of satisfaction with regulations, permitting fees, and modifications to regulations.

A total of 28 states completed the recycling survey and 37 states completed the composting survey. The majority of the surveyed states had regulations for recycling and composting activities and required permits for operation of recycling or composting facilities. Use of numerical thresholds for distinguishing between recycled materials and municipal solid waste and between different types of compostable wastes was less common than use of regulations and permitting for recycling and composting activities. Permitting requirements for recycling and composting were less strict than the requirements for municipal solid waste. Residual, and in particular putrescible, content generally were not quantified for regulatory purposes. The majority of the surveyed states had regulations related to the duration of storage of materials at recycling and composting facilities. For composting, 16 out of 35 states indicated that they had standards addressing the composition or quality of waste that may be composted and 11 out of 35 states indicated that they had standards for the quality of compost intended for different applications. Overall, the majority of states were neutral in level of satisfaction with regulatory framework and strictness in comparison to other states. More than a third of the states indicated “considering or in the process” of changing regulations.

California was similar to the majority of other states in regulating recycling and composting activities. California regulations include numerical thresholds for distinguishing between recycled materials and municipal solid waste and between different types of compostable wastes as well as quantification of residual and putrescible content as part of a small group of the surveyed states. California does not have requirements for duration of on-site storage of processed materials in recycling facilities, in contrast to the practices in majority of the surveyed states. California does not have standards addressing the composition or quality of waste that may be composted and standards for the quality of compost in relation to end use. Overall, California was generally satisfied with the current regulatory framework and California regulations were perceived to be stricter in comparison to other states.

Current management practices used in California to comply with the Three-Part Test and green material contamination were evaluated based on-site visits and discussions with Local Enforcement Agencies (LEAs). The research team made site visits to 12 recycling facilities in California. Findings were analyzed with respect to compliance with the individual requirements of the Three-Part Test. Source-separated material collection is common in California and all the facilities visited received such materials. However, one municipality had collection routes that combined municipal solid waste with source-separated materials in a single collection vehicle due to difficulty with access to neighborhoods with multiple collection vehicles. Even though the materials are source-separated by the generator, the combined delivery to the processing center effectively negates the original source-separation. Such a distinction is not present in the current regulations.

The residual content at the visited sites varied between approximately 5-22 percent with a common range between 15-20 percent. Therefore, the majority of the facilities did not meet the residual content requirement in the Three-Part Test. The variations in residual content were highly region specific. The differences in residual content were mostly attributed to differences in public awareness about recycling as well as in part to presence of illegal poaching activities in certain communities. The residual content at the visited sites was determined by monitoring the outflowing materials and quantifying leftover materials sent to landfills subsequent to processing. The facilities all had scales for quantifying material flows on a weight basis. In a limited number of cases, operators conducted detailed load characterization of the incoming materials to establish appropriate tipping fees, and not for regulatory compliance. The residual contents were determined frequently and materials flows reports were developed approximately monthly for the facilities. The residual content was monitored and quantified only at the fully permitted facilities and not at the sites with temporary permits. Even though a quantitative threshold is included for putrescible content in the Three-Part Test, the amount of putrescible materials was not monitored by the majority of the sites. The research team observed only a single facility that attempted to quantify putrescible content.

All of the fully permitted facilities were large-scale operations and included indoor and/or outdoor processing locations. Both manual sorting and mechanized sorting equipment were used. Stockpiling of materials was a function of space available at a facility. Stockpiling was kept to a duration of days or weeks at the fully permitted facilities, whereas at the temporary permitted site, the materials were being stored for extended periods of time (i.e., months) for speculative accumulation. The severe drop in the commodities markets in the past year caused higher inventory of stored materials due to limited demand for products. The quality of outgoing materials was affected by market conditions in that the operators adjusted their processes to meet market demands (i.e., lower quality materials during periods of low demand and higher quality materials during periods of high demand).

The research team made site visits to nine composting facilities in California. Current management practices used in California to comply with the green material contamination rule were evaluated based on-site visits. The sites that received only commercial wastes indicated that they readily met the rule. The sites that received

curbside wastes also indicated that they achieved compliance with the rule. However, the operators expressed concern regarding the lack of specificity and inconsistency of visually-based measurements associated with the rule. The local LEAs indicated the difficulty of measurement of the contamination percentage at composting facilities and proposed enforcement at collection sites, with random sampling of residential green material bins. All of the sites visited had full-time inspectors visually checking each load entering the site for contamination. At the majority of the visited sites, incoming green materials were unloaded, visually inspected, and contaminants removed by hand. A visited site utilized a mechanized sorting system for front-end processing prior to composting, which was observed to be highly effective for removal of contaminants. Another visited site utilized hand separation of contaminants followed by extensive screening after the composting process. The finished compost product was visually very uniform and appeared to be free of contaminants. At facilities with both recycling and composting activities, the feedstock was highly variable, especially in comparison to the composting-only facilities and the feedstock (which contained municipal solid waste in some cases) did not meet the green material contamination rule.

In-depth analyses of regulatory models and methods were conducted using the content of state Web sites, survey results, discussions with state representatives, and site visits as well as technical literature and additional Web sites. State regulatory models and methods were analyzed and compared for any content based in science and engineering fundamentals, health or safety impacts, including cost and feasibility aspects as well as risk assessment features. Also, analysis of current management practices used in California to comply with the Three-Part Test and green material contamination threshold was conducted. In addition, analyses were conducted to compare other states' regulations to the state-of-the-practice in California. A subset of surveyed states was selected (nine states for recycling, seven states for composting) for detailed analyses both for specific regulatory framework and for comparison to California. Furthermore, waste regulations in the European Union were provided. Significant aspects of the assessments of other states' and countries' models and methods included:

- Demographic data.
- Waste diversion.
- Specific regulatory thresholds.
- Region-specific regulatory schema.
- Differences in regulations due to geographic and demographic boundaries, environmental conditions (e.g., business, residential, urban, rural, dry, wet).
- Public vs. private infrastructure.
- Application of regulations in regards to front-end vs. back-end (i.e., inflow vs. outflow) regulatory enforcement.
- Presence of tiered regulatory methods.

- The overall economic structure for regulation (e.g., regulatory incentives for recycling, transformation or composting).
- Entity responsible for compliance (generator, handler, transporter, recycler)
- Fees and use of the fees for promoting specific management practices.
- Availability of education programs for recycling and promoting recycling.
- Cradle-to-grave operations.
- Integrated approach for variability, type and amount, of regulated materials.

The detailed analyses indicated that the selected states generally had three categories of regulations for recycling and composting operations: no regulation, regulations for all operations, and intermediate regulations as a function of operational conditions. The parameters considered in the operational conditions included: size of facility, throughput of material, type of facility, and type of materials handled/processed. The regulations were developed to minimize impact to the environment or nuisance to nearby residents. Specific criteria related to science and engineering fundamentals, health or safety impacts, risk assessment, or cost and feasibility aspects have not been identified for other states. The regulations use qualitative descriptions to address health, safety, and environmental protection.

For comparison to the Three-Part Test, source-separation was used for permit exemption in some states as the sole criterion or in other states with additional requirements as part of composite criteria (i.e., compliance with multiple criteria required for exemption). The residual material threshold varied between 5 and 15 percent at selected states, whereas, putrescible content was not quantified in any of the selected states' regulations. Several states' regulations included requirements for duration for handling, storage, and disposal of putrescible materials at recycling facilities. In addition, the majority of the selected states had duration requirements for general storage of materials at recycling facilities. Selected states commonly regulated handlers, transporters, and recyclers with one state regulating generators.

For comparison to green material contamination rule, all selected states with one exception maintained a specific definition of green waste (or similar term such as yard waste). Green waste was regulated and permits were required in all selected states. All selected states had provisions to allow exemptions to permit status typically as a function of facility size and/or material type. The selected states did not have thresholds for contamination levels for incoming materials (i.e., feedstock) at composting facilities. Residual content threshold was used for outgoing finished compost products. The research team identified only one other state with requirements for contaminant content in the incoming compostable materials.

Regulatory models for recycling and composting exist in other states that extend beyond the current regulatory requirements in California. The recycling regulations in California are generally in line with regulations of other states both in terms of content and level of strictness. However, duration limits are enforced for storage of putrescible materials and stricter quantitative thresholds for residual content are present in other states. The

composting regulations in other states are generally more comprehensive than the regulations in California in terms of content and more rigorous in terms of level of strictness. Other states' regulations include criteria for facilities composting various types of feedstock and provisions for facility operation as well as for final product specifications and associated end use (i.e., land application) limits. Recommendations for recycling and composting regulations and a summary of the impact of the proposed recommendations on the current recycling and composting infrastructure in California are provided based on all of the analyses conducted in this investigation. The recommendations are summarized in Tables 1 and 2 for recycling and composting, respectively.

Table 1 – Recycling Recommendations and Impact on Infrastructure

Recycling Recommendation	Comparison with Three-Part Test	Impact on Infrastructure
Avoid using total facility throughput as a threshold for exemption	Consistent with current Three-Part Test	None
Consider review and refinement of excluded activities and materials	Currently exclusions are provided for a variety of waste material handling operations and specific materials for omission in calculation of residual content	High – Would require potential regulatory compliance by additional waste material handling operations
Consider requirement for indoor operations	Currently not included in Three-Part Test	High – Would require construction/addition of new buildings for numerous facilities
Avoid use of source-separation as sole criterion for exemption	Consistent with current Three-Part Test	None
Use absolute threshold for residual material handling instead of percentage of residual material	This could be used to replace the 10 percent residual component of the Three-Part Test	Low – Quantities are already measured, recommended method would avoid the requirement for calculating percentages
Regulate the duration for putrescible material storage and handling to less than 24 hours	Rather than regulate quantity of putrescible content (which is quite difficult to determine and to enforce), as is done currently in the Three-Part Test, the duration for storage/processing of putrescible can be regulated for permitted facilities. This provision would not be used to determine exemption status.	Medium – This recommendation would simplify the regulatory framework. Operators would be required to closely monitor the processing of putrescible materials
For measured material quantities, use weight basis to provide a consistent set of values	Currently not specified in Three-Part Test	Low - Would simplify material quantity reporting. Would require that all facilities have scales installed (most have this capacity, so minimal impact on operators is envisioned)

Recycling Recommendation	Comparison with Three-Part Test	Impact on Infrastructure
Avoid the use of composite criteria if not developed using scientific basis or risk analysis approaches	Inconsistent with current Three-Part Test	Function of level of change considered
Promote timely modifications to permits for advancing recycling technology at operational facilities	Limited direct connection to Three-Part Test, part of broader regulatory framework	Low - Potentially lead to improvements in the equipment for processing recycled materials. Regulators would have to monitor the effects of the new equipment on the overall operations and impact on the environment
Investigate options for preventing illegal activities from occurring	In some cases, illegal operations are affecting regulatory compliance with the Three-Part Test	Function of the extent and nature of increased enforcement of illegal activities
Maintain some level of regulatory oversight for entire recycling process, including generators	Additional regulations than what are currently in place that may result in significant long-term gains in recycling and would improve compliance with the Three-Part Test	Low - Minimal enforcement of generators is envisioned in practice. If regulated, convenient opportunities for recycling (e.g., reverse vending machines) need to be available to generators
Require proper documentation and identification for transactions involving recycled materials	New provision, especially for small scale operations, in order to prevent illegal activities. This would improve compliance with the Three-Part Test	Low - Increased record keeping will increase enforcement efforts. This point of enforcement has high potential to identify and prevent illegal operations
Promote educational programs that include on-site components at operational facilities	Increased public awareness and better recycling habits would improve compliance with the Three-Part Test in the long term	Medium - Producing such programs would require initial investment from operators and regulators
Increased regulations be used for siting operations in relation to impact to the natural and developed environment	Limited direct connection to Three-Part Test, part of broader regulatory framework.	Medium - May limit geographic location for recycling facilities to avoid adverse impacts on the surrounding environment and communities
Include regulatory provisions for post-closure plans for permitted facilities	Limited direct connection to Three-Part Test, part of broader regulatory framework.	Medium – minimal impact on the day-to-day operations and enforcement, but potential financial impact for post-closure developments

Table 2 – Composting Recommendations and Impact on Infrastructure

Composting Recommendation	Comparison with California Regulations, Green Material Contamination	Impact on Infrastructure
Avoid using composite criteria such as combined composted material type and total facility capacity as criterion for exemption	Currently regulations have exemptions as a function of type of composted material and facility capacity	Medium – The existing capacity thresholds are relatively low, thereby effecting only some operations
Consider review and refinement of excluded activities	Currently exclusions are provided for a variety of composting operations	High – Would require regulatory compliance by additional composting operations
Provide exemptions for only backyard, on-site residential operations	Exemptions are provided for a multitude of operations as described above	High – Would require regulatory compliance by a wide variety of composting operations
Maintain 1 percent green material contamination regulation	Current status	None
Enforce direct measurement of 1 percent green material contamination	Both visual observation and measurement are used	Medium – Facilities already are required to be capable of conducting direct measurements; measurement only requirement would increase test durations
Develop detailed test protocol for determining 1 percent green material contamination criterion	Limited detail is provided for obtaining representative consistent measurements	Medium – Facilities already have capabilities to measure contamination; the new protocol may require longer test durations, but would streamline operations
For measured material quantities, use weight basis to provide a consistent set of values	Currently, both volume and weight are specified in regulations related to exclusions, weight is used for green material contamination	Low – Would simplify material quantity reporting. Would require that all facilities have scales installed (many have this capacity, so minimal impact on operators is envisioned)
Adopt a classification system for feedstock	Currently not required	Low – Modifications are required in regulations, it is expected that composting operations would not be significantly affected as the requirement only refers to identification

Composting Recommendation	Comparison with California Regulations, Green Material Contamination	Impact on Infrastructure
		of feedstock type
Develop guidance for compost end use as a function of feedstock	Currently not available	Medium – May limit the use of certain types of feedstock for specified applications
Better regulate sampling requirements for outgoing compost as a function of the type of feedstock	Currently sampling requirements for green material feedstock may be less stringent than the requirements for biosolids or municipal solid waste feedstock	Medium – May affect some operations as a function of feedstock type; all operations already conduct some form of sampling
Lower the concentration limits for metals and pathogens in line with other states and Europe	Currently California regulations are less stringent than selected other states and European standards	Medium – The research team believes that lower concentrations can be achieved in California, as they are already used elsewhere; may require modifications to some operations
Adopt / develop testing procedures for determining the quantity of contaminants and stability of outgoing compost	Currently, these parameters are not determined	High – Equipment and personnel or outside testing services would be required for completing the measurements
Implement labeling requirements	Currently outgoing compost does not have labeling requirements	Low – Composters already obtain majority of the data that would be included in a label; the requirement simply ascertains that compost characteristics be made available to the consumers
Avoid the use of multipart tier criteria if not developed using scientific basis or risk analysis approaches	Inconsistent with current composting regulations	Function of level of change considered

Composting Recommendation	Comparison with California Regulations, Green Material Contamination	Impact on Infrastructure
Increased regulations be used for design and operation of composting facilities to promote better environmental protection	Specific details regarding distances to property boundaries; requirements for geotechnical reports; requirements for adequate geotechnical liner systems; requirements for minimizing surface water and groundwater impacts are not included	Medium - May limit geographic location for recycling facilities and require construction of liner/drainage systems
Include regulatory provisions for post-closure plans for permitted facilities	Currently not required by regulations	Medium – minimal impact on the day-to-day operations and enforcement, but potential financial impact for post-closure developments

2. Introduction

The California Integrated Waste Management Board (now CalRecycle) adopted Strategic Directive 8.3 (SD 8.3) in February 2007. The SD 8.3 requires review of CalRecycle regulations to ensure that the regulations are based on the best available science; have provisions for changing market conditions; and take advantage of developing technologies. This study was conducted to support a staff-driven review of current regulations relative to the Three-Part Test and green material contamination and potential revision of those regulations in support of SD 8.3. These analyses are intended to be utilized in identifying, defining, and ultimately determining the level of regulatory oversight that may be required for activities operating within California. The outcomes of the study will assist the CalRecycle staff to complete review of the California regulatory schema in a timely manner. The Three-Part Test and the green material contamination rule are defined in California regulations.

The Three-Part Test is defined as:

Regulations: Title 14, California Code of Regulations (14 CCR), Natural Resources--Division 7, CalRecycle

Chapter 3. Minimum Standards for Solid Waste Handling and Disposal

17402.5. Definitions and Related Provisions Regarding Activities That Are Not Subject to the Transfer/Processing Regulatory Requirements

d) A "Recycling Center" means a person or business entity that meets the requirements of this subdivision. A recycling center shall not be subject to the requirements of Articles 6.0, 6.1, 6.2, 6.3 and 6.35 of this Chapter.

(1) A recycling center shall only receive material that has been separated for reuse prior to receipt.

(2) The residual amount of solid waste in the separated for reuse material shall be less than 10% of the amount of separated for reuse material received by weight.

(A) The residual amount is calculated by measuring the outgoing tonnage after separated for reuse materials have been removed.

(B) The residual amount is calculated on a monthly basis based on the number of operating days.

(3) The amount of putrescible wastes in the separated for reuse material shall be less than 1% of the amount of separated for reuse material received by weight, and the putrescible wastes in the separated for reuse material shall not cause a nuisance, as determined by the EA.

(A) The amount of putrescible wastes is calculated in percent as the weight of putrescible wastes divided by the total incoming weight of separated for reuse material.

(B) The amount of putrescible wastes is calculated on a monthly basis based on the number of operating days.

Green material contamination is defined as:

Regulations: 14 CCR, Natural Resources--Division 7, CalRecycle

Chapter 3.1. Compostable Materials Handling Operations and Facilities Regulatory Requirements

Article 1. General

14 CCR, Section 17852. Definitions

(a) For the purposes of this Chapter:

(21) "Green Material" means any plant material that is separated at the point of generation, contains no greater than 1.0 percent of physical contaminants by weight, and meets the requirements of section 17868.5. Green material includes, but is not limited to, yard trimmings, untreated wood wastes, natural fiber products, and construction and demolition wood waste. Green material does not include food material, biosolids, mixed solid waste, material processed from commingled collection, wood containing lead-based paint or wood preservative, mixed construction or mixed demolition debris.

Article 7. Environmental Health Standards, 14 CCR Section 17868.5. Green Material Processing Requirements

In order for a feedstock to be considered green material, as defined in section 17852(a)(21), the following requirements shall be met:

(a) The feedstock shall undergo load checking to ensure that physical contaminants are no greater than 1.0 percent of total weight. Load checking shall include both visual observation of incoming waste loads and load sorting to quantify percentage of contaminating materials.

(1) A minimum of one percent of daily incoming feedstock volume or at least one truck per day, whichever is greater, shall be inspected visually. If a visual load check indicates a contamination level greater than 1.0 percent, a representative sample shall be taken, physical contaminants shall be collected and weighed, and the percentage of physical contaminants determined. The load shall be rejected if physical contaminants are greater than 1.0 percent of total weight.

3. Objectives

The objectives of the project were: to analyze waste and material handling activities in other states that have been successful in operating with little or no environmental or public health and safety impacts; to provide descriptions of other states models and methods that can be adopted to California; and to provide recommendations for models and methods and best management practices for potential revision of existing regulations and adoption of new regulatory schema, in particular in relation to Three-Part Test and green material contamination components in recycling and composting regulations, respectively.

4. Main Components

The California Polytechnic State University (Cal Poly) project team conducted a comprehensive analysis of waste and material handling activities in other states that have been successful in operating with little or no environmental, or public health and safety impacts. The analyses consisted of detailed description of the models, methods, and best management practices used in other states; how the models and methods are applied in other states; and recommendations specifically applicable to California with regard to recycling and composting regulations including potential adoption in California and effects on current infrastructure.

Initially, the research team identified other states' regulatory requirements for recycling and composting operations. Surveys were developed each for recycling and composting to define regulatory schema and general waste management related background in other states. The survey results were analyzed together with communications and correspondence with state representatives, and information from relevant state Web sites, to describe the state models, methods, and best management practices for recycling and composting. Then, current operational conditions in California were assessed by conducting site visits to a broad range of recycling and composting facilities. Finally, models and methods from other states and operational conditions in California were compared to the current California regulatory framework to establish recommendations for potential modification of the regulations to assure that the regulations are based in current practices and best available management practices.

The main components of the study included:

- Identification of contacts in all 50 states for recycling and composting;
- Administration of surveys to all 50 states;
- Lead-up and follow-up (i.e., pre and post-survey) communication with state representatives;
- Development of database of other states' regulations for recycling and composting;
- Analysis and interpretation of survey results;
- Site visits to recycling and composting facilities in California;
- Detailed description and comparison of state regulations for recycling and composting;
- Analysis of current management practices used in California that could be applied to maintain compliance with Three-Part Test and green material contamination;
- Identification of best management practices in other states;
- Analysis of whether and how each model and method was based in current science, market dynamics, new technologies, and also whether the models and methods were developed using scientific analysis and risk assessment approaches; and
- Development of recommendations for state models, methods, and best management practices that can be adopted in California and identification of the impact of the recommendations on the current infrastructure.

5. Overview of States

An overview of demographic information and waste management practices was conducted for all 50 states. Population, waste diversion rates, agricultural status, and bottle bill status for the states are presented in Table 3 to provide baseline context for the analyses conducted in this investigation. Based on data in Table 3, the states with high populations have high waste diversion rates (the average waste diversion rate for the five most populous states—California, Texas, New York, Florida, and Illinois—is 32.4 percent, whereas the overall average waste diversion rate for all states is 27.6 percent). Of the 11 states that have bottle bills, nine are in the top 25 states for overall waste diversion rate. The average waste diversion rate for the five top agricultural states (California, Idaho, Indiana, Iowa, and Kansas) is 36.0 percent. Idaho, the second largest producing agricultural state, has a comparatively low waste diversion rate of 8.0 percent.

In addition, baseline regulatory information was obtained for all 50 states using the state regulatory Web sites. The information for state recycling regulation Web sites is presented in Table A-1 (in Appendix A). The information for state composting regulation Web sites is presented in Table A-2. The regulatory information obtained from the Web sites was used in conjunction with information obtained from surveys, as described below, to analyze other states' regulatory schema for recycling and composting.

Table 3. State Statistics

State	Population (2008)[1]	Indices of Total Farm Output[2]	Bottle Bill Status[3]	MSW Diversion (2006)[4]
Alabama	4,661,900	1.1623	No	8.5%
Alaska	686,293	N/A	No	3.7%
Arizona	6,500,180	2.0413	No	12.5%
Arkansas	2,855,390	0.7767	No	15.4%
California	36,756,666	9.0782	Yes - 5, 10 cents	54%
Colorado	4,939,456	1.3403	No	5.5%
Connecticut	3,501,252	0.1421	Yes - 5 cents	24.7%
Delaware	873,092	0.2630	Yes - 5 cents	10.4%
Florida	18,328,340	2.0213	No - Bill died	28.7%
Georgia	9,685,744	1.8553	No	8.3%
Hawaii	1,288,198	N/A	Yes - 5 cents	24.9%
Idaho	1,523,816	5.1919	No	8.0%
Illinois	12,901,563	1.3720	No	37.0%
Indiana	6,376,792	3.6186	No	33.4%
Iowa	3,002,555	2.2446	Yes - 5 cents	33.7%
Kansas	2,802,134	2.8903	No	20.0%
Kentucky	4,269,245	1.2791	No	38.0%
Louisiana	4,410,796	0.6463	No	8.3%
Maine	1,316,456	0.1311	Yes - 5, 15 cents	31.9%
Maryland	5,633,597	0.5125	No - "Unfavorable"	36.2%
Massachusetts	6,497,967	0.1635	Yes - 5 cents	37.2%
Michigan	10,003,422	1.5618	Yes - 5, 10 cents	20.3%
Minnesota	5,220,393	3.4820	No - In progress	42.8%
Mississippi	2,938,618	2.1253	No	4.5%
Missouri	5,911,605	1.3249	No	32.0%
Montana	967,440	0.7194	No	16.8%
Nebraska	1,783,432	2.5359	No	11.0%
Nevada	2,600,167	1.4254	No	20.6%
New Hampshire	1,315,809	3.6171	No - In progress	32.0%
New Jersey	8,682,661	0.0498	No - In progress	34.5%
New Mexico	1,984,356	0.2707	No - Bill died	9.0%
New York	19,490,297	0.6094	Yes - 5 cents	35.5%
North Carolina	9,222,414	0.1199	No - In progress	22.9%
North Dakota	641,481	1.1870	No	12.6%
Ohio	11,485,910	1.9045	No	20.9%
Oklahoma	3,642,361	1.3681	No	3.9%
Oregon	3,790,060	1.1056	Yes - 5 cents	41.1%
Pennsylvania	12,448,279	1.5565	No - In progress	29.5%
Rhode Island	1,050,788	0.0159	No	12.4%
South Carolina	4,479,800	0.6221	No	30.4%
South Dakota	804,194	1.7088	No	9.7%
Tennessee	6,214,888	0.8788	Yes - Reintroduced in 2010	39.3%
Texas	24,326,974	4.5197	No	18.9%

State	Population (2008)[1]	Indices of Total Farm Output[2]	Bottle Bill Status[3]	MSW Diversion (2006)[4]
Utah	2,736,424	0.3606	No	15.3%
Vermont	621,270	0.8989	Yes - 5, 15 cents	35.7%
Virginia	7,769,089	0.1749	No	33.9%
Washington	6,549,224	1.6563	No	32.8%
West Virginia	1,814,468	2.3097	No - Bill died	16.0%
Wisconsin	5,627,967	0.1585	No	32.1%
Wyoming	532,668	0.2618	No	10.7%

[1]Population facts from: http://factfinder.census.gov, http://www.census.gov

[2]Total farm output data from: http://www.ers.usda.gov/Data/AgProductivity/table03.xls (baseline value is 1.0 for Alabama in 1996)

[3]Bottle Bill Status from: http://www.bottlebill.org/legislation/usa.htm

[4]MSW Diversion Rates from: http://www.jgpress.com/archives/_free/001782.html, The State of Garbage In America, *BioCycle*, December 2008, Vol. 49, No. 12, p. 22. Most recent values for diversion rates are provided for selected states below using data obtained directly from state Web sites. In some cases, differences were present between the values, for example, California diversion rates were 38.9% and 54% for BioCycle and CalRecycle Web site, respectively.

6. Survey

Surveys were used to obtain focused information on other states' regulatory framework related to recycling and composting in particular regarding regulations in line with the Three-Part Test and green material contamination. Initially, individual contacts were made with all 50 states using telephone calls and e-mails to identify appropriate personnel as contacts for the survey in particular and for this investigation in general. High-level personnel with significant knowledge and experience with each state's regulatory framework were targeted in the preparation of the contact lists. For majority of the states, distinct contacts were identified for recycling and composting. In some states, a single contact was present for both recycling and composting. The name, position, and regulatory agency information of the state contacts for recycling and composting are presented in Tables A-3 and A-4, respectively.

The Web-based surveys were developed using Survey Crafter Professional 4.0 software. The recycling survey is provided in Appendix B. The recycling survey included a total of 44 questions.

- General background information including state level waste management and recycling (Q1-Q5).
- Questions regarding status of recycling regulations with respect to municipal solid waste regulations and composting regulations (Q6-Q9).
- Specific details of recycling regulations (Q10-Q19).

- Specific details regarding type, properties, amount, and storage of materials handled by recycling activities (Q20-Q26).
- Question related to beneficial reuse of waste materials (Q27).
- Question regarding initial development of the regulations (Q28).
- Questions regarding level of rigor and flexibility of regulations (Q29-Q30).
- Enforcement of regulations and reporting requirements (Q31-36).
- Efficiency and level of satisfaction with regulations and modifications to regulations (Q37-Q40).
- Additional comments and information (Q41-Q44).

The composting survey is provided in Appendix C. The composting survey included a total of 39 questions:

- General background information regarding composting and composting related definitions (Q1-Q5).
- Questions regarding status of composting regulations (Q6-Q7).
- Specific details of composting regulations including feedstock specific provisions and description of regulatory framework with respect to municipal solid waste regulations (Q8-Q16).
- Specific details regarding type, properties, and amount of materials handled by composting activities (Q17-Q22).
- Questions related to outgoing materials and storage of materials (Q23-24).
- Questions related to type of composting facilities (Q25-Q26).
- Question regarding initial development of the regulations (Q27).
- Questions regarding level of rigor of regulations (Q28).
- Enforcement of regulations and reporting requirements (Q29-30).
- Efficiency and level of satisfaction with regulations, permitting fees, and modifications to regulations (Q31-Q35).
- Additional comments and information (Q36-Q39).

Photographs were added to enhance the appearance of the surveys and keep the interest of the respondents for high rates of complete returns. The surveys were sent to each state contact for recycling and each state contact for composting using personalized e-mail messages. Prior telephone correspondence was made with each state representative to confirm their availability for completing the surveys for high response rates. Repeated follow-up telephone correspondence also was made with state representatives to remind them of due dates as well as to encourage participation from unresponsive representatives. The state contacts were encouraged to share

surveys with appropriate persons from other regulatory divisions or agencies as needed to respond to all of the questions.

A total of 28 states completed the recycling survey and 37 states completed the composting survey. The results of the surveys are included in Appendices B (Recycling) and C (Composting) using maps that depict the details of the responses. Responses to selected questions, which directly related to Three-Part Test and green material contamination as well as general regulatory framework are presented in Figures 1 and 2. The majority of the surveyed states had regulations for recycling and composting activities and required permits for operation of recycling or composting facilities (Figure 1a and 2a). Use of numerical thresholds for distinguishing between recycled materials and municipal solid waste and between different types of compostable wastes was less common than use of regulations and permitting for recycling and composting activities (Figures 1b and 2b). Permitting requirements for recycling and composting were less strict than requirements for municipal solid waste. Residual, and in particular putrescible, content generally were not quantified for regulatory purposes (Figures 1d, 1e, 2d, 2e). The majority of the surveyed states had regulations related to the duration of materials storage at recycling or composting facilities. For composting, 16 out of 35 states indicated that they had standards addressing the composition or quality of waste that may be composted and 11 out of 35 states indicated that they had standards for the quality of compost intended for different applications (Figure 2h). Overall, the majority of states were neutral in level of satisfaction with regulatory framework and strictness in comparison to other states (Figures 1g and 2g). More than one-third of the states indicated “considering or in the process” of changing regulations.

California was similar to the majority of other states in regulating recycling and composting activities. California regulations include numerical thresholds for distinguishing between recycled materials and municipal solid waste and between different types of compostable wastes. In addition, California regulations include quantitative thresholds for residual and putrescible content similar to a limited number of surveyed states. California does not have requirements for duration of on-site storage of processed materials in recycling facilities in contrast to the practices in majority of the surveyed states. California does not have standards addressing the composition or quality of waste that may be composted and standards for the quality of compost intended for different applications. Also, California was one of the limited number of states, which indicated that the regulation of green waste composting did not differ from the regulation of food waste or biosolids composting. Overall, California is generally satisfied with the current regulatory framework and considers California regulations to be stricter in comparison to other states.

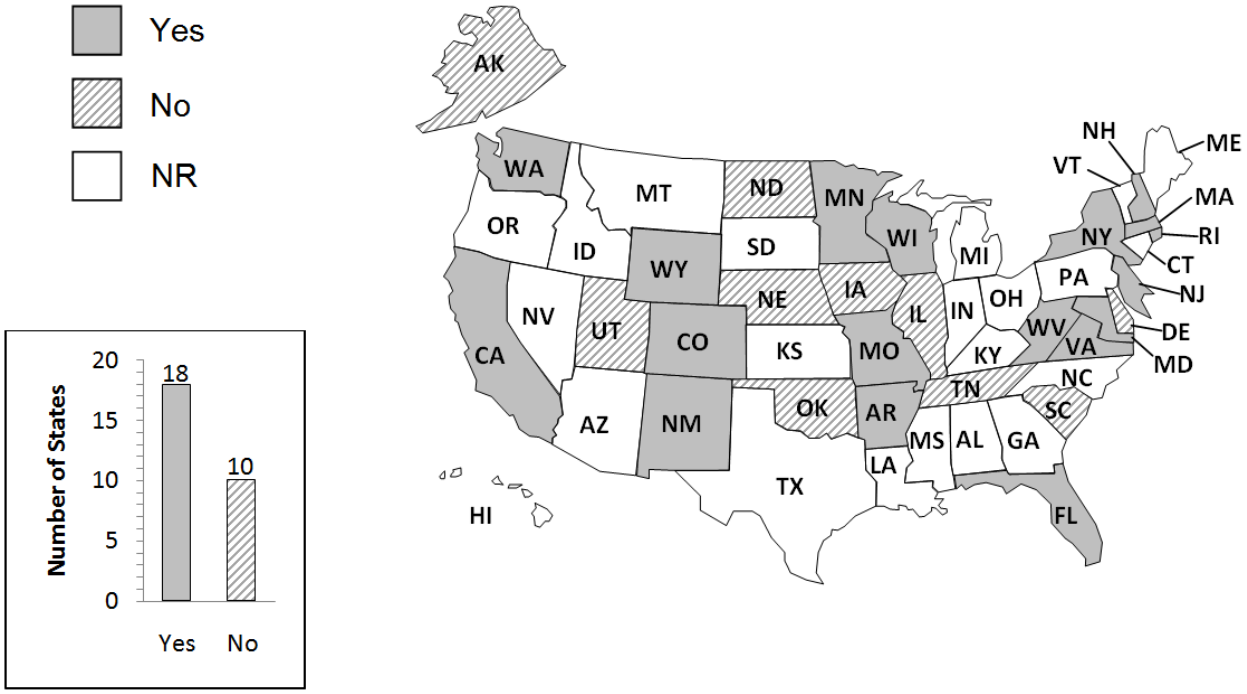


Figure 1a. Is recycling regulated at the state level in your state?

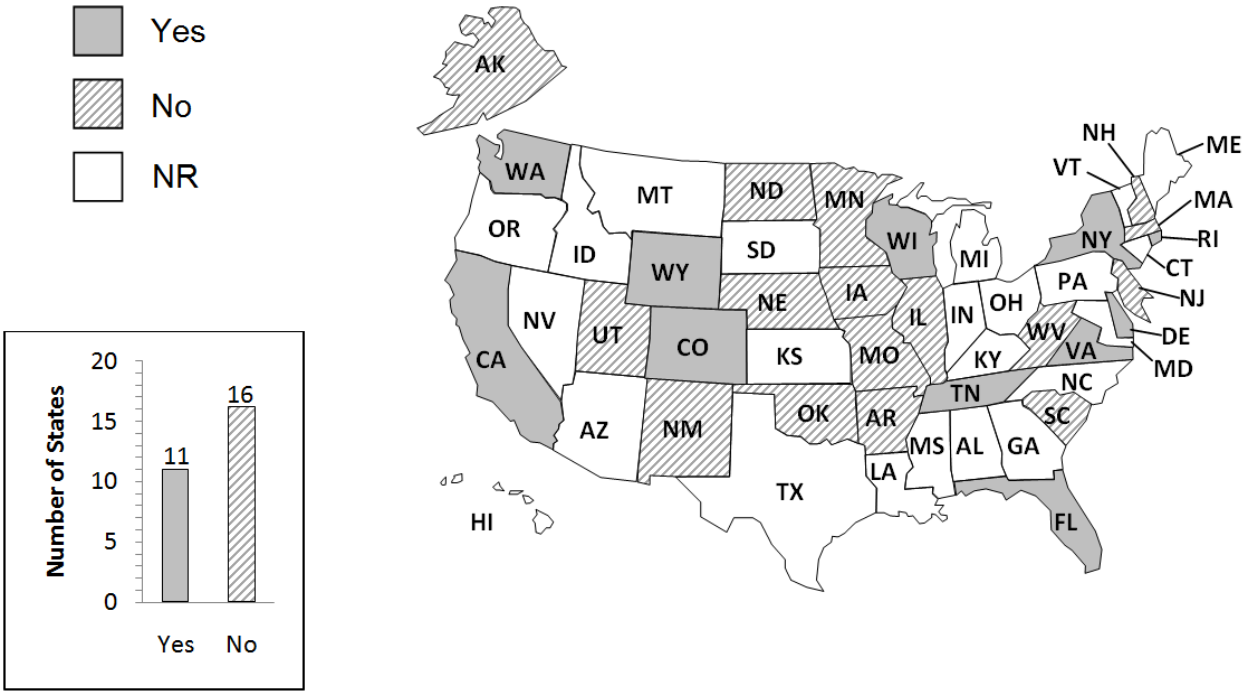


Figure 1b. Are there numerical thresholds or definitions used to distinguish recycled materials from municipal solid waste?

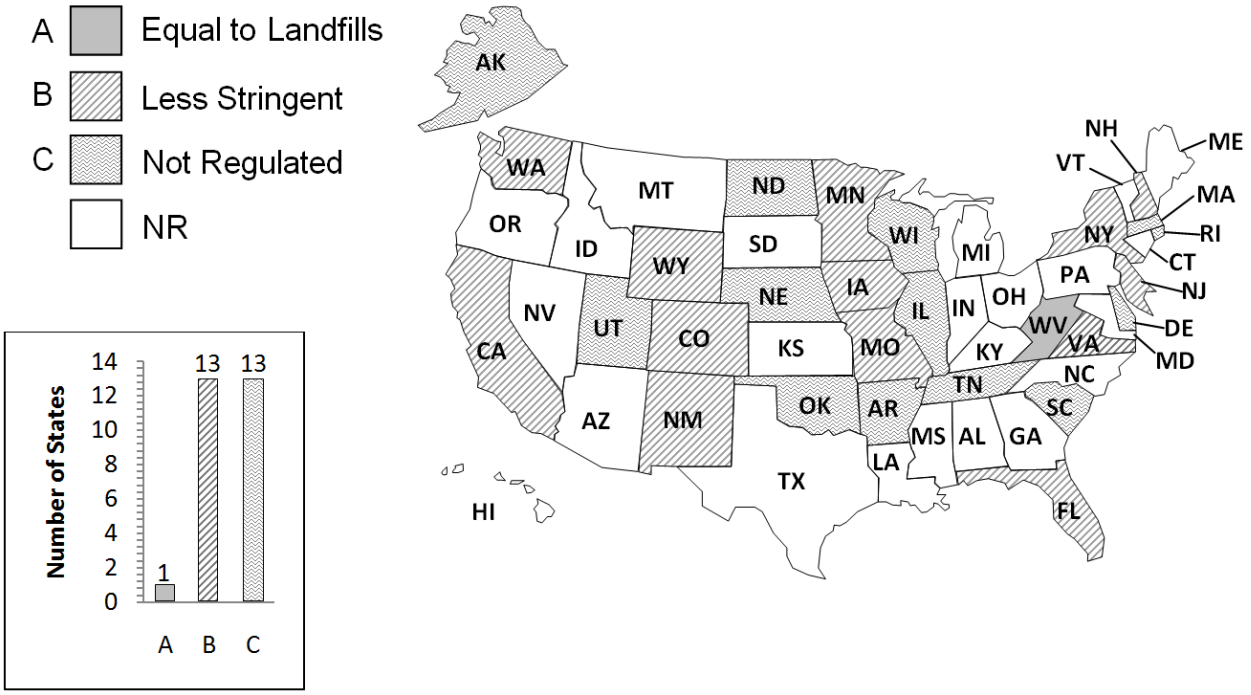


Figure 1c. What level of permitting is applied to recycling facilities?

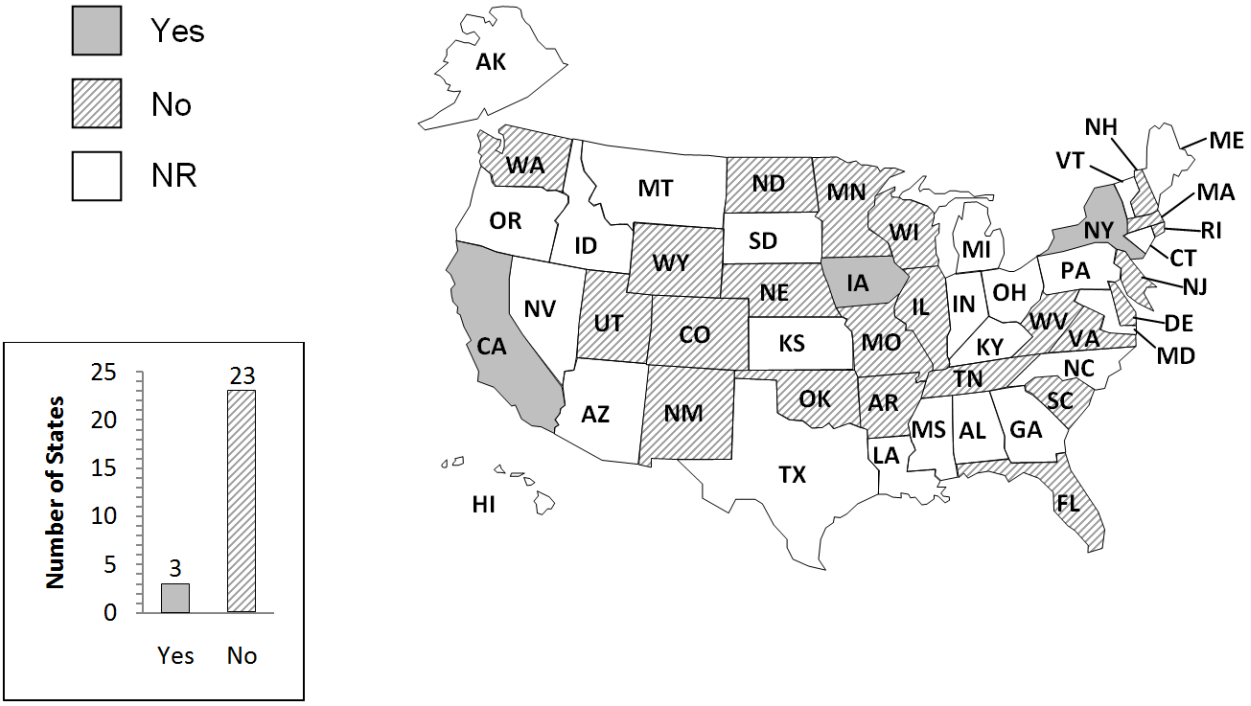


Figure 1d. Is putrescible content quantified for regulatory purposes?

Figure 1e. Is residual content (or contaminant content) quantified for regulatory purposes?

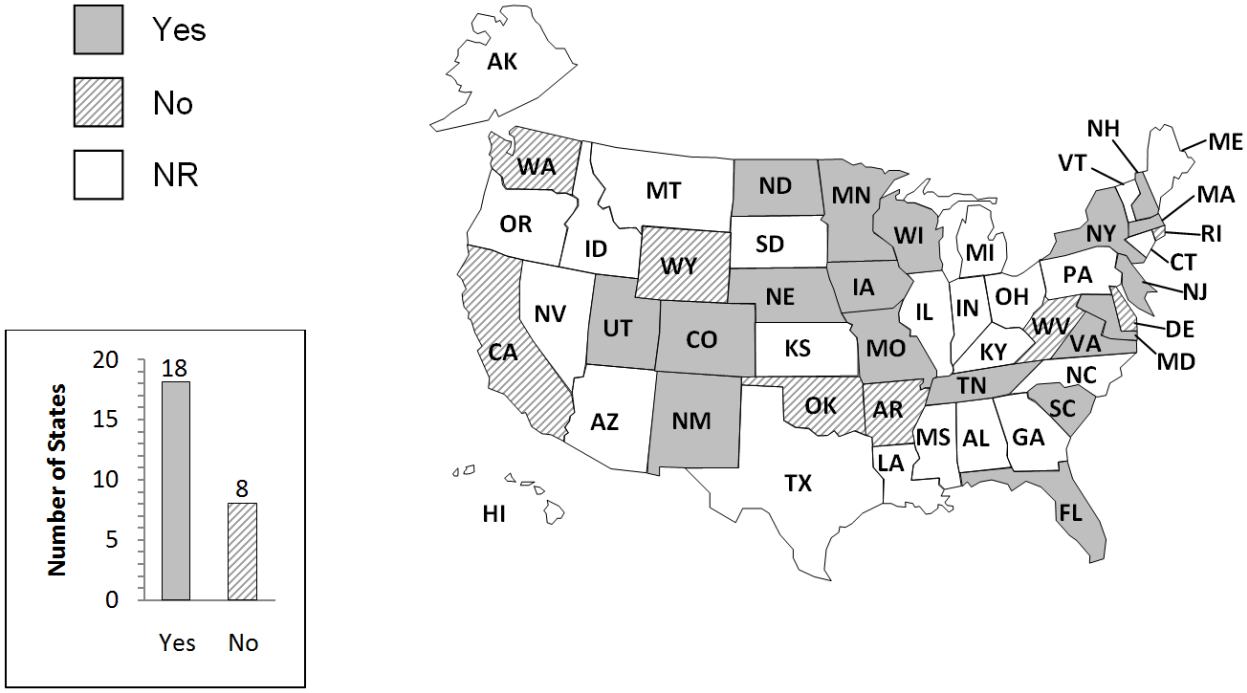


Figure 1f. Does your state have regulations related to the duration that materials can be stockpiled or stored on site at a recycling facility?

Figure 1g. Are you satisfied with the current model of regulation?

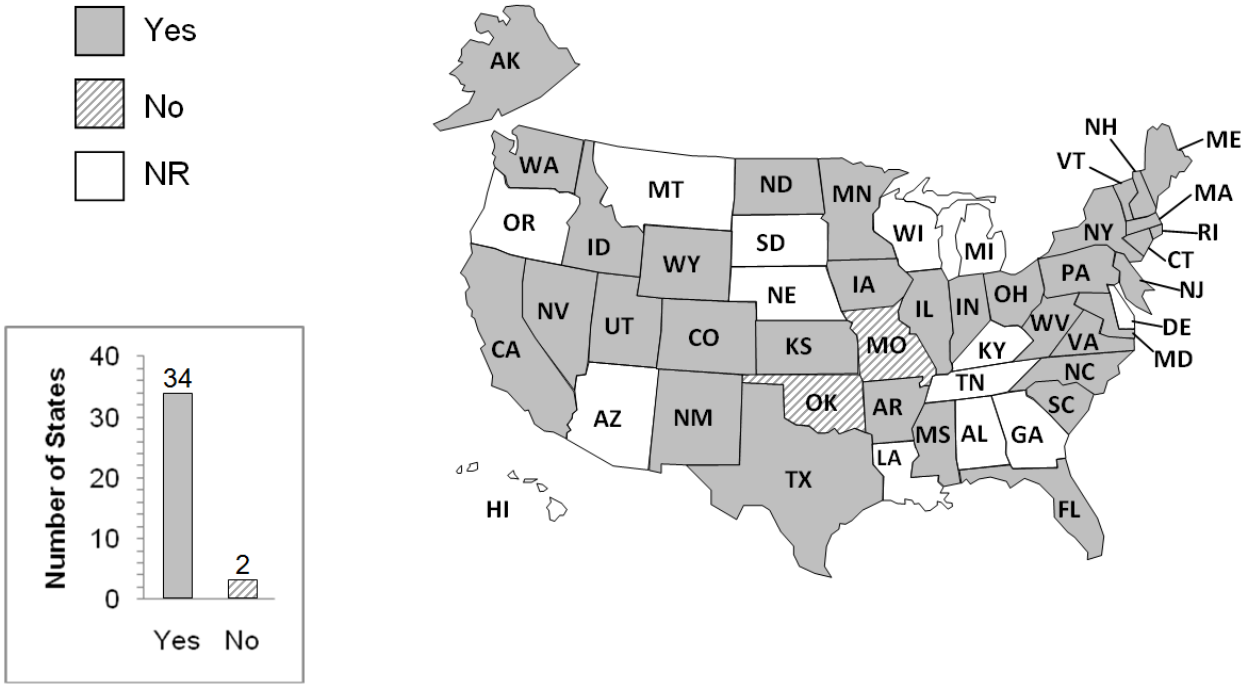


Figure 2a. Is green waste composting regulated at the state level in your state?

Figure 2b. Are there numerical thresholds that are used to distinguish various types of compostable wastes?

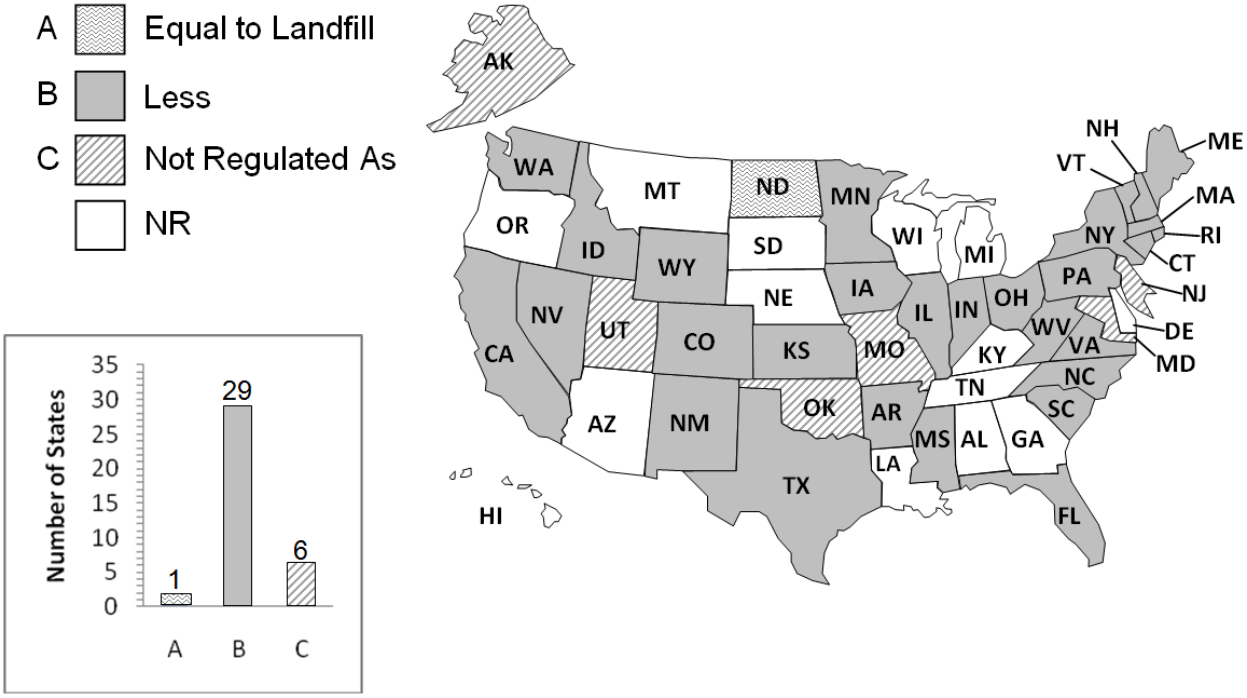


Figure 2c. What level of permitting is applied to green waste composting facilities?

Figure 2d. Is putrescible content quantified for regulatory purposes?

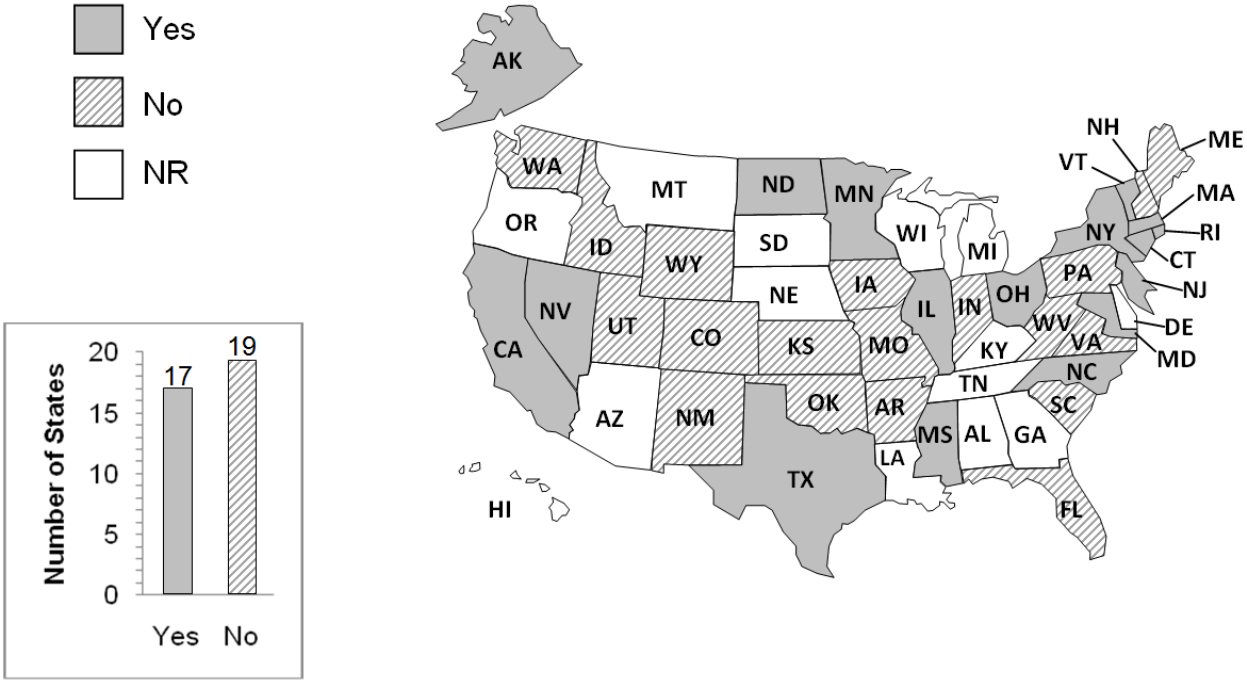


Figure 2e. Is residual content (or contaminant content) quantified for regulatory purposes?

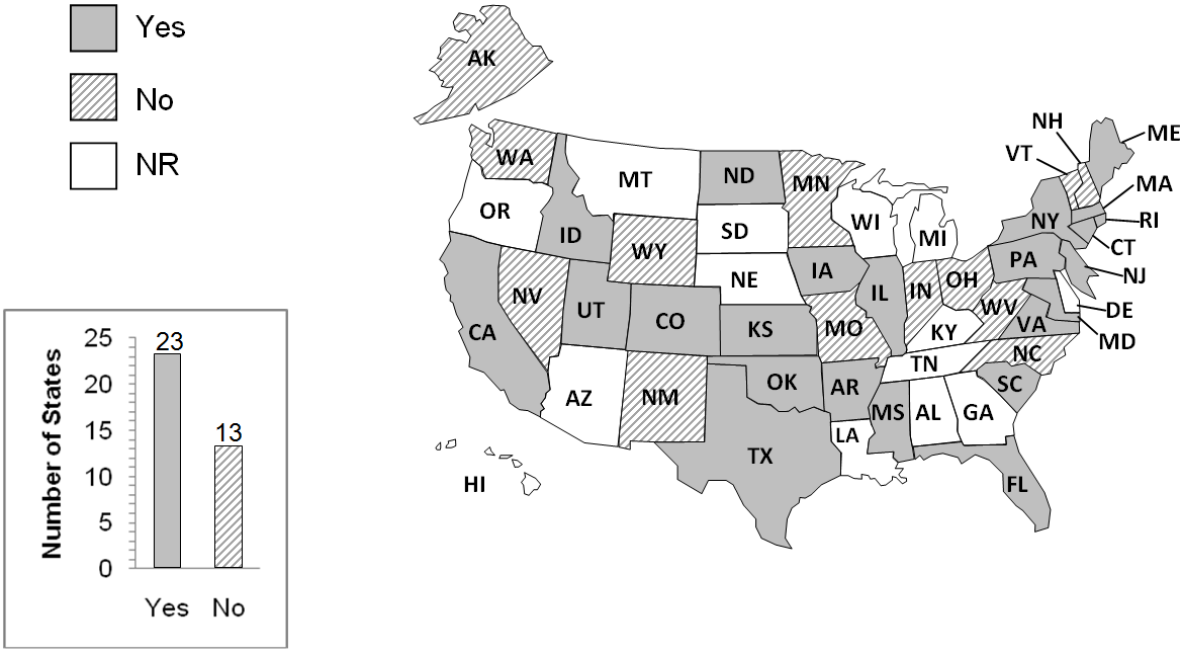


Figure 2f. Does your state have regulations related to the duration that materials can be stockpiled or stored on-site at a recycling facility?

Figure 2g. Are you satisfied with the current model of regulation?

Figure 2h. Are there standards addressing the composition or quality of waste that may be composted?

7. Site Visits

Current management practices used in California to comply with the Three-Part Test and green material contamination were evaluated based on site visits and discussions with LEAs. Data collected during the site visits were summarized in trip reports. The trip reports included information on Cal Poly team, LEA (if in attendance), and CalRecycle staff (if in attendance) data; date of visit; background facility information; capacity statistics; summary of operation; general observations; permit status; and operator's perspective on regulatory framework. Photographs also were presented to depict significant aspects of the recycling or composting operations. Some of the sites visited had recycling and composting activities. Examples of individual trip reports are included in Appendix D.

Recycling Facilities

The research team made site visits to 12 recycling facilities in California. Findings were analyzed with respect to meeting the individual requirements of the Three-Part Test. Source-separated material collection is common in California and all the facilities visited received such materials. However, one municipality (San Jose) had some collection routes that combined municipal solid waste with source-separated materials in a single collection vehicle due to difficulty with access

to neighborhoods with multiple collection vehicles. Even though the materials are source-separated by the generator, the combined delivery to the processing center effectively negates the original source-separation. Such a distinction is not present in the current regulations.

The residual content at the visited sites varied between approximately 5-22 percent with a common range between 15-20 percent. Therefore, the majority of the facilities did not meet the residual content requirement in the Three-Part Test. The variations in residual content were highly region specific as a function of public attitudes about recycling. As an example, based on discussions with a site manager in the San Francisco Bay Area, residual content varied significantly between two recycling processing centers under his management located in separate municipalities. The large difference in residual content was mostly attributed to differences in public awareness about recycling in the two communities and, in part, due to the presence of illegal poaching activities in one community. The residual content at the visited sites is determined by monitoring the outflowing materials and quantifying leftover materials sent to landfills subsequent to processing. The facilities all had scales for quantifying material flows on a weight basis. In a limited number of cases, operators conducted detailed load characterization of the incoming materials. This was conducted for establishing appropriate tipping fees, and not necessarily for regulatory compliance. The residual contents were determined frequently and materials flows reports were developed approximately monthly for the facilities to meet the requirements of the Three-Part Test. The residual content was monitored and quantified only at the fully permitted facilities and not at the sites with temporary permits. Even though a quantitative threshold is included for putrescible content in the Three-Part Test, the amount of putrescible materials was not monitored by the majority of the sites. Some of the operators were not familiar with the term putrescible. The research team observed only a single facility that attempted to quantify putrescible content. Operators expressed concern regarding perceived disparity in permit requirements between their own recycling operations and nearby illegal recycling operations and large-scale scrap metal operations. The operators believed that the other operations had similar public health problems and nuisance levels as their own operations.

All of the fully permitted facilities were large-scale operations and included indoor and/or outdoor processing locations. Both manual sorting and mechanized sorting equipment were used at all visited facilities. Stockpiling of materials was a function of space available at the facility. Stockpiling was kept to a duration of days or weeks at the fully permitted facilities, whereas at the temporary permitted site, the materials were being stored for extended periods of time (i.e., months) for speculative accumulation. The severe drop in the commodity markets in the past year caused higher inventory of stored materials due to limited demand for products at the facilities that had capacity for storage. The quality of outgoing materials was affected by market conditions in that the operators adjusted their processes to meet market demands (i.e., lower quality materials during periods of low demand and higher quality materials during periods of high demand).

Composting Facilities

The research team made site visits to nine composting facilities in California. Current management practices used in California to comply with the 1 percent green material contamination rule were evaluated based on-site visits. The two sites receiving only commercial wastes, Central Valley Agricultural Grinding, Inc. in Oakdale, and GS Brothers, Inc. in Carson,

indicated compliance with the green material contamination rule with relative ease due to the uniformity and quality of the incoming materials. Both sites were highly discriminating in selection of the operators that were allowed to bring green materials to their facilities.

The four sites receiving curbside waste, Community Recycling Lamont Compost Facility, Lamont ; Mt. Vernon Recycling and Composting Facility, Bakersfield; Agromin Green Material Composting Operation, Newhall; and Limoneira/Agromin Agricultural Composting, Santa Paula; all indicated compliance with the green material contamination rule. However, the operators expressed concerns regarding lack of specificity in the rule and inconsistency of visually based measurements associated with the rule. The Los Angeles County LEA, Pete Oda, commented that measurement of the contamination level was difficult. He also commented that local code enforcement at a collection site, with random sampling for residential green material bins, would be a better method of reducing green waste contamination than the green material contamination criterion used at a composting facility on incoming green wastes.

All of the sites visited had full-time inspectors visually checking each load entering the site for contamination. At all sites, except the Vernon Recycling and Composting Facility, Bakersfield, green material loads were unloaded, visually inspected, and contaminants were removed by hand. The Bakersfield facility utilized a mechanized sorting system with a trommel screen and a conveyor belt sorting line for front end processing prior to composting. This approach appeared to provide a superior raw material for composting. At the Community Recycling Lamont Compost Facility, Lamont, hand separation of contaminants was used followed by extensive screening after the composting process. The finished compost product was visually very uniform and appeared to be free of contaminants.

At the facilities that had both recycling and composting activities, the feedstock was highly variable, especially in comparison to the composting only facilities that were visited. The feedstock at these facilities did not meet the green material contamination rule. Most of the facilities maintained separate areas for processing of separated, sorted green material. At least one facility produced compost from leftover residual material (which essentially consisted on municipal solid waste) from sorting of recyclable materials.

8. Other States' Models and Methods

The research team analyzed how the other states' and countries' models and methods are applied in the state/country regulatory program identified. The analysis was based on content of state Web sites, survey results, discussions with state representatives, and site visits as well as technical literature and additional Web sites. State regulatory models and methods were analyzed and compared for any content based in science and engineering fundamentals, health or safety impacts, including cost and feasibility aspects as well as for additional features. Analysis of current management practices used in California to comply with the Three-Part Test and green material contamination threshold was conducted. A subset of surveyed states was selected for detailed analysis both for specific regulatory framework and for comparison to California. Analysis of how selected states' regulations compare to the state-of-the-practice in California is provided. Following the analysis of conditions in other states, the waste regulations in the

European Union (containing provisions for both recycling and composting) are presented. Significant aspects of the assessments of other states' and countries' models and methods include:

- Demographic data.
- Waste diversion.
- Specific regulatory thresholds.
- Region-specific regulatory schema.
- Differences with regard to geographic or demographic boundaries as well as environmental conditions for regulations (e.g., urban vs. rural, business vs. residential, dry vs. wet).
- Public vs. private infrastructure.
- Application of regulations in regards to front-end vs. back-end (i.e., inflow vs. outflow) regulatory enforcement.
- Presence of tiered regulatory methods for comparison to California methods.
- The overall economic structure for regulation (e.g., regulatory incentives for recycling, transformation, or composting).
- Entity responsible for regulatory compliance including generator, handler, transporter, and recycler.
- State fees and use of these fees towards promoting specific management practices.
- Education programs that are available and how recycling is promoted.
- Cradle-to-grave operations.
- Integrated approach for variability in type and amount of regulated materials.

In addition, an assessment of other states' recycling and composting regulations was conducted to determine whether and how (if applicable) the regulatory methods and models of selected states address current science, market dynamics, and new technologies. Furthermore, an assessment of other states' recycling and composting regulations was conducted to determine whether and how (if applicable) the models and methods identified for selected states included environmental and public health risk assessment components.

States for detailed analyses were selected based on various criteria: 1) presence of specific thresholds in regulatory framework, 2) to include states with a range of populations and assuring that states with large populations comparable to California are included, 3) discrete regulatory schema for recycled materials and green materials, and 4) better than average waste diversion rates. In addition, the regulations for the set of selected states include novel features as described further below. Selected states and the criteria used for selecting the states are presented in Tables 4 and 5 for recycling and composting, respectively.

Table 4. Selected States for Detailed Recycling Analyses

State	Presence of Specific Regulatory Thresholds	Large Population	Discrete Regulatory Schema for Recycling	Better Than Average Waste Diversion Rate
Arkansas	X		X	X
Florida	X	X	X	X
Massachusetts	X		X	X
Missouri	X		X	X
New Hampshire	X		X	X
New Jersey	X		X	X
New Mexico	X		X	
New York	X	X	X	X
Washington	X		X	X

Table 5. Selected States for Detailed Composting Analyses

State	Presence of Specific Regulatory Thresholds	Large Population	Discrete Regulatory Schema for Green Materials	Better Than Average Waste Diversion Rate
Arkansas	X		X	X
Colorado	X		X	
Florida	X	X	X	X
Illinois	X	X	X	X
New York	X	X	X	X
Oregon	X		X	X
Texas	X	X	X	

Recycling

The recycling rates (quotient of total tonnage recycled and total municipal solid waste generated) as reported in state survey responses ranged from approximately 2 percent (Utah) to 45 percent (Arkansas and New York). The states generally had three categories of regulations for recycling operations: no regulation, regulations for all operations, and intermediate regulations as a function of operational conditions. The parameters considered in the operational conditions included: size of facility, throughput of material, type of facility (e.g., transfer station versus recycling center), and type(s) of waste materials (e.g., Class A recyclables versus construction and demolition wastes). Data for California are included in all of the tables generated for recycling analyses for completeness and discussed in a separate section titled “Analysis Related to California.”

Application of Models and Methods

A summary of how recycling regulatory models and methods are applied in selected states is presented in Table 6. Overall, the regulations for recycling are developed to minimize impact to the environment or nuisance to nearby residents. Specific criteria related to science and engineering fundamentals, health or safety impacts, risk assessment, or cost and feasibility aspects have not been identified for other states based on the analysis of survey results, e-mail

and telephone correspondence with state representatives, and regulatory materials available online. The regulations use qualitative descriptions to address health, safety, and environmental protection aspects. Examples of such regulatory language for recycling are presented in Table 7.

Table 6. Analysis of Application of Recycling Regulatory Models and Methods from Selected States

State	Specific Recycling Regulatory Thresholds	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for recycling, transformation, or composting)	Entity Responsible for Regulatory Compliance Including Generator, Handler, Transporter, Recycler, etc.	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Recycling is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)
Arkansas	MRFs that engage in the handling and processing of non-putrescible, source-separated recovered materials are exempt from permitting (Ch 10).	Non-exempt MRFs are required to obtain a permit and must follow applicable regulations.	A recycling tax credit program is available for recyclers.	Handlers, transporters, and recyclers are regulated at the state level.	Taxpayers are allowed a 30% income tax credit for the purchase of processing equipment for recyclables.	Education programs for teachers, communities, and businesses.	Application for permit, operating plan, design criteria, and closure plan. (for transfer stations)
California	These facilities are exempt from articles 6.0, 6.1, 6.2, 6.3, and 6.35 of chapter 3: Buy-back centers, drop-off centers, and recycling centers that accept source-separated material, produce less than 10% residual, and produce less than 1% putrescible waste. Additional facilities	Depending on the amount of waste handled, facilities are either in a: not subject to regulations tier, excluded tier, notification tier,	Redemption values on bottles and cans, loans through the recycling market development program for businesses that use recyclable materials to produce new products, and	Handlers and recyclers are regulated at the state level.	Competitive grants are available to establish beverage container recycling and litter abatement programs, and to encourage market development	Web site offers information for consumers on how to recycle several different types of recyclable material.	Regulatory tier based on size, operating standards, and design requirements. (for facilities subject to 6.0, 6.1, 6.2, 6.3, and 6.35)

State	Specific Recycling Regulatory Thresholds	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for recycling, transformation, or composting)	Entity Responsible for Regulatory Compliance Including Generator, Handler, Transporter, Recycler, etc.	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Recycling is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)
California (con't.)	(e.g., metal scrap recyclers, rendering plants) are exempt.	registration permit tier, or full SWFP permit tier.	beverage container recycling grants.		and expansion for beverage container materials.		
Florida	Persons who handle recovered materials of quantities less than 600 tons per year are exempt from regulations of recovered materials (Ch 62-722).	Persons who are exempt are not required to obtain certification or registration.	Grants are available to facilities that are innovative in reducing MSW.	Recyclers are regulated at the state level.	Competitive grants are given to counties who have innovative programs related to recycling.	Web site offering information about recycling in local communities. There is also information for teachers and links to Web sites and books.	Application for permit, operating plan, construction requirements, and closure plan (only for operations permitted as solid waste facilities)
Massachusetts	Recycling drop-off centers, bottle bill handling operations, paper bailing and handling, and recycling	Certain recycling operations are not required to	Offer a redemption value on bottles and cans that can be	Generators, transporters, and recyclers are regulated at the state	Grants can be used for: education, MSW planning, and	Currently developing a comprehensive Education plan for all involved	Application for permit, operating plan, design plan, site

State	Specific Recycling Regulatory Thresholds	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for recycling, transformation, or composting)	Entity Responsible for Regulatory Compliance Including Generator, Handler, Transporter, Recycler, etc.	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Recycling is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)
Massachusetts (con't.)	operations do not need a site assignment or permit if: they receive presorted material, receive no more than 100 tpd of recyclable materials including incidental solid waste, facility is enclosed, and residue does not average more than 15% of weight during any quarter.	obtain a site assignment or permit.	reclaimed when recycled. Grants are also available.	level.	contracting for recycling.	in recycling.	assignment, closure plan, and post closure (only for solid waste facilities)
Missouri	"A recycling center" (any collection facility or system) "or drop-off collection point that accepts source-separated or commingled recyclable materials" are not required to obtain a permit	Recycling centers and drop-off collection points are either permitted or not permitted.	Competitive grants are available for recyclers.	Recyclers are regulated at the state level.	Fees collected at landfills can be used for grants to fund recycling.	There are some facts and tips on how to recycle.	Application for permit, operating requirements, design requirements, and closure plan (only for solid waste facilities)

State	Specific Recycling Regulatory Thresholds	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for recycling, transformation, or composting)	Entity Responsible for Regulatory Compliance Including Generator, Handler, Transporter, Recycler, etc.	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Recycling is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)
New Hampshire	No permit is needed to collect, store, or transfer unprocessed recyclables if: material is source-separated, material is stored in containers, and no more than 100 cubic yards is stored at the facility.	C/S/T facilities are either permitted or not permitted.	No economic incentives.	Generators and recyclers are regulated at the state level.	No economic incentives.	3rd party Web site available to direct citizens on how to recycle.	Application for permit, operating requirements, design requirements, and closure plan (only for transfer stations and recycling facilities that are not exempt)
New Jersey	No permit is required for Class A recyclables (metal, glass, paper, plastic containers, and corrugated and other cardboard) that are source-separated and non-putrescible.	Permits are issued by type of recyclable material.	Grants are available for recyclers.	Generators, handlers, and recyclers are regulated at the state level.	Recycling tonnage grants are available.	Public program to encourage recycling and links to other Web sites.	Application for permit, operating and design requirements, and closure plan (only for solid waste facilities)

State	Specific Recycling Regulatory Thresholds	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for recycling, transformation, or composting)	Entity Responsible for Regulatory Compliance Including Generator, Handler, Transporter, Recycler, etc.	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Recycling is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)
New Mexico	MRFs are permitted and recycling centers that accept source-separated materials and operate for greater than seven days are registered.	Depending on the operation, facilities are either permitted or registered.	Grants are available for various entities.	Transporters and recyclers are regulated at the state level.	Grants are available for recyclers.	State Web site has limited links to 3rd party Web site to inform citizens about recycling.	Application for permit, operating requirements, design requirements, closure plan, and post closure plan (only for recycling facilities that also accept solid waste)
New York	Recycling facilities are considered solid waste facilities, however operating requirements/permit/ registration requirements vary on size and type of facility (buy-back versus	Size and type of operation determines if a facility is registered or permitted.	Offer a redemption value on bottles and cans that can be reclaimed when recycled. Grants are available for recyclers.	Handlers and recyclers are regulated at the state level.	There are state matching grants for recycling infrastructure and coordination.	Pamphlets and Web sites available to the public about variety of topics related to recycling.	Application for permit, operating requirements, and design requirements (only for transfer stations)

State	Specific Recycling Regulatory Thresholds	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for recycling, transformation, or composting)	Entity Responsible for Regulatory Compliance Including Generator, Handler, Transporter, Recycler, etc.	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Recycling is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)
New York (con't.)	MRF). Recycling facilities must handle less than 15% residual content to remain only registered. Returnable beverage container redemption operations and buy-back centers are not subject to 360-12.						
Washington	In order for a facility to be exempt from a solid waste handling permit, the facility must: accept only source-separated material, allow inspections, and submit annual reports. MRFs must not exceed 5% residual by weight per year or 10% per load.	Facilities are either permitted or not permitted – no tiered structure aside from exemption status.	Grants are available.	Handlers, transporters, and recyclers are regulated at the state level.	There is a coordinated prevention grant program that is used to help local governments develop their solid waste management plan.	State Web site has limited links about recycling.	Application for permit (except exempt facilities), operating and design requirements, and closure plan (all facilities must meet these performance standards)

Table 7. Examples of Qualitative Descriptions in Recycling Regulations

State	Regulatory Language	Referenced Section from Regulations
Arkansas	MRF must be operated so that animals are not attracted and any other nuisances must be prevented.	Reg.22.1002 (d)
California	(a) The operator shall take adequate measures to minimize the creation, emission, or accumulation of excessive dust and particulates, and prevent other safety hazards to the public caused by obscured visibility	17407.4(a)
Florida	"Recovered materials" means metal, paper, glass, plastic, textile, or rubber materials that have known recycling potential, can be feasibly recycled, and have been diverted and source-separated or have been removed from the solid waste stream for sale, use, or reuse as raw materials, whether or not the materials require subsequent processing or separation from each other, but does not include materials destined for any use that constitutes disposal.	62-701.200(95)
Massachusetts	Facility is exempt from siting if: "carried out in a manner that prevents an unpermitted discharge of pollutants to air, water or other natural resources of the Commonwealth and results in no public nuisance".	16.05 (3)
Missouri	To be exempt from permitting, a facility must also not create: pollution, a public nuisance or a health hazard.	(9) Permit Exemptions.
New Hampshire	Waste cannot be stored at a C/S/T facility, which results in conditions that affect the environment, public health, attract insects, or produce vectors.	Env-Sw 408.06 (e)
New Jersey	Recycling property needs to be free of litter and debris so that mud is not tracked onto local streets. Facility must operate with respect to local ordinances in accordance with noise and dust standards.	§ 7:26A-4.1 (iii(8))
New Mexico	Facilities must show how they will "not create a nuisance, harbor vectors, or create a public health hazard".	20.9.3.27 (D.4.e)
New York	Solid waste facilities must have ways to control: dust, vectors, odor, and noise.	§360-1.14 (k,l,m,p)
Washington	A facility must comply with pollution controls.	WAC 173-350-040

Numerical thresholds were provided in the regulatory schema. The limits included were round numbers with several examples presented in Table 6. No states were identified that had region-specific regulatory schema (e.g., urban versus rural, business versus residential, dry versus wet). Washington has provisions where local health agencies can impose specific local requirements (based on survey response). Other than this case, all selected states had a single statewide set of regulations.

Web-based analysis indicated that both public and private infrastructure exists for the recycling industry. Recycling operations are performed both by public and private entities.

The survey results indicated that front- and back-end regulatory enforcement included determination of amount of incoming and outgoing materials, except for Wisconsin, which reported additionally regulating quality of outflow to maintain levels consistent with market conditions (enforced by judgment or repeated rejected loads by buyers). Based on discussions with state representatives in Wisconsin, such enforcement is not common.

Amount of incoming and outgoing materials are quantified on a weight and/or volumetric basis. All selected states require annual reports to be submitted. For the surveyed states, weight-based measurements are more common than volumetric measurements. The selected states have a range of measurement requirements. Regulatory models of the selected states have requirements for only inflow measurements (Massachusetts, New Jersey), only outflow measurements (Florida), and both inflow and outflow measurements (Arkansas, Missouri, New Hampshire, New Mexico, New York, and Washington). The categories of materials measured are total (Massachusetts and Missouri), total and "other" (New Jersey), and individual constituents of materials (e.g., paper, plastic, metals, glass) [remaining six selected states]. Arkansas and New Hampshire require both weight and volume measurements. Select outgoing materials are also monitored in Missouri (scrap tires), New Mexico (electronics, green waste, oil, tires, batteries), and New York (comingled recyclables, electronics, other materials). Problems arise when conversions are made between weights and volumes without discrete measurements of both quantities. Based on survey response, Washington provides a volume to weight conversion, but does not require its use. Based on follow-up phone call, New Mexico has challenges with these conversions as many of the local jurisdictions do not have scales for conducting weight measurements.

Tiered regulatory structures were determined to be common in other states. These include permit exemption for relatively clean operations, small operations, specific material streams, and enclosed facilities. Seven of the nine selected states specifically require source-separated (or pre-sorted) materials to qualify for permit exemption. Two of the selected states limit size of operations for exemption: 600 tons/year in Florida; 100 tons per day of presorted recyclable materials, enclosed operations, and less than 15 percent residual on a quarterly basis in Massachusetts. Type of material handled affects permit status (e.g., Class A recyclables that are non-putrescible and source-separated are exempt in New Jersey, whereas New Mexico distinguishes between MRFs, which require a permit, and recycling centers, which are registered). Further details of the tiered systems (in addition to material provided in Table 6) are provided in Table A-5.

The entity responsible for regulatory compliance at state level, as summarized in Table 6, includes recyclers (most common – regulated for all selected states), transporters (Arkansas,

Massachusetts, New Mexico, Washington), handlers (Arkansas, New Jersey, New York, Washington), and generators (Massachusetts, New Hampshire, New Jersey). In Massachusetts, generators are regulated such that they cannot dispose of banned materials and transporters are regulated such that they cannot contract to haul banned materials. In New Hampshire, a generator is defined as someone who processes recyclables that will be reused and therefore must follow regulations. In New Jersey, generator means any person, or entity, whose act or process produces waste or recyclable materials and are required to sort-separate recyclables. The definition of generator in New Jersey includes homeowners and businesses. A discussion with a state representative indicated that enforcement in New Jersey occurs at the local level and such enforcement rarely occurs for businesses or homeowners. In New Mexico, commercial transporters must register, however exemptions are available. In Washington, permits are required for transporters who haul recyclable materials over public highways. Washington maintains regulatory provisions for transport of recycled materials including detailed recordkeeping requirements for each load, prohibition of disposal of recycled materials, and provisions for financial penalties. In addition, Washington regulates state agencies, which are under an executive order from the governor to recycle. Missouri regulates handlers of scrap tires (including hauler, collection site, and processors).

The regulatory models and methods of the selected states include integrated approaches to account for variability in the type and amount of regulated materials. The tiered permit structure described above provides different regulatory levels (e.g., permit types) for different scales of operations. The models also contain specific regulatory thresholds (Table 6) related to quality of material being processed (e.g., source-separated materials, residual content).

For enforcement of regulations, New Hampshire, New Mexico, New York, and Washington administer fines for violations. The penalty can escalate to revocation of permit for serious or repeated violations.

Bottle bills and permitting fees provide funds towards recycling efforts. Of the selected states, New York is the only state that does not charge fees for permit or operating under a permit.

Based on survey responses and searches of state Web sites, educational programs and grants programs are common. Summaries of the programs are outlined in Tables 8 and 9. Education programs are available in all selected states. These range from Web sites devoted to recycling information, to links to third party Web sites, to full programs for teachers, communities, and businesses (Table 8). A rating is provided for each state in Table 8. The ratings are based on a scale of 0 to 10. A rating of 10 indicates a strong educational program, with educational content available directly through a state-sponsored Web site. For educational programs, a state that has a rating of 7 to 9 does not have a comprehensive list of links and/or their Web site is not highly accessible (i.e., user friendly) as a state with a rating of 10. A state with a rating of 4 to 6 does not have a highly accessible Web site and they do not publish educational information on their own Web site, rather they rely on third party Web sites to provide information to their citizens. Lower ratings would indicate limited or no educational content available at the state level. Arkansas, Massachusetts, and New York have the strongest educational programs. The selected states do not offer educational programs for recycling operators. However, New Jersey offers a certified recycling coordinator training program. The selected states all have some educational content intended for public awareness about recycling.

For grants programs (Table 9), ratings are also provided and based on a scale of 0 to 10. A rating of 10 indicates a strong grants program, with funds available from the state for a wide variety of recycling related activities. A state that has a rating of 7 to 9 does not offer as many opportunities for grants as does a state with a rating of 10. Lower ratings would indicate limited grant programs available at the state level. A rating of 0 means the state does not have an existing grant program. The ratings were based on the variety of applications the funds could be used for and not on the number of grants offered or the amount of funds available. The numbers of grants and total funds available varied considerably. Arkansas, Massachusetts, New Mexico, and New York had the most highly rated grant programs. New Hampshire currently has no recycling grant programs.

Table 8. Summary of State Recycling Educational Programs

State	Educational Program	Program Rating	State Diversion Rate[1]
Arkansas	State Web site has a variety of educational programs available for teachers, communities, and businesses. The state will develop a custom presentation if requested. There are no educational programs for the operators of recycling facilities.	10	44.6
California	State Web site has information on how to start a recycling program for businesses, gyms, and schools. Web site also has information for recycling construction debris, electronic waste, plastic, and used oil. California has links to a variety of topics for operators of recycling facilities.	10	58
Florida	State Web site has curriculum for educators and links to third party Web sites for further information about recycling. There are no educational programs for the operators of recycling facilities.	9	28
Massachusetts	State Web site has information on recycling for both adults and children. There also are links and phone numbers available to non-profit recycling organizations. There are no educational programs for the operators of recycling facilities.	10	28.9
Missouri	State Web site contains only basic information about recycling and links to third party Web sites for further information about recycling. There are no educational programs for the operators of recycling facilities.	6	46
New Hampshire	State Web site only has links to third party Web sites that are not easily accessible to the general public for obtaining detailed information on recycling. There are no educational programs for the operators of recycling facilities.	5	20.4
New Jersey	State Web site has technical information about recycling and specific information for educating	7	57.3

State	Educational Program	Program Rating	State Diversion Rate[1]
	children. The DEP sponsors a certified recycling coordinator training program, the program was the first of its kind in the U.S.		
New Mexico	State Web site contains only basic information about recycling and links to third party Web sites for further information about recycling. There are no educational programs for the operators of recycling facilities.	6	11.0
New York	State Web site has a large selection of links that are distributed among the 3 R's, school materials, business materials, and several other categories. There are no educational programs for the operators of recycling facilities.	10	48
Washington	State Web site has a few links that could be helpful to its citizens. There are no educational programs for the operators of recycling facilities.	6	38

[1]Diversion rates obtained in 2009 from state Web sites.

Table 9. Summary of State Recycling Grant Programs

State	Recycling Grant Program	Program Rating	State Diversion Rate[1]
Arkansas	The DEQ provides grants every year to cities, counties, and solid waste authorities to help develop and support recycling programs. The DEQ provides more than $3 million in grants each year. The amounts that have been provided in the past range from $1,000 to $100,000 annually, and these funds are applied to covering expenses associated with recycling equipment and recycling programs.	10	44.6
California	Programs are available to support curbside recycling, neighborhood drop-off efforts, public education, litter prevention, and beverage container recycling. Grants totaling $1.5 million were given out for 2008/2009 year.	10	58
Florida	The DEP provides grants on a competitive basis for innovative recycling programs. With this framework, a recycling facility with typical operations may not be eligible for grants. In 2008, there were 33 proposals totaling $10.7 million. In recent years, all proposals have been funded, however the legislature was only able to allocate $2.0 million for 2008.	8	28
Massachusetts	Grants are available to cities, towns, schools, and certain government entities to provide financial and technical assistance. Grants were given to a large number of municipalities in 2008 for a variety of items totaling more than $950,000. In addition to the financial support, up to 80 hours of technical assistance can also be requested by each grantee.	10	28.9
Missouri	Grants provide financial assistance to residents to create reduction and recycling projects. There were 32 projects selected to receive financial support in 2005 totaling more than $1.6 million. In the 13 years that the grant program has been operating, 390 projects have been funded.	8	46
New Hampshire	No recycling grants are available at this time.	0	20.35

State	Recycling Grant Program	Program Rating	State Diversion Rate[1]
New Jersey	There is a recycling tonnage grant program available to municipalities. A $3.00 per ton tax is collected on all solid waste disposed. Approximately 60% of the funds collected through this tax are distributed through the annual recycling tonnage grants program. More than $14.5 million was distributed in 2007.	7	57.3
New Mexico	Grants are available to various organizations that will increase access to recycling and develop recycling programs, education, or infrastructure. A $250,000 pool is available for 2009 with a limit of $50,000 per grant.	10	10.96
New York	Grants are available for capital projects that enhance recycling infrastructure, however there is no mention of grants being used to enhance public awareness. From 1994 to 2007, $83 million was appropriated to the program with an additional $50 million from the Clean Water/Air Act. Over the life of the program, 750 grants have been issued.	9	48
Washington	Grants are used to develop and implement solid waste management plans, which can contain recycling components. The Coordinated Prevention Grant program issued $5 million in total grants in the 2009-2010 offset cycle with more than $800,000 funding waste reduction, recycling, and planning.	7	38

[1]Diversion rates obtained in 2009 from state Web sites.

The variability in education and grants programs can be partly attributed to variations in recycling tonnages and populations, however strong correlations do not exist between the program ratings and state populations. In addition, the program ratings are not highly correlated to the waste diversion rates in the states. Overall, the states that had high ratings for educational programs also had high ratings for grant programs. However, the strong educational and grant programs did not directly transfer into higher diversion rates.

Cradle-to-grave operations (i.e., provisions for appropriate siting, design, operation, closure, and post-closure of facilities) are in place in all selected states for regulated facilities. New Mexico is unique in requiring a post-closure plan. Exempt facilities have some requirements in relation to cradle-to-grave operations. Specifically, all selected states except New York require that non-permitted facilities maintain operational standards. In addition, design plans are required for exempt facilities in Missouri, New Hampshire, New Jersey, and Washington; construction plans are required for exempt facilities in Washington; and closure plans are required for exempt facilities in New Hampshire and Washington.

Three of the selected states indicated in survey responses that they are in the process of updating their regulations. New directions for the regulations include: better clarifying how regulatory requirements apply to evolving technology such as anaerobic digesters (Massachusetts), further developing beneficial reuse regulations (New Jersey), and moving to permit-by-rule approach (New York).

Specific Features of Recycling Regulations

Specific features are identified in regard to regulations for recycling. Based on survey responses, we determined that a wide range of practices is used in relation to the duration that materials can remain on-site (Table 10).

Table 10. Summary of Regulations Related to Storage of Materials On-Site

State	Storage Duration for Recycled Materials On-Site	Referenced Section from Regulations
Arkansas	The owner or operator must be able to demonstrate that substantially all of the incoming materials at the facility are sold, used, or reused within one year	Reg.22.1002-Material Recovery Facilities
California	No regulations for the duration of storage of recyclable materials on-site.	N/A
Florida	A majority of the recovered materials at a facility is demonstrated to be sold, used, or reused within one year.	62-701.220(2)(c)
Massachusetts	For purposes of 310 CMR 16.05, speculative accumulation shall be presumed to occur if materials, whether in their as-received, in-process or processed condition, are stored for more than 90 days from the date of their receipt at the recycling operation. This time limit may be exceeded in the case of storage of a processed material pending accumulation of a transportable load (one full truck load).	16.05(3)(d)
Missouri	Applies to permitted solid waste facilities (non-permitted facilities do not have a regulation on the duration of recyclable material): Materials for recycling or resource recovery from a solid waste processing facility shall be properly stored to prevent vector or aesthetic problems or transported to another solid waste processing facility for further processing or sale.	10 CSR 80-5.010(9)(C)
New Hampshire	Materials destined for recycling shall be collected and stored in a manner as to preserve the market value of the material.	405.02(d)
New Jersey	Unprocessed recyclable materials, post-consumer materials, and used or abandoned materials that are or will be deposited on or in the lands of the State for any period exceeding six months, including by stockpiling, staging or storing, are solid waste that shall be managed in accordance with the Solid Waste rules, *N.J.A.C. 7:26*,	7:26A-1.1(d)

State	Storage Duration for Recycled Materials On-Site	Referenced Section from Regulations
New Jersey (con't.)	unless the facility and/or materials are exempt or the operator has prior written permission.	
New Mexico	There are no specific time limits on the storage of recyclable materials. Records must be maintained to assure sufficient throughput at the facility by demonstrating "that after an initial accumulation period, the quantity of recyclable materials that were recycled during each successive calendar year was at least 75 percent of the quantity of recyclable materials in inventory; the accumulation period is to be based on a three year rolling average of the facility's stock of the recyclable material at the end of the previous calendar year."	State Survey Response and 20.9.3.29
New York	Nonputrescible recyclables may be stored for up to 60 days.	360-12.2(b)
Washington	No regulations for the duration of storage of recyclable materials on-site.	N/A

For the selected states, the allowable specified storage durations ranged from 60 days (New York), to 90 days (Massachusetts), to six months (New Jersey), to one year (Florida). Massachusetts does not allow "speculative accumulation" of materials, Missouri only imposes limits on permitted facilities, New Hampshire requires that materials are "actively managed," and New Mexico does not impose a specific duration limit except for cases causing a nuisance. In addition, New Mexico has a provision for throughput at a facility, which has implications for stored materials on-site. The three-year rolling average term for quantities in the New Mexico provision is updated annually and affects overall operations at a facility and does not explicitly restrict temporal variation in material flows. Both New Jersey and New York have provisions for longer periods of storage with permission/approval.

A summary of regulatory policies related to both residual material and putrescible material is presented in Table 11. Additional details are provided in Table A-6. The residual contents range from 5 percent for an entire year or 10 percent for single load (Washington), to 10 percent (Florida), to 15 percent (Massachusetts and New York). New Jersey has a provision for separate storage requirements of residual materials. For regulations related to putrescible materials, timing of storage is addressed in regulations in Arkansas (24 hours), New Hampshire (earlier of one week or presence of onset of noticeable odor), New Jersey (must begin processing on same day as receipt of material), and New York (seven days). None of the selected states indicated a specific numerical threshold for putrescible content limit. Massachusetts has provisions in their regulations for presence of "toxic substances," however, the regulations do not refer to "putrescible" materials.

Table 11. Summary of Regulations Related to Residual and Putrescible Contents

State	Residual Quantities for Recycling	Residual Storage/Disposal Requirements	Putrescible Quantities	Putrescible Storage/Disposal Requirements
Arkansas	De minimis	No longer than 24 hours unless in water tight container	De minimis	No longer than 24 hours unless in water tight container
California	10% by weight per month, some materials are exempt from this calculation	None for exempt facilities, seven days from receipt of material for limited volume operations (Notification level), 48 hours from receipt of material for medium and large volume facilities (Registration and full Permit level).	1% by weight per month	No specific mention, however would be included with residual requirements.
Florida	De minimis	None	De minimis	None
Massachusetts	15% by weight per quarter	Must handle material in an enclosed building or covered containers	Putrescible is combined with residue	Must handle material in an enclosed building or covered containers
Missouri	None	None	None	None
New Hampshire	None	Material can not affect the environment	None	Removed within one week
New Jersey	None	Removed within six months	None	Processing must begin on day of receipt
New Mexico	None	Material can not affect the environment	None	Putrescible is combined with residue
New York	Greater of 2 tons or 15% of average daily total intake (whichever is greater) based on a full year of	Two weeks	Putrescible is combined with residue	Removed within seven days

State	Residual Quantities for Recycling	Residual Storage/Disposal Requirements	Putrescible Quantities	Putrescible Storage/Disposal Requirements
	operation			
Washington	5% by weight per year or 10% by weight per load	None	Putrescible is combined with residue	Control nuisance odors

Based on survey responses, all selected states except Arkansas, Florida, and New Mexico have special regulations for beneficial reuse. An example is an increased tire allowance for a facility that is using tires for septic systems in Missouri.

Based on survey responses, economic and business aspects are addressed in both Washington and New York. In Washington, all new rules and regulations undergo fiscal impact analysis including economic principles. In New York, small business impacts, job impacts, environmental quality impacts, coastal assessment rural impacts, and in the future, climate change impacts, are included in development of regulations.

Problems with regulations reported by the states in survey responses and follow-up phone calls include understaffing of local permit and enforcement offices (Washington), problems with self-reporting due to inconsistencies (Washington), a desire to include self-reporting (New Hampshire), and limited breadth of application of regulations in New York (e.g., facilities that receive materials are regulated, however, the act of separation is a generator/hauler function and the regulations do not cover these aspects).

A summary of the significant relevant attributes of the regulatory models for the selected states is provided in Table 12. The attributes included in the table are: permit exemption threshold, residual material threshold, putrescible material regulation, storage of materials, entity responsible for compliance at the state level, education program rating, grant program rating, and state diversion rate. Permit exemption thresholds were highly variable and ranged from no exemptions to combined requirements of material type, facility throughput, facility design, and limited residual content. In most cases, regulatory oversight was not provided for residual material threshold or putrescible material content. For cases with residual material thresholds, the limits varied from 5-15 percent. For cases with putrescible material regulations, duration of storage and handling of putrescibles were regulated rather than quantity of putrescibles. The storage durations for processed materials were highly variable between the selected states. Allowable storage times ranged from 60 days (most strict) to longer durations (90 days, 6 months, 1 year), to qualitative descriptions (e.g., preventing speculative accumulation, actively managed material), to no regulations on duration of storage. The entity responsible for regulatory compliance at the state level included recyclers in all selected states. Several of the selected states also have regulations for generators, transporters, and/or handlers of the recycled materials. The educational and grant programs were rated based on the accessibility of materials and funding as well as the flexibility for which these resources can be used. The variation in ratings was

significant, although the quality of these programs was determined not to be highly correlated to the reported state diversion rates.

Table 12. Summary of Recycling Regulations in Selected States

State	Recycling Permit Exemption Threshold	Residual Material Threshold	Putrescible Material Threshold	Duration of Storage of Processed Materials	Entity Responsible for Regulatory Compliance at State Level	Educational Program Rating	Grant Program Rating	State Diversion Rate[1]
Arkansas	Non-putrescible, source-separated	De Minimis	De Minimis	1 year	Handlers, transporters, and recyclers	10	10	44.6
California	Source-separated, 10% residual, and 1% putrescible, some facility types exempted (e.g., scrap metal recycling)	10% by weight per month	1% by weight per month	No duration restriction	Handlers and recyclers	10	10	58
Florida	600 ton/year	De Minimis	De Minimis	1 year	Recyclers	9	8	28
Massachusetts	Presorted, less than 100 ton/day, enclosed operation, less than 15% residual	15% by weight per quarter	Combined with residue	90 days	Transporters and recyclers	10	10	28.9
Missouri	Source-separated material	No regulation	No regulation	Restriction for permitted facility – no specific duration	Recyclers	6	8	46
New Hampshire	Source-separated, material is stored in	No regulation	No regulation	Stored in a manner as to preserve the market value of	Recyclers	5	0	20.4

State	Recycling Permit Exemption Threshold	Residual Material Threshold	Putrescible Material Threshold	Duration of Storage of Processed Materials	Entity Responsible for Regulatory Compliance at State Level	Educational Program Rating	Grant Program Rating	State Diversion Rate[1]
New Hampshire (con't.)	containers, and no more than 100 yd^3 is stored at the facility.			the material				
New Jersey	Non-putrescible Class A recyclables (metal, glass, paper, plastic containers, corrugated and other cardboard)	No regulation	No regulation	6 months	Generators, handlers, and recyclers	7	7	57.3
New Mexico	No exemptions (source-separated materials are registered instead of permitted)	No regulation	No regulation	No specific duration, however a 75% throughput of material on 3-year rolling average is required	Transporters and recyclers	6	10	11.0
New York	Registration applies if less than 15% residual content, otherwise permitted	The greater of 15% or 2 tons by weight per day over a daily average based on a year	Combined with residue	60 days	Handlers and recyclers	10	9	48
Washington	Source-separated material, allow	5% by weight per year or 10% by	Combined with residue	No limit on duration for nonputrescible	Handlers, transporters, and recyclers	6	7	38

State	Recycling Permit Exemption Threshold	Residual Material Threshold	Putrescible Material Threshold	Duration of Storage of Processed Materials	Entity Responsible for Regulatory Compliance at State Level	Educational Program Rating	Grant Program Rating	State Diversion Rate[1]
Washington (con't.)	inspections, not exceed 5% residual by weight per year or 10% per load, and submit annual reports.	weight per load		materials				

[1]Diversion rates obtained in 2009 from state Web sites.

Analysis Related to California

The details related to California recycling regulations are provided in the Tables 6-12 to provide direct comparison to other states. The states that regulate recycling generally have a similar structure to California for regulatory framework. Overall, the regulations include provisions for permit applications, design and operations plans, and closure plans. Washington has specific regulatory requirements that are similar to the Three-Part Test. The recycling regulations in Washington require an operation to accept only source-separated material, allow inspections, and not exceed 5 percent residual by weight per year or 10 percent per load. Washington's regulations are more stringent in relation to residual level, but do not address putrescible content, as does the Three-Part Test. Other states that have provisions for limits on residual contents include Florida (10 percent de minimis solid waste) and Massachusetts and New York (both of which maintain a 15 percent residual limit in their regulations). California has exclusions for some materials for the calculation of residual content (e.g., material received at buy-back or drop-off centers, construction and demolition materials, compost feedstock, and sewage sludge). New York and Texas both mention nonputrescible materials in their regulations, but do not quantify tolerance limits. The source-separated aspect of the Three-Part Test is common in establishing permitting levels in other states as described in this report.

Numerous states use tiered regulatory systems that are a function of waste stream and facility operations. The activities eligible for exemption status are similar in California and other states and include requirements for siting, design, operating standards, record keeping, fees, and permitting (if applicable). The requirements that need to be met for a facility to be exempt from regulations in California (e.g., source-separated material, less than 10 percent residual material, less than 1 percent putrescible material) are more stringent than requirements in most other states investigated. As described in this report, numerous states have models with exemptions, registrations/notifications, and permits. The terminology used for the tiered methods varies considerably, but the underlying effect remains the same for these models. Texas has the most similar model compared to California, including exemption, notification, registration, and permit levels of regulation. Various material processing operations including auto dismantlers, auto shredders, buy-back centers, drop-off centers, regional produce distributors, rendering plants, scrap metal recyclers and dealers, wire choppers, and wood, paper, or wood product manufacturers are exempted in California regulations. These facilities are not required to meet requirements set forth in recycling/solid waste facility regulations.

Outgoing recycled material storage is regulated in most of the selected states. The provisions range from specified durations (e.g., 90 days in Massachusetts, one year in Florida) to moving average throughput requirement (New Mexico) to descriptions related to quality (maintain market value in New Hampshire) to no limit (e.g., California, Washington). California has duration limits for storage of residual materials (48 hours or seven days, depending on scale of operation).

Inflow and outflow regulations are common throughout the U.S. Quantities (weights and/or volumes) of both incoming and outgoing materials are required to be monitored by the majority of the investigated states.

Similar to California, other states have single sets of regulations for the entire state. Regulations that address new and alternative technologies, current science, market conditions, and stability of changing markets are similar across the states studied in that these topics are not focused upon in

the regulations. Health and safety aspects are included using qualitative descriptions and terminology as described above without providing specific/quantitative actions/procedures.

Education and grants programs for recycling are common across the U.S. Recycling facility operators in California indicated specific needs for better education of the public regarding recycling as well as a need for more comprehensive programs for advancing recycling technologies (i.e., more grant programs for investigating innovative recycling techniques).

Of the selected states, all describe their regulatory framework for recycling operations as prescriptive, with the exception of Arkansas and Massachusetts, which describe their regulations as performance-based. Prescriptive regulatory framework is consistent with California's framework.

Current Science, Market Dynamics, and New Technologies

Based on the survey responses, investigation of published regulations, and telephone and e-mail correspondence with state agency representatives, the research team determined that no rigorous current science, market dynamics, and new technology aspects were included in the development of state regulations for recycling. The regulations can be interpreted to having some scientific basis, but a systematic scientific method for developing the regulations is lacking. Current science has not been incorporated in recycling regulations as described in this report. Several of the states referenced environmental regulations within the waste regulations. These related to state air and water quality standards. Most of the states, though, retained qualitative descriptions within the recycling regulations that the operations must prevent nuisances, odors, vectors, etc.

The regulatory provisions for stability (i.e., stability with changing markets) of outflow or outgoing products after processing were similar in all selected states for recycling as little was reported for regulating quality of outgoing materials. Specifically, Wisconsin has regulations to assure that quality of outflow is maintained at levels consistent with market conditions (287-07, Section 7). Wisconsin is not included in the list of selected states, however is included in this analysis due to this unique feature in their regulations. In follow-up discussion with a Wisconsin representative, it was determined that enforcement of outgoing material quality is not common, but having regulations provides the state with an enforcement option for problematic operators. Recycling regulations generally have not been designed to control the quality of outgoing materials. The quality of the materials is driven by economic markets. The economic factors result in fluctuations in the quality of the outflow. Modifications in recycling operations to adjust outflow quality may potentially affect the environmental and health risk impacts of these operations. However, analysis of such potential impacts or provisions for such potential impacts have not been included in regulatory schema or in scientific literature.

Similar to quality of outflow, the effects of price of outflow have not been included directly in recycling regulations. A higher price will allow the operators to dig deeper into the mixture to get more material out of waste (or get higher quality product by removing more contaminants). We heard this from various operators during site visits in California. This additional processing will have environmental consequences and public health and safety (as well as worker safety) implications. Therefore, price changes result in changes in quality of outflow and potential changes in the environmental and health risk impacts of recycling operations.

Very limited information is provided in regards to new technologies and alternative treatments in recycling regulations. In general, regulations do not have specific provisions related to type of technologies to be used by operators. The limited inclusion of technology specifics in regulations neither precludes nor promotes the use of new technologies, resulting in a generally flexible regulatory framework in this regard. Numerous states offer grant programs, which specifically promote adoption of new equipment and processes. No states specifically mentioned new (i.e., alternative) technologies within their recycling regulations. Several states had separate regulations for alternative waste management technologies. In general, the regulations for recycling operations were less strict than for other methods of waste management, as determined specifically using the survey data.

Several states indicated in survey responses the use of science and engineering principles and science-based risk assessment in the development of their regulations. However, in depth examination of the regulations generally did not provide specific use of current science, market dynamics, and new technology aspects or risk assessment for environmental and public health and safety protection in the development of the regulatory criteria or for use in enforcement of regulations. As an exception, new composting regulations adopted in Oregon in fall 2009 include use of risk assessment tools for assessing composting facilities and permitting decisions.

Environmental and Public Health Risk Assessment

Based on the survey responses, investigation of published regulations, telephone and e-mail correspondence with state agency representatives, the research team determined that no rigorous risk assessment for environmental and public health aspects were included in the development of state regulations for recycling. Several of the states referenced environmental regulations within the waste regulations. These related to state air and water quality standards. Most of the states, though, retained qualitative descriptions within the recycling regulations that the operations must prevent nuisances, odors, vectors, etc.

Composting

Application of Models and Methods

Data for California are included in all of the tables generated for composting analyses for completeness and discussed in a separate section titled “Analysis Related to California.” A summary of how compost regulatory models and methods are applied in selected states is presented in Table 13. Overall, the regulations for composting are developed to minimize impact to the environment or nuisance to nearby residents. The regulations are not based on detailed scientific analyses and are written using qualitative descriptions. Examples of such regulatory language for composting are presented in Table 14.

Table 13. Analysis of Application of Composting Regulatory Models and Methods from Selected States

State	Specific Composting Regulatory Thresholds	Application of Regulations in Regards to Front-End vs. Back-End (i.e., inflow vs. outflow) Regulatory Enforcement	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for composting)	Entity Responsible for Regulatory Compliance	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Composting is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)	Regulation by Feedstock Type and/or System Throughput (i.e., size of operation)
AR	Regulations apply to yard waste, source-separated organic wastes and other solid waste that may be approved by the Department Less than 50 ton/yr or 500 yd^3/yr^e Other permit exemptions for exclusively nurseries, animal facilities,	Inflow establishes facility type, outflow quality regulated and labels required	3 types of feedstock identified and 3 types of facilities are permitted as a function of material stream 3 tiers (exempt, permit, general permit)	Grants are available	Composter	Cities, counties, and solid waste authorities may apply for grants for composting equipment and education and awareness	Information available on state Web site to inform citizens about the composting process and troubleshooting	Application for permit, operating plan, and closure plan required	Both

State	Specific Composting Regulatory Thresholds	Application of Regulations in Regards to Front-End vs. Back-End (i.e., inflow vs. outflow) Regulatory Enforcement	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for composting)	Entity Responsible for Regulatory Compliance	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Composting is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)	Regulation by Feedstock Type and/or System Throughput (i.e., size of operation)
	and beneficial use								
CA CA	< 500 yd^3 capacity[e], <1000 yd^3 given away or sold[e], <50 yd^3 capacity within-vessel[e], storage of bagged compostable material which are <5 yd^3 [e], <12,500 yd^3 capacity only required to notify EA	Inflow establishes regulatory tier, outflow quality regulated	Exempt, Notification to EA, Registration, Permitted	No economic incentives to encourage composting	Composter, handler	Grants for LEAs to help fund waste facilities permit and inspection program. Reuse Assistance grants promote reuse concept to local business community	State Web site provides strategies for community outreach programs to be implemented at the local level along with information that explains food waste composting and general information on composting	Application for permit, operating plan, and notification of site restoration following few guidelines	Both
CO	Less than 100 yd^3 capacity,	Inflow establishes facility type,	3 tiers (exempt, notification	Grants are available	Composter	The Recycling Resources	No education available from the state about	Application for permit, operating	Both

State	Specific Composting Regulatory Thresholds	Application of Regulations in Regards to Front-End vs. Back-End (i.e., inflow vs. outflow) Regulatory Enforcement	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for composting)	Entity Responsible for Regulatory Compliance	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Composting is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)	Regulation by Feedstock Type and/or System Throughput (i.e., size of operation)
	exclusively yard and landscape waste, agricultural operations (with conditions), handling and bagging operations, and wastewater plants with biosolids[e] Greater than 10,000 yd^3 [c]	outflow quality regulated	and certificate of designation), 3 types of feedstock defined and 5 types of facilities are permitted as a function of material stream and size of operation			Economic Opportunity Act allowed grants to be given out to projects that promote "recyclable materials that would otherwise be treated as discards"	compost	plan, closure plan, and post-closure plan required	
FL	Varies by Class[b] Every 20,000 tons or every 3 months, whichever	Outflow quality regulated. Multi-level classification system for compost	No tiered system, composting operations are permitted with some	Grants are available.	Composter	$1000/yr There is a solid waste grant program that allows all solid	There are publications on the composting Web site devoted to the basics of what it is and how it works, the quality of it, and	Application for permit and operating plan required	Feedstock

State	Specific Composting Regulatory Thresholds	Application of Regulations in Regards to Front-End vs. Back-End (i.e., inflow vs. outflow) Regulatory Enforcement	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for composting)	Entity Responsible for Regulatory Compliance	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Composting is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)	Regulation by Feedstock Type and/or System Throughput (i.e., size of operation)
	is first[c] Heavy metal limits for classificatio n of compost Foreign matter limits of 2, 4, and 10% used for various grades of compost		exemptions			waste facilities to apply for grant money	the various uses for it		
IL	Compost must have less than 1% man made materials Extensive regulatory framework for landscape	Outflow quality regulated	Multi-level classificatio n system for compost 3 tiers (exempt, registered, permitted) Primarily landscape waste,	No economic incentives to encourage composting	Composter	No economic incentives to encourage composting	The state does not have information about composting. County Web sites do have some general information	Application for permit, operating plan, and closure plan required	Feedstock

State	Specific Composting Regulatory Thresholds	Application of Regulations in Regards to Front-End vs. Back-End (i.e., inflow vs. outflow) Regulatory Enforcement	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for composting)	Entity Responsible for Regulatory Compliance	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Composting is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)	Regulation by Feedstock Type and/or System Throughput (i.e., size of operation)
IL	waste composting, which is distinguished from other compost Food waste composting being developed		regulation in development for food wastes						
NY	Less than 3,000 yd^3 of yard waste per year or accepts only animal manure and associated bedding material[e] Registration (in lieu of permit) for between 3,000 and 10,000 yd^3	Inflow establishes facility type, outflow quality regulated	Multiple types of feedstock defined and 3 levels of regulation (exempt, registered compost facility, or permitted organic waste processing facility) as a function of	Grants are available	Composter	Grants available for composting facilities and equipment	State Web site has information for citizens on how to compost at home and the land application of compost	Application for permit, operating plan, and closure plan required	Both

State	Specific Composting Regulatory Thresholds	Application of Regulations in Regards to Front-End vs. Back-End (i.e., inflow vs. outflow) Regulatory Enforcement	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for composting)	Entity Responsible for Regulatory Compliance	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Composting is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)	Regulation by Feedstock Type and/or System Throughput (i.e., size of operation)
NY	of yard waste; for less than 1,000 yd^3 of sorted organic waste; or for food wastes (quantities listed are throughput per year).		material stream and size of operation						
OR	Exemptions for less than 100 tons of Type 1 or 2 feedstock, or both during any year, less than 20 tons of Type 3 feedstock	Inflow material used to establish if the facility will be registered and permitted	There is a tiered system that is based on the amount and type of feedstock received, registrations or permits required if not exempt.	Grants are available.	Composter	Grants are available to local governments to fund solid waste prevention and reduction projects.	The state has links to publications about commercial and residential composting, as well as reports and links to third party Web sites.	Application for permit, performance standards, operations plan, closure plan required, and post-closure plan	Both

State	Specific Composting Regulatory Thresholds	Application of Regulations in Regards to Front-End vs. Back-End (i.e., inflow vs. outflow) Regulatory Enforcement	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for composting)	Entity Responsible for Regulatory Compliance	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Composting is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)	Regulation by Feedstock Type and/or System Throughput (i.e., size of operation)
	during any year, less than 40 tons of Type 3 feedstock in any year when conducting in-vessel composting, or any composting facility that produces silage on a farm for animal feed							required	
TX	Greater than 5,000 yd^3 or annually[c], whichever is more	Inflow and Outflow Permit type is a function of feedstock	Multiple types of feedstock defined and 4 levels of regulation	Grants are available.	Composter	Grants are available to regional and local governments for MSW	State Web site has information for citizens on how to compost at home and the application	Application for permit, operating plan, and closure plan	Compost

State	Specific Composting Regulatory Thresholds	Application of Regulations in Regards to Front-End vs. Back-End (i.e., inflow vs. outflow) Regulatory Enforcement	Presence of Tiered Regulatory Methods	The Overall Economic Structure for Regulation (e.g., regulatory incentives for composting)	Entity Responsible for Regulatory Compliance	State Fees and Use of These Fees Towards Promoting Specific Management Practices	Education Programs That are Available and How Composting is Promoted	Cradle-to-Grave Operations (provisions for appropriate design, operation, closure, and post-closure of facility)	Regulation by Feedstock Type and/or System Throughput (i.e., size of operation)
	frequent Less than 1.5% dry wt[b] Sampling rates are a function of permit type	type	(exempt, permits, registration, or notification) as a function of material stream			manage-ment projects	of compost	required	

a: Incoming acceptable
b: Percent foreign matter total on 4 mm screen
c: Sampling Required
d: Inspection Required
e: Permit exemption

Table 14. Examples of Qualitative Descriptions in Composting Regulations

State	Regulatory Language	Referenced Section from Regulations
Arkansas	(a) Common Requirements—Requirements common to all composting facilities: (1) The operation shall be conducted in a manner which precludes pollution, public health hazards, nuisances, odors and the harborage of vectors;	Reg.22.805-Operational Requirements
California	(2) All handling activities shall be conducted in a manner that minimizes vectors, odor impacts, litter, hazards, nuisances, and noise impacts; and minimizes human contact with, inhalation, ingestion, and transportation of dust, particulates, and pathogenic organisms.	Title 14 CCR, Division 7, Chapter 3.1 section 17867
Colorado	(D) Nuisance Conditions: A composting facility shall control on-site and prevent off-site nuisance conditions such as noise, dust, mud, odors, vectors and windblown debris.	14.3.3 Facility Operation Requirements
Florida	(4) Design and operating requirements. (a) The facility shall have the operational features and equipment necessary to maintain a clean and orderly operation, including: 1. An effective barrier to prevent unauthorized entry and dumping into the facility site; 2. Dust control methods; and 3. Fire protection and control provisions to deal with accidental burning of solid waste.	62-709.320
Illinois	Specific measures an operator should take to control other sources of nuisance include preventative measures to control litter, vectors, and dust and noise generated from truck or equipment operation.	(e). 830.202
New York	(5) The facility must be operated to control the generation and migration of odors and dust to a level that is to be expected from a well operated facility, as determined by the department.	Section 360-5.3
Oregon	(4) All composting facilities must be designed, constructed, and operated in a manner that, to the greatest extent practicable, consistent with proper facility design and operation, controls and minimizes odors that are likely to cause adverse impacts outside the boundaries of the facility. (6) All composting facilities must be designed, constructed, and operated in a manner that controls or prevents propagation, harborage, or attraction of vectors, including but not limited to rats, birds, and flies. (7) All composting facilities must comply with all other applicable laws and regulations.	340-096-0070
Texas	(12) Site operating plan (G) control of windblown material; (H) vector control; (I) quality assurance and quality control.	Chapter 332, Site Operating Plans

All selected states with the exception of Texas maintain a specific definition of green waste (or similar term such as yard waste). Based on survey responses, only New York maintains provisions for food wastes. Florida has provisions for animal byproducts and vegetable wastes. Green waste is regulated and permits are used in all selected states. In addition, all selected states have provisions to allow exemptions to permit status. Based on the survey responses, the regulations for compost differ from municipal solid waste regulations in all of the selected states except for Texas. Green waste facilities are operated as solid waste facilities under a specific set of rules in all selected states except for Illinois. All of the selected states indicated in survey responses that their regulations for composting were less stringent than regulations for municipal solid waste.

Web-based analysis indicated that both public and private infrastructure exists for the composting industry. Composting operations are performed by both public and private entities.

The survey results indicated that front- and back-end regulatory enforcement included determination of amount of incoming and outgoing materials, and additionally regulating quality of outflow to maintain mature compost that is free of pathogens and heavy metal contaminants. Amount of incoming and outgoing materials are quantified on a weight and/or volumetric basis. For the selected states, volume-based measurements are more common than weight-based measurements. The selected states have a range of measurement requirements. A summary of quantities of incoming and outgoing materials is presented in Table 15.

Table 15. Incoming and Outgoing Material Measurements Required in Selected States

State	Total In	Total Out	Compost Out	Recycling Out	Other In	Other Out
AR	W + V	V	W + V	W + V	W + V	W + V
CA	W	V	V	-	W	-
CO	V	V	V	-	V	V
FL	W or V	W or V	-	-	-	-
IL	V	V	V	-	V	-
NY	V	-	-	-	-	-
OR	W+V	-	-	-	-	-
TX	W +V	W + V	-	-	-	-

Note: W = weight-based, V = volume-based, (-) = category not required to be measured

Regulatory models of the selected states have requirements for only inflow measurements (New York and Oregon), and both inflow and outflow measurements (remaining selected states). Arkansas has the most stringent measuring requirements (Table 15). Based on survey response, Florida reported requiring either weights or volumes. Problems arise when conversions are made between weights and volumes without discrete measurements of both quantities.

Tiered regulatory structures were present in other states. Examples include permit exemption for relatively clean operations, small operations, and specific material streams. Tiered regulations include level of permitting (exemption, registration, permit). The regulatory provisions for tiered systems for the selected states are presented in detail in Table A-7. All selected states had some

use of a tiered system for permitting. Divisions of categories are based on type of material stream and size of operation. Material stream based exemptions ranged from highly restricted (granting exemptions only to landscaping operations in Illinois) to exempting a large variety of materials in Texas (source-separated yard trimmings, on-site farming operations, mulching operations, land application at agronomic rates, paper application, and on-site industrial solid wastes). The thresholds for scales of operation that qualify for exemption range from backyard operations (defined as 100 yd^3 in Colorado, not quantified in Florida), to less than 3,000 yd^3 per year of yard waste (New York), to less than 20 to 100 tons depending on compost type and operational details (Oregon), to less than 50 tons (or 500 yd^3) per year (Arkansas). Various on-site operations including landscaping, farming, and industrial wastes also are exempted (Table A-7).

Numerical thresholds were applied by all of the states as provided in Table 13. All of the states had categorical permit exemptions, which extended over a significant range from 50 yd^3/yr (Florida) to 5000 yd^3/yr (Texas). Further details of regulatory tiers are provided in Table A-7. All of states had a single set of regulations for the entire state. No states were identified that had region-specific regulatory schemes (e.g., urban versus rural, business versus residential, dry versus wet).

Outgoing compost is regulated according to feedstock, physical characteristics, and quality. Physical characteristics include gradation. For quality, testing requirements for heavy metals, pathogens, pH, salts, and foreign matter are common in composting regulations. The metal contaminant limits are based on EPA 40 CFR 503. A comparison of allowable limits among several states is provided in Table 16. A higher number of states than just the selected states was used for this analysis to demonstrate a breadth of limits used in regulations. For heavy metals, the states have limits that are equal to or more stringent than those in EPA 40 CFR 503 (except for lead in Maine). From this analysis of the regulations, Florida for Grades 1 and 2 compost, Maine (except for lead), Texas Grade 1, and Washington maintain lower limits (more stringent) than EPA 40 CFR 503. For Florida, Maryland, Rhode Island, and Texas, the heavy metal limits are used specifically as thresholds for characterizing compost grades. Pathogen testing is required in all selected states. The limits are identical to those presented in EPA 40 CFR 40 with the exception of Texas, where the limits are less stringent than EPA for their Grade 2 and Waste Grade composts.

Other characteristics for outgoing compost that are measured for selected states include: C/N ratio, organic content, and other constituents in Colorado; dangerous materials (glass/metal), stability, and man-made materials (less than 1 percent) in Illinois; maturity/stability by reduction in organic matter, foreign matter, PCBs (for permitted facilities) in Texas. In Illinois, the end-product compost derived from landscape waste must be tested for the parameters set forth in Section 830.503 at a frequency of: once every 5,000 cubic yards of end-product compost transported off-site; or once per year, if less than 5,000 cubic yards of end-product compost are transported off-site per year. For the quantification of man-made materials in Illinois, the following process is prescribed in the state regulations (Title 35, Subtitle G, Chapter 1, Subchapter i, Part 830, Subpart E): 1) Take four 250 gram samples, 2) Dry samples at 70°C for 24 hours and let sample cool to room temperature (20 to 25°C), 3) Weigh each sample and pass through a 4 mm screen. Inspect material remaining on the screen, and separate and weigh man-made materials. Calculate percent man-made materials relative to the total dry weight of the sample prior to screening.

Table 16. Comparison of State Regulations for Heavy Metal and Pathogen Limits in Compost

		Cumulative Pollutant Loading Rates (mg/kg dry weight)										Pathogen Limits	
State	Compost Grade	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Zinc	Fecal Coliform (MPN/g)	Salmonella (MPN/4g)
EPA 40 CFR 503 (Ceiling conc.)	Biosolids Land Application	75	85	NA	4300	840	57	75	420	100	7500	1000	3
EPA 40 CFR 503 (Monthly ave. conc.)	Biosolids Land Application	41	39	NA	1500	300	17	NA	420	100	2800	1000	3
Arkansas	All	41	39	1200	1500	300	17	54	420	36	2800	1000	3
California	All	41	39	1200	1500	300	17	NA	420	36	2800	1000	3
Colorado	All	41	39	NA	1500	300	17	NA	420	100	2800	1000	3
Florida	Level 1	NA	<15	NA	< 450	< 450	NA	NA	<50	NA	< 900	NA	NA
	Level 2	NA	15- <30	NA	450- < 900	450- < 900	NA	NA	50-< 100	NA	900- <1,800	NA	NA
	Level 3	NA	30-100	NA	900- 3,000	900- 3,000	NA	NA	100- 500	NA	1,800- 10,000	NA	NA
	Level 4	NA	>100	NA	>3,000	>3,000	NA	NA	>500	NA	>10,000	NA	NA
Illinois	All	41	21	1200	1500	300	17	NA	420	36	2800	1000	3
Iowa	All	41	39	NA	1500	300	17	NA	420	36	2800	1000	3
Maine	All	NA	10	1000	1000	700	10	NA	200	NA	2000	1000	3
Maryland	General Use	41	39	1200	1500	300	17	18	420	36	2800	NA	NA
	Limited Use	41	39	1200	1500	300	17	18	420	36	2800	NA	NA
	Restricted	75	85	3000	4300	840	57	75	420	100	7500	NA	NA
Ohio	All	41	35	NA	1500	300	7.8	NA	420	100	2800	1000	3
Oregon	Type I & <50% Type II	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1000	3
	Type I & >50% Type II	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1000	NA
Rhode Island	Class A	41	39	1200[a]	1500	300	17	75	420	36	2800	1000	3
	Class B	75	85	3000[a]	4300	840	57	75	420	100	7500	1000	3
Texas	Grade 1	10	16	180[a]	1020	300	11	75	160	36	2190	1000	3
	Grade 2	41	39	1200[a]	1500	300	17	75	420	36	2800	<2,000,000	NA
Virginia	All	41	21	NA	1500	300	17	54	420	28	2800	1000	<1[c]
Washington	All	20	10	NA	750	150	8	9[b]	210	18	1400	1000	3

NA = not applicable (measurement not required)
[a]Total
[b]No testing required for Molybdenum for composting of type 1 or type 2 feedstock
[c]Virginia reported Salmonella concentrations with units of MPN/g

Red = Lower than Monthly Average Concentration Specified in EPA 40 CFR 503
Yellow = Higher than Monthly Average Concentration Specified in EPA 40 CFR 503
Green = Identical to EPA 40 CFR Ceiling Concentrations
No Color = Identical to Monthly Average Concentration Specified in EPA 40 CFR 503
Blue = Lower than Ceiling Concentrations Specified in EPA 40 CFR 503

Grading requirements for green material composting are summarized in Table 17 for those investigated states that maintain such requirements (additional details are provided in Table A-8). The investigated state regulations are significantly different. However, most of the regulations address foreign material contamination, bacterial pathogen reduction, metal concentrations, and biological stability. Two states also had particle size requirements. Two states base compost grades on feedstock. These regulatory elements are summarized below:

1. Foreign Material Contamination: Florida, Illinois, Rhode Island, Texas. (Significantly, these states regulate foreign matter in the finished compost, not in the feedstock as in California.)

2. Bacterial Pathogen Reduction: Illinois, Oregon, Rhode Island, Texas

3. Metal Concentrations: Florida, Illinois, Maryland, Rhode Island, Texas

4. Biological Stability (or Maturity): Illinois, Maryland, Rhode Island, Texas

5. Particle Size: Florida, Maryland

6. Feedstock: Florida, Oregon

While all of the investigated states have some restrictions on compost use, Rhode Island had the most specific restrictions. In Rhode Island, Class A compost is essentially unrestricted for all uses, residential, commercial, and public. Class B compost use requires a permit and can only be sold in bulk distribution for agricultural purposes. Class C compost use is restricted to landfill cover applications or other uses on a case-by-case basis.

Four investigated states were determined to have label requirements for the final compost. A summary of label requirements is presented in Table 18. The label requirements included information on type and/or origin of compost, physical data, health and safety provisions, suitable applications, and application rates. Highly detailed labeling is required in Maryland and Rhode Island as presented in Table 18.

Table 17. Summary of Regulations Related to Grading/Restricted Use of Compost

State	Grade	Material	Maturity/ Stabilization	Particle Distribution	Metal/ Pathogen Conc.	Foreign Matter	Application Restrictions	Additional Information and Definitions
Florida	Y	Yard Trash, mature or semi-mature	Mature/semi-mature	Fine, medium, or coarse	Level 1	<2%	Unrestricted	Mature: Reduction of organic matter (OM) of greater than 60%, Semi-Mature: Reduction of OM of greater than 40% but less than or equal to 60%, Fresh: Reduction of OM of greater than 20% but less than or equal to 40%, Fine: <=10mm and OM >= 25%, Medium: <=15mm and OM >=30% Coarse: <=25 mm & OM >= 35%.
	YM	Manure or yard trash with manure	Mature/semi-mature	Fine, medium, or coarse	Level 1	<2%	Unrestricted	
	A	Solid Waste, other than only yard trash and manure, which is mature and is fine.	Mature	Fine	Level 1	<2%	Unrestricted	Shall contain no foreign matter, such as glass or metal shards, of a size and shape that can cause injury.
	B	Solid Waste, other than only yard trash or manure	Mature/semi-mature	Fine, medium	Level 1 or 2	≤4%	Restricted to use by commercial, agricultural, institutional, or governmental operations.	Shall contain no foreign matter, such as glass or metal shards, of a size and shape that can cause injury.
	C	Solid Waste, other than only yard trash or manure	Mature/semi-mature	Fine, medium, or coarse	Level 1, 2, or 3	≤10%	Restricted to use by commercial, agricultural, institutional, or governmental operations.	
	D	Solid waste, or from only yard trash or manure	Fresh	Fine, medium, or coarse	Level 1, 2, or 3	≤10%	Shall only be used at landfills or land reclamation projects. However, such use shall not be allowed if contact with the general public is likely.	
	E	Solid Waste, other than only yard trash or manure	NA	NA	Level 4	NA	Must be disposed of pursuant to 62-701 FAC.	

State	Grade	Material	Maturity/ Stabilization	Particle Distribution	Metal/ Pathogen Conc.	Foreign Matter	Application Restrictions	Additional Information and Definitions
Illinois	General Use	Landscape Waste	Stabilized	NA	See Table 16 of this report	< 1%	No Restrictions	Stabilized: Either the compost does not reheat, upon standing, to greater than 20ºC above room temperature or that the compost supports a germination rate of 70% for annual ryegrass and radish.
Illinois (con't.)	Designated Use	End-product compost, which does not qualify as general compost.	NA	NA	NA	NA	Must be used only as daily cover or vegetative amendment in the final layer at a landfill.	
Maine	Bulk Distribution	All	Dewar's stability Class III				Direct Agricultural uses or blending with other residuals.	C:N ratio of finished compost <25:1.
	High-end Use /Bagging	All	Dewar's Stability Class IV				Bagging or high-end horticultural purposes.	C:N ratio < 25:1 and total NH_3-N < 800ppm.
		Type IC: such as grass clippings.			Class A Pathogen Reduction			
Maryland	General Use	NA	Stabilized	< 0.5 in.	See Table 16 of this report	<2%	May be used by the general public as a mulch, soil conditioner, or topsoil substitute.	May not have an objectionable odor. Stabilized compost means any compost that has ceased active biological decomposition, that is, the temperature of a 4-foot-high, 6-foot-diameter pile of compost may not rise more than 20ºC above ambient temperature when the pile is left undisturbed for 72 hours at the composting facility.

State	Grade	Material	Maturity/ Stabilization	Particle Distribution	Metal/ Pathogen Conc.	Foreign Matter	Application Restrictions	Additional Information and Definitions
	Limited Use	NA	Stabilized	< 0.75 in.	See Table 16 of this report	<4%	a) Only for use by a commercial, agricultural, institutional, or governmental operation, b) Only for use where contact by the general public is unlikely, c) On agricultural land when repeated applications occur to a site the total amount of heavy metal applied per acre per year to that site may not exceed 1/10 the maximum cumulative loading for that metal listed in Regulation .12, and d) The total amount of any heavy metal applied per acre cumulatively to a site may not exceed the maximum amount for that metal listed in Table 2 of Regulation 12.	May not have an objectionable odor.
Maryland (con't.)	Restricted Use	May not be a hazardous waste as defined in COMAR 26.13.02.03. Contains any compost exceeding any parameter limit for Limited Use Compost, or any compost designated by the registrant as Restricted	NA	NA	See Table 16 of this report	NA	a) Only for use a landfill cover, on marginal land or in land reclamation efforts, provided that the maximum total amount of each heavy metal that is applied does not exceed the cumulative loading limit for that metal as listed in Regulation .12, b) Only for use where there will be no contact by the general public with the compost, and c) Not for use by the general public.	May not be stockpiled or disposed of unless authorized by the Maryland Department of the Environment.

State	Grade	Material	Maturity/ Stabilization	Particle Distribution	Metal/ Pathogen Conc.	Foreign Matter	Application Restrictions	Additional Information and Definitions
		Use classification.						
Rhode Island	A	NA	Stabilized	< 0.39 in.	See Table 16 of this report	<1%	Unrestricted	Stabilized: Shall be black and brown in color and have a reduction in organic matter of at least 60 % as measured by reduction in volatile solids. It shall be sufficiently stable, such that it does not reheat, upon standing, to greater than 20ºC above ambient temperature. Other techniques or measures, subject to the approval of the department may be substituted for the above to demonstrate an equivalent maturity and stability.
	B	NA	Stabilized	< 0.39 in.	See Table 16 of this report	<2%	May be distributed for agricultural and non-agricultural applicants with Department approval, and must be limited to bulk distribution only. Restrictions apply on use where crops are produced for direct human consumption, residential/homeowner use, any use with unrestricted public access, or any use where excessive ingestion of soil/dust may occur by children under 72 months of age. All projects and/or locations utilizing Class B compost must obtain advance approval from the Department.	

State	Grade	Material	Maturity/ Stabilization	Particle Distribution	Metal/ Pathogen Conc.	Foreign Matter	Application Restrictions	Additional Information and Definitions
Rhode Island (con't.)	C	Any compost which does not meet the limits established for Class A or Class B compost shall be considered Class C where specific Class C limits for heavy metals are omitted.	NA	< 0.98 in.	No Standards	<4%	Compost is restricted to use in locations with limited public access and must be limited to bulk distribution only. All projects and/or locations utilizing Class C compost must obtain approval from the Department, and allowable uses are limited to the following: 1) Landfill cover material 2) Other uses, if approved by the Department, on a case-by-case basis.	Semi-Stabilized: Shall be light to dark brown or brown to black in color and have a reduction in organic matter of at least 60% as measured by reduction in volatile solids. It may reheat, upon standing, to greater than 20ºC above ambient temperature. Other techniques or measures, subject to the approval of the Department may be substituted for the above to demonstrate an equivalent maturity and stability.

Table 18. Compost Labeling Requirements from State Regulations

State	Compost Labeling Requirements
Arkansas	(a) Labeling Requirements Compost produced from Type S and Type O facilities that is offered for sale or distribution must contain a label indicating recommended safe use and application rates, and restrictions, if any, on use of the product. If compost is offered for bulk sale or distribution, signs or printed literature must be available with this information. (Reg.22.809- Compost Utilization)
Louisiana	h. Finished Compost ii. All distributed compost shall be accompanied with a label or leaflet that indicates, at a minimum, the type of waste from which the compost was derived, any restriction on the use of the product, and recommended application rates.
Maryland	06 Compost Labeling. A. A person who manufactures or distributes a package or container of compost subject to this chapter is responsible for labeling the package or container with the following information: (1) Net weight or volume; (2) Brand under which the compost is distributed; (3) Classification of compost; (4) Manufacturer's name and complete address; and (5) Origin. B. A person who manufactures or distributes for bulk sale any compost subject to this chapter shall have a label or have labeling with information required in §A of this regulation. A manufacturer or distributor shall make any label or labeling information available to the Department, upon request. C. Each lot of bulk compost offered for sale or distribution by a person shall be identified by that person by a legible sign containing at least the following: (1) Brand name; and (2) Classification of compost. D. A person who manufactures a compost produced from materials containing an industrial sludge is responsible for labeling the product indicating the origin of the industrial sludge. E. A person who distributes a compost is responsible for the label or labeling or providing on a written invoice or shipping statement, if the compost is offered for bulk distribution, information indicating recommended uses, application rates, and use restrictions, if any, for the compost product, including information stating that: (1) Compost classified as General Use may be used by the general public as a mulch, soil conditioner, or topsoil substitute; (2) Compost classified as Limited Use is limited for use as follows: (a) Only for use by a commercial, agricultural,

State	Compost Labeling Requirements
Maryland (con't.)	institutional, or governmental operation, (b) Only for use where contact by the general public is unlikely, (c) On agricultural land when repeated applications occur to a site, the total amount of any heavy metal applied per acre per year to that site may not exceed 1/10 the maximum cumulative loading for that metal listed in Regulation .12 of this chapter, and (d) The total amount of any heavy metal applied per acre cumulatively to a site may not exceed the maximum amount for that metal listed in Table 2 of Regulation .12 of this chapter; (3) Compost classified as Restricted Use is restricted for use as follows: (a) Only for use as a landfill cover, on marginal land or in land reclamation efforts, provided that the maximum total amount of each heavy metal that is applied does not exceed the cumulative loading limit for that metal as listed in Regulation .12 of this chapter, (b) Only for use where there will be no contact by the general public with the compost, and (c) Not for use by the general public.
Rhode Island	(2) Class "A" Compost Distribution and Labeling: (a) Bagged or Packaged Compost— All compost that is bagged or distributed in any other packaged form shall be properly labeled. The label shall appear on the face or display side of the container and the label shall contain, at a minimum, the following information in a readable and conspicuous form: (i) Net weight or volume of the contents. (ii) Brand name, which shall include in its name or in a separate section of the label, an indication that it qualifies as R.I. Class "A", Class "B", or Class "C" compost (per compost quality standards within Rule 8.8.01. (iii) The type of waste the compost product was derived from, including a listing of wastes that make-up the waste stream that was composted, any bulking agents, and any co-composting materials or wastes. (iv) Recommended safe uses. (v) Any restrictions (prohibitions) on use of the product. (vi) Directions for application to soil (to include recommended land application rates). (vii) Name and address of the registrant (distributor). (viii) Warning to keep out of reach of children. (ix) Electrical conductivity, and pH ranges of compost and the acceptable levels according to end user applications. (x) If the recommended land application method does not include mixing or blending this product with existing on-site soils, then a statement that the product is "lead safe" but not "lead free" must appear on the package. If the product is "lead free", then no statement is required.

The entity responsible for regulatory compliance at state level includes composters for all selected states. Some additional data was collected from state Web sites in states other than the selected states related to regulation of transporters. Examples of regulations related to transport of compost are presented in Table 19.

Table 19. Regulations Related to Transport of Compost

State	Transport Regulations
Louisiana	Requires recordkeeping as reported in Section 723 of their regulations: b. The permit holder shall maintain records of transporters transporting waste for processing at the facility. The records shall include the date of receipt of shipments of waste and the transporter's solid waste identification number issued by the administrative authority.
Delaware	From Section 4, Permit Requirements: 4.1.1.2 No person that is subject to the requirements of Section 7.2 or 7.3 of these regulations shall transport solid waste in or through the State of Delaware without first having obtained an appropriate solid waste transporter's permit from the Department.

Based on survey responses of the selected states, fees for permits are collected by Arkansas, Colorado, and Florida. Based on survey responses and searches of state Web sites, composting educational programs and grants programs are common. Summaries of the programs are outlined in Tables 20 and 21. Education programs are available in all selected states with the exception of Colorado. The educational programs range from Web sites devoted to composting information, to links to third party Web sites, to full programs for teachers, communities, and businesses (Table 20). A rating is provided for each state in Table 20. The ratings are based on a scale of 0 to 10. A rating of 10 indicates a strong educational program, with educational content available directly through a state-sponsored Web site. For educational programs, a state that has a rating of 7 to 9 does not have a comprehensive list of links and/or their Web site is not highly accessible (i.e., user friendly) as a state with a rating of 10. A state with a rating of 4 to 6 does not have a highly accessible Web site and they do not publish educational information on their own Web site. Instead, they rely on third party Web sites to provide information to its citizens. Lower ratings would indicate limited or no educational content available at the state level. All selected states have some educational content. New York and Texas had the strongest educational programs. The selected states (except Colorado) have some educational content intended for public awareness about composting.

Table 20. Summary of State Composting Educational Programs

State	Educational Program	Program Rating	State Diversion Rate[1]
Arkansas	State Web site has a comprehensive description of the composting process for municipal composters but they do not provide any information for backyard composting.	7	44.6
California	State Web site provides strategies for community outreach programs to be implemented at the local level, information on backyard composting, overall composting, and food waste composting.	8	58
Colorado	No education program.	0	35
Florida	State Web site has publications on how composting works and how it is used in the state of Florida. They also provide several links to third party Web sites that provide more detail related to backyard composting.	8	28
Illinois	State Web site has links to third party Web sites, however the topical focus is recycling and not composting.	2	19.1
New York	State Web site is relatively easily accessible and contains links for large-scale composters and homeowners. State Web site has information on overall description of compost, facilities in the state that handle compostable materials, and guides on how to compost.	10	48
Oregon	State Web site is relatively easily accessible and contains links for commercial and residential composting. It also has links to third party Web sites and numerous publications and reports on composting.	10	30.1
Texas	State Web site has a few high quality publications that cover composting and mulching and provide instruction on how to create and use mulch and compost.	9	35

[1]Diversion rates obtained from state Web sites.

For grants programs (Table 21), ratings are also provided and based on a scale of 0 to 10. A rating of 10 indicates a strong grants program, with funds available from the state for a wide variety of recycling related activities. A state that has a rating of 7 to 9 does not offer as many opportunities for grants as does a state with a rating of 10. Lower ratings would indicate limited grant programs available at the state level. A rating of 0 would indicate that the state does not have an existing grant program. The ratings were based on the variety of uses the funds could be used for and not on the number of grants offered or the amount of funds available. The numbers of grants and total funds did not vary as much as for recycling grant programs. Arkansas, Colorado, and New York had the most highly rated composting grant programs.

Table 21. Summary of State Composting Grant Programs

State	Grant Program	Program Rating	State Diversion Rate[1]
Arkansas	The same grant program handles both recycling and composting. The DEQ provides grants every year to cities, counties, and solid waste authorities to help obtain composting equipment and to fund education and awareness programs. The DEQ provides more than $3 million in grants each year. The amounts that have been provided in the past range from $1,000 to $100,000 annually, and these funds are applied to covering expenses associated with composting equipment and composting programs.	10	44.6
California	Grants for LEAs to help fund waste facilities permit and inspection program. Reuse Assistance grants promote reuse concept to local business communities.	7	58
Colorado	The CDPHE created a Recycling Resources Economic Opportunity grant program that funds both recycling and composting. Several projects that are being funded this year that will expand current composting programs.	9	35
Florida	The same grant program handles both recycling and composting. Grants are given out on a competitive basis with the majority of the funds being allocated towards recycling projects. A few examples of composting grants issued include: backyard educational programs, vermicomposting, drywall composting, and in-vessel composting of undeliverable business mail.	8	28
Illinois	Grants are available to reduce food scraps and other organic material from landfills (except for yard waste). There also is a Recycling Expansion and Modernization Program that provides funds to divert material from the MSW stream.	7	19.1
New York	The same grant program handles both recycling and composting. Grants are available for composting facilities and equipment. The majority of projects funded are involved with recycling and not composting.	9	48
Oregon	Grants are available for organic collection, composting equipment, and education on composting. There is a wide variety of what categories the grant funds can be used for (e.g., salaries, administrative costs, and operating costs).	10	30.1
Texas	There is a Regional Solid Waste grant program that is used to support regional programs and local projects. The state Web site has a list of eligible categories, however composting is not explicitly defined.	7	35

[1]Diversion rates obtained in 2009 from state Web sites.

The variability in education and grants programs can be partly attributed to variations in composting tonnages and populations, however strong correlations do not exist between the program ratings and state populations. In addition, the program ratings are not highly correlated to the waste diversion rates in the states.

Cradle-to-grave operations (i.e., provisions for appropriate siting, design, operation, and closure of facilities) are in place in all selected states for regulated facilities except for closure plans in Florida. Colorado is unique in additionally requiring post-closure plans. Illinois requires plans for any compost that does not meet specifications. Exempt facilities have some requirements in relation to cradle-to-grave operations. Specifically, all selected states except Illinois and Arkansas require that non-permitted facilities maintain operational standards (Texas has regulatory standards in this regard for exempt facilities, whereas Colorado, Florida, New York, and Oregon only have such requirements if a facility causes a nuisance or health concern for the community). Exempt facilities are not required to maintain closure plans in any of the selected states.

The regulatory models and methods of the selected states include integrated approaches to account for variability in the type and amount of regulated materials. The tiered permit structure described above provides different regulatory levels (e.g., permit types) for different scales of operations. The models also contain specific regulatory thresholds (Tables 13, 16, 17, and Appendix A) related to quality of material being processed (e.g., source-separated materials, residual content).

Three of the selected states indicated in survey responses that they are in the process of updating their regulations. Colorado recently updated their regulations. Arkansas is in the process of modifying regulations to permit landfills to utilize yard waste for harvesting of methane gas. Florida is changing regulations to promote composting of more putrescible materials (source-separated food wastes from industrial and commercial operations). Illinois is changing regulations to promote more food and paper composting by exempting facilities from local siting ordinances (which are different from local zoning ordinances).

Specific Features of Composting Regulations

All selected states have provisions for duration of stockpiled materials. Durations are established either as time limits or material flow rates. Arkansas allows finished compost to remain stockpiled for six months. In Florida, unprocessed compost materials can be stockpiled for a period of six months or for a period associated with accumulating either 3,000 tons or 12,000 yd^3. Unprocessed logs of diameter greater than 6 inches are allowed to remain on-site for 12 months in Florida. After processing, materials can remain stockpiled for 18 months in Florida. Extensions of stockpiling durations are allowed in Florida. Putrescible materials must be removed within 48 hours and hazardous wastes must be removed immediately in Florida. In Illinois, stockpiling is allowed for one year. In New York, stockpiling is allowed for two years. In Texas, a 50 percent turnover in six months is required, but processed mulch and compost in windrows are allowed to remain on-site longer.

For sampling weights and measurements, materials flows analysis is used in Arkansas (estimated per load, continuously), New York (daily), and Florida (recorded monthly, reported annually). Discrete spot measurements are used in Colorado (varies by facility), Illinois (continually/every load), and Texas (one sample is composed of nine grab samples taken every 5,000 yd^3, every 3,000 yd^3 if includes grease trap waste or municipal solid waste, or annually, whichever is most frequent).

New York has relatively rigorous geotechnical specification for liner systems for composting (from 360-5.5(d)(3), The title of 360-5.5 is "Organic Waste Processing Facilities For Biosolids, Mixed Solid Waste, Septage And Other Sludges"):

The waste storage area, processing area, leachate storage and product storage area at the facility must be located on surfaces that minimize leachate release into the groundwater under the site and the surrounding land surface, such as asphalt (except for leachate storage), concrete, or drying beds that have under drains for Leachate collection. The following criteria apply: (i) If low permeability soils are used, the liner must be a minimum of two feet of compacted soil having a maximum remolded coefficient of permeability of 1 x 10^{-7} centimeters per second. The soil material particles must be able to pass through a one inch screen. The applicable criteria in subdivision 360-2.13(j) of this Part must be complied with; (ii) If a geomembrane is used, the liner system must be designed and built in accordance with the applicable criteria in section 360-2.13 of this Part; (iii) If a surface impoundment is used for leachate storage, a minimum of two feet of freeboard must be maintained. In addition, the bottom of the liner system must be a minimum of five feet above both seasonal high groundwater elevation; and bedrock. (iv) For composting facilities, product storage beyond the 50 day detention time requirement does not have to occur on a low permeability surface. For products other than compost, the Department shall determine when the product no longer must be stored on a pad.

The maturity level of compost is determined in Illinois in part using a sophisticated seed germination testing protocol. This is the only reference to such testing among the selected states' regulations. The details of the method as provided in the regulations are presented below:

The operator shall demonstrate that the composite sample has reached stability by showing that the end-product compost supports a germination rate of 70% for annual ryegrass and radish using the following protocol:

A) Mix 4 liters of vermiculite with 4 grams of air-dried soil.

B) Take 1 liter of the composite sample with a moisture level within the range of 45 to 55 percent, on a dry weight; if necessary, adjust the moisture level until within such range.

C) In three 2-liter containers, combine the vermiculite-soil mix with the compost sample at the ratios specified in the regulations to obtain 75% compost (wet weight basis), 50% compost, and 0% compost (control).

D) Break up lumps of compost with a spatula or trowel. Moisten the blend with water.

E) Cover each container with plastic wrap and mix well by inverting each container 20 times.

F) Transfer each blend into four 4-inch pots. Fill the pots to the brim of another 4-inch pot. Leave about 2 to 5 centimeters of space between surface of the blend and the top of the pot.

G) Add approximately 50 milliliters of water soluble fertilizer (e.g., 20-20-20 NPK, fish emulsion) diluted to half-strength to each pot.

H) Place 10 seeds of annual ryegrass and 10 radish seeds onto the surface of the moistened blend. Cover the seeds with about 1 centimeter dry vermiculite.

I) Set the pots in a tray of warm water and let them remain there until capillary action has drawn water up and moistened the surface of the blend. Remove the pots from the tray when moisture from the bottom-watering is observed.

J) Put pots in an environment suitable for plant growth (e.g., 8 to 12 hours of light daily, 30 to 60% humidity, 20 to 25° Check pots daily to determine if watering is needed.

Blends should be kept evenly moist. If necessary, cover each pot with plastic wrap until the seedlings emerge. Remove plastic wrap at the first sign of emergence.

K) Seven days after planting the seeds, count emergent seedlings in each pot and record visual observations of relative plant conditions identified in Section 830.Table C.

L) Calculate the percent germination of plants in each blend relative to the control pot, using the formula set forth in Section 830.Table C.

Arkansas and Florida are the only selected states that specifically include putrescible wastes in the regulatory framework. In Arkansas, the putrescible content may affect siting constraints (in vicinity to airports). In Florida, putrescible contaminants must be moved off site within 48 hours.

Based on survey responses of the selected states, provisions for residual content are included in Illinois (must be less than 1 percent by weight on outgoing compost), New York (less than 2 percent by weight for food waste and mixed solid waste), and Texas (1.5 percent dry weight on a 4 mm screen). Specification by dry weight brings in uncertainty due to variability in moisture conditions of materials being processed and additional testing requirements and/or assumptions to be used. In addition to the selected states, Minnesota indicated a limit of less than 3 percent inert materials in their composting operations and New Jersey indicated a limit of 1 percent contaminants for incoming materials.

According to survey responses, windrow composting operations are present in all selected states except Florida; aerated static piles are present in Colorado and Texas; and aerobic in-vessels are present in Texas. None of the investigated states indicated using other methods with the exception of Ohio, which reported using passively aerated static piles (no blowers).

Economic and feasibility aspects of regulations were included in Colorado (in relation to costs for design and operation plans) and Texas (where all regulations include a fiscal impact assessment for large and small businesses as well as local governments). Other criteria used in establishing the regulations included (according to survey responses) public workshop with input from the regulated community in Florida and based on legislative directives in Texas.

Composting operations in all selected states are inspected by a state agency. Scheduled inspection frequencies vary from quarterly (Arkansas), to annually (Colorado, Illinois, and Texas), to no formal period (Florida, where some districts try for annual inspections). In addition, provisions are in place for inspections in response to complaints (Florida, Illinois, and Texas—where such inspections are completed within one week of the complaint). All selected states except for Florida require reports to be submitted by composting operators.

Additional comments from the state surveys include:

Florida: A problem exists with terminology and perceived stigma of operations requiring a permit of any kind.

Illinois: Recent increased interest in composting food wastes (restaurant, grocery store produce) – mainly in Chicago. The state expects more permits for in-vessel composting in the near future.

Texas: Mulching operations should be required to send all material off site after one year. Composting operations should have a similar requirement with an allowance for a longer time period if part of the composting process.

A summary of the significant relevant attributes of the composting regulatory models for the original selected states is provided in Table 22. The attributes included in the table are: permit exemption threshold, incoming and outgoing material measurement requirements, grades of compost, grading criteria, educational program rating, grant program rating, and state diversion rate. Permit exemption thresholds are present in all selected states and typically included backyard composting, landscaping operations, on-site animal/agricultural composting, and relatively small operations (with variable size limits). Total incoming and total outgoing material quantities are measured in all selected states (with the exception of total outgoing for New York). Additional measured quantities include outgoing compost, outgoing recyclables, and incoming and outgoing other materials. Outgoing compost is characterized into multiple grades by half of the selected states. The number of grades ranges between 2 and 7 in the selected states. The quality of compost is determined using chemical, biological, and physical analysis. Specifically, foreign material contamination, bacterial pathogen reduction, metal concentrations, biological stability, and particle size in various combinations are used to determine the delineation between grades of compost. Florida and Oregon use feedstock type as part of the classification. Some states (only Arkansas of the selected states) require labeling of compost based on the analysis results and grading criteria. The entity responsible for regulatory compliance at the state level included and was limited to composters in all selected states.

The educational and grant programs were rated based on the accessibility of materials and funding as well as the flexibility for which these resources can be used. The ratings were variable, although the quality of these programs was determined not to be highly correlated to the reported state diversion rates.

Table 22. Summary of Composting Regulations in Selected States

State	Permit Exemption Threshold	Incoming and Outgoing Material Measurement Requirements	Grades of Compost	Grading Criteria	Educational Program Rating	Grant Program Rating	State Diversion Rate[1]
Arkansas	Less than 50 ton/yr or 500 yd^3/yr; exclusively nurseries, animal facilities, and wood	TI, TO, CO, RO, OI, OO	Application is regulated – specific grades are not identified	NA	7	10	44.6
California	< 500 yd^3 capacity <1000 yd^3 given away or sold <50 yd^3 capacity within-vessel Storage of bagged compostable material which are < 5yd^3 <12,500 yd^3 green waste capacity are only required to notify EA	TI, TO, CO,OI	Application of compost is regulated if compost exceeds allowable limits-specific grades are not identified	NA	8	7	58
Colorado	Less than 100 yd^3 capacity, exclusively yard and landscape waste, agricultural operations (with conditions), handling operations, and wastewater plants	TI, TO, CO, OI, OO	NA	NA	0	9	35
Florida	Backyard composting, normal farming for on-site use	TI, TO	7 classes for compost	C, PS, F	8	8	28
Illinois	Landscape wastes and operations	TI, TO, CO, OI	2 classes for compost	C, P, M, S, PS	2	7	19.1

State	Permit Exemption Threshold	Incoming and Outgoing Material Measurement Requirements	Grades of Compost	Grading Criteria	Educational Program Rating	Grant Program Rating	State Diversion Rate[1]
New York	Less than 3,000 yd^3 of yard waste per year, accepts only animal manure and associated bedding material, or combination of these two	TI	NA	NA	10	9	48
Oregon	Annually less than 100 tons of Type 1 feedstock, Type 2 feedstock, or combination; 20 tons of Type 3 feedstock; 40 tons of Type 3 feedstock when conducting in-vessel composting; or facility that produces silage at farm	TI	3 types of compost	P, F	10	10	30.1
Texas	Operations for source-separated yard trimmings, clean wood, vegetative material, paper, manure; certain industrial materials; agricultural and industrial for on-site use; mulching; land application	TI, TO	3 classes for compost	C, P, M, S	10	7	35

[1]Diversion rates obtained in 2009 from state Web sites.

NA – not applicable

C – foreign material contamination, P – bacterial pathogen reduction, M – metal concentrations, S – biological stability, PS – particle size, F – feedstock

TI – total in, TO – total out, CO – compost out, RO – recycling out, OI – other in, OO – other out, NSR – no survey response

Analysis Related to California

Current management practices used in California to comply with composting regulations were evaluated using site visits and discussions with LEAs. The research team made site visits to nine composting facilities in California. The following discussion provides comparison between regulations in California and in other states based on analysis of the regulations and the site visits.

1. The California provision for permit status to be a function of both material type and duration that materials remain on-site at a facility is unique. Most states use either material type or material quantities or some combination of the two (see Tables 13 and Appendix A).

2. A numerical threshold for incoming residual content also is unique. Other states have provisions for categories of compost and permitting as a function of material types and material mixes, but quantifying the ratios of residual to clean material on incoming materials is not common.

3. The tiered regulatory scheme in California is present in most other states in some form. However, the research category for compost facilities in California is unique.

4. Although the U.S. has a long history of treating agricultural and municipal wastewater biosolids with anaerobic digesters, no commercial, full-scale solid waste digesters are currently operating in the U.S. using green materials as a feedstock. A promising new technology, the Anaerobic Phased Solids (APS) Digester, has been developed by the Department of Biological and Agricultural Engineering, University of California, Davis (Rapport, et al, 2008). The APS Digester has been tested with food wastes and green materials as a feedstock. The pilot plant is currently installed at the Campbell Soup Company cannery in Sacramento processing food wastes from the manufacturing process (Ebert, 2008).

5. The coverage of environmental protection (air and water pollution impacts) within the California compost regulations is relatively low compared to some other states. This may be attributed to other state environmental agencies being involved in the overall permitting process in California whereas other states may have more consolidated regulations and enforcement (e.g., Oregon and Illinois).

6. A relatively high level of detail is provided for odor control plans in permit applications in California, however, the level of detail provided for design, siting, and operation of facilities is not as extensive as the selected states. In addition, regulatory framework for closure and post-closure is generally lacking compared to the selected states.

7. Regulations for quality of the compost product are not as detailed as some other states (in terms of testing requirements, parameters used for characterization, test protocols, and labeling). For example some states require disclosure of nutrient content (nitrogen and phosphorus) as well as heavy metals content and pathogen reduction.

8. Similar to most other states, coverage of market conditions in California regulations is limited. Most operators interviewed during the site visits felt that they were in the best position to gauge market requirements rather than a regulatory agency.

Current Science, Market Dynamics, and New Technologies

Based on the survey responses, investigation of published regulations, telephone and e-mail correspondence with state agency representatives, the research team determined that no rigorous current science, market dynamics, and new technology aspects were included in the development of state regulations for composting. The regulations can be interpreted to having some scientific basis, but a systematic scientific method for developing the regulations is lacking.

Several of the states referenced environmental regulations within the waste regulations. These related to state air and water quality standards. Examples of explicit scientific content in the regulations include provisions for geotechnical liners for facilities, groundwater tests, and use of engineering judgment in developing the regulations. Most of the states, though, retained qualitative descriptions within the composting regulations that the operations must prevent nuisances, odors, vectors, etc. (Table 14). In comparison to recycling regulations, the scientific content for composting regulations is collectively at a higher level. This is in large part due to the requirements for regulating the quality of outflow through chemical testing, specifically in relation to toxicology aspects covered in EPA CFR 40 503—Biosolids Metals Concentrations.

The monitoring of outgoing product allows for regulations to inherently address stability of outflow (i.e., stability with changing markets). Modifications in composting operations to adjust outflow quality may potentially affect the environmental and health risk impacts of these operations. However, analysis of such potential impacts or provisions for such impacts have not been included in regulatory schema or in scientific literature.

Similar to quality of outflow, the effects of price of outflow have not been included directly in composting regulations. A higher price will allow the operators to dig deeper into the mix to get more material out of waste (or get higher quality product by removing more contaminants). We heard this from various operators during site visits in California. This additional processing will have environmental consequences and public health and safety (as well as worker safety) implications. Therefore, price changes result in changes in quality of outflow and potential changes in the environmental and health risk impacts of composting operations. Labeling requirements in numerous states' regulations provide an opportunity for promoting and controlling targeted sales into variable markets at different prices.

Limited information is provided in regards to new technologies and alternative treatments in composting regulations. In general, regulations do not have specific provisions related to type of technologies to be used by operators. The limited inclusion of technology specifics in regulations neither precludes nor promotes the use of new technologies, resulting in a generally flexible regulatory framework in this regard. Numerous states offer grant programs, which specifically promote adoption of new equipment and processes. A few of the selected states specifically mentioned new (i.e., alternative) technologies within the composting regulations. In general, the regulations for composting operations were less strict than for other methods of waste management, as determined specifically using the survey data.

Environmental and Public Health Risk Assessment

Based on the survey responses, investigation of published regulations, scientific literature, and personal correspondence (telephone and e-mail) with state agency representatives, the research team determined that no rigorous risk assessment for environmental and public health aspects

were included in the development of state regulations for composting with the exception of the new regulations approved in Oregon in September 2009. Several of the states referenced environmental regulations within the waste regulations. These related to state air and water quality standards. Most of the states, though, retained qualitative descriptions within the recycling regulations that the operations must prevent nuisances, odors, vectors, etc.

The instances of risk and probabilistic analyses that have been broadly incorporated into state composting regulations include 1) the observance of established chemical concentration thresholds for outgoing compost as originally defined by the U.S. EPA (EPA CFR 40 503—Biosolids Metals Concentrations) and 2) the common use of Most Probable Number (MPN) for quantifying bacterial contaminants. A summary of the new risk-based regulations in Oregon is presented below.

On Aug. 20, 2009, the Oregon Environmental Quality Commission adopted new rules for regulating composting facilities. The new rules became effective Sept. 14, 2009, when they were filed by the Secretary of State. All existing compost operations in the state have 180 days from that effective date to submit documents so that a risk assessment (screening) can be performed by the state. Key points of the new rules include:

1. All facilities, both existing and new, will be screened to evaluate the degree of environmental risk posed by the facility. Low-risk facilities will operate under a registration permit. Higher-risk facilities will be required to provide an operations plan for DEQ approval that addresses the identified risks. These facilities will operate under a composting permit.

2. There are only two tiers for green waste composting (called Type 1 composting). Facilities less than 100 tons/year are exempt from the screening and other regulations. Compost facilities greater than 100 tons/year must be screened.

3. The screening process, as defined by Oregon Administrative Rule 340-096-0080, evaluates the current and likely future impact of the composting facility to human health and the environment; risk of adverse effects to surface water and groundwater, and the likelihood that the facility will create unacceptable odor problems. The Screening Process applies to all existing and future composting facilities. The process is administered by the Land Quality Division of the Oregon Department of Environmental Quality. The standards of the Land Quality Division are at a comparable level to the California EPA standards and regulations.

The compost operator must provide the following information to the Land Quality Division for the screening process:

Physical Information:

(A) The location and site schematic, including areas for management of leachate and stormwater, of the existing or proposed composting facility by latitude and longitude, identified on a map;

(B) The location of the facility on a tax lot map;

(C) The location of and distance to surface water in the drainage area of the composting facility, and all drainage channels, ditches and any other water conveyances leading from the composting facility to surface water, identified on a map;

(D) Distance to the uppermost groundwater aquifer and other known aquifers at the location of the composting facility and in any areas proposed for infiltration of leachate or stormwater from the composting facility;

(E) Soil type or types, and permeability if known or available, at the location of the composting facility and in any areas proposed for infiltration of leachate or stormwater;

(F) The location and well logs of all wells on the property where the composting facility is located; the location and well logs of any wells within a distance of the composting facility; and, if known, the location of any proposed wells within a distance (a specific distance is not defined in regulations) of the composting facility;

(G) The locations of all commercial and residential structures within a one mile radius of the composting facility, identified on a map or photograph;

(H) The prevailing wind direction, by season, identified on a map, and any other climactic information

Operational information including:

(A) A description of the composting operation including feedstock types, volumes and sources, any grinding or other preparation of feedstocks, composting methods, and uses of composted material;

(B) A description of any leachate and stormwater produced at the facility, including information about the chemical composition of leachate;

(C) A description of all existing or planned structures and features for managing leachate and stormwater, including but not limited to information about any detention or infiltration basins, and any infiltration structures such as filter strips and bioswales;

(D) If the facility is subject to the pathogen reduction requirements of OAR 340-096-0070(5), a description of the methods the facility will use to achieve such pathogen reduction;

(E) A description of the methods the facility will use to achieve vector control;

(F) Any seasonal variances in the operation of the facility;

(G) Contact information including the composting facility operator, composting facility owner, and property owner;

(H) Operational and compliance history of the facility

4. Compost facilities determined to have a low environmental and health risk will be issued a registration permit, with a standardized permitting process.

5. Compost facilities determined to present a risk of potential adverse effects to surface water, groundwater, or soil, or may create odor problems beyond the boundaries of the facility, must comply with OAR 340-096-0090: Operations Plan Approval.

6. After approval of the operations plan the facility can apply for a composting permit. This may require an engineering study.

7. All compost facilities, both with a registration and with a permit, must meet performance standards for leachate and stormwater control, prevention of adverse impacts to groundwater, control and minimization of odors, achievement of pathogen reduction by a specified sampling protocol and best practices for temperature and detention time, and control of vectors such as rats, birds, and flies.

The new Oregon compost rules are concise and rigorous, especially the screening process for all new and existing facilities.

Comparison of U.S. and EU Regulations

A summary of EU regulations is provided in Appendix E. A report by Brinton (2000) indicated that Europe has more stringent regulations in terms of quality of compost (specifically heavy metal limits), but the U.S. has more stringent standards related to maturity of compost. The report indicated that the California Compost Quality Council was the leading group on developing maturity standards in the world. Brinton (2000) reported that Germany was the country with the most composting per capita. It was in Germany where the first quality standards were applied using the Dewar Self Heating Test.

EU regulations are similar to the selected states' regulations in that qualitative descriptions are provided in the regulations for protecting human health and the environment. The regulations differ in the specificity of how incoming material is handled. There is no regulation on the percentage of residual or the percentage of putrescible waste in incoming recyclable material. Another difference is the inclusion of regulations on producer responsibility. Such measures suggest that a producer should accept the waste that remains after their product has been used.

9. Recommendations and Impact on Infrastructure

This section includes recommendations for recycling and composting as well as a summary of the impact of the proposed recommendations on the current recycling and composting infrastructure in California. Regulatory models for recycling and composting exist in other states that extend beyond the current regulatory requirements in California. The recycling regulations in California are generally in line with regulations of other states both in terms of content and level of strictness. However, duration limits are enforced for storage of putrescible materials and stricter quantitative thresholds for residual content are present in other states. The composting regulations in other states are generally more comprehensive than the regulations in California in terms of content and more rigorous in terms of level of strictness. Other states' regulations include regulation for facilities composting various types of feedstock and provisions for facility operation as well as for final product specifications and associated end use (i.e., land application) limits.

Recycling

Recommendations provided in this section are developed based on the data collected and analyses conducted in this investigation including nationwide survey results; detailed analyses of state and country Web sites; e-mail and telephone correspondence with state representatives; observations and discussions from site visits (primarily from California where multiple facilities were visited and from Japan where a single facility was visited—not funded by this agreement); discussions with LEAs; and analyses of case histories obtained from literature as well as the general expertise of the research team.

The analyses conducted for the development of recommendations for recycling included identification of best management practices in regulatory schema for protection of the environment and public health and safety; enforceability of regulations (indicating consistency and reproducibility of regulations); and applicability to California, including comparisons to the Three-Part Test. In general, strict regulations were deemed more effective for environmental protection and for providing a high level of public safety and protection compared to more lenient regulations. The research team did not identify a single state with a complete set of regulatory methods and models that represented best management practices in themselves. Therefore, specific relevant and highly applicable features were identified for states analyzed by the research team and recommendations for recycling were developed based on this compilation of features.

Recommendations provided for recycling were based on the themes used in the analyses in Sections 5-8. Specific references are made to the Three-Part Test within the categories analyzed. A list of specific recommendations is provided to summarize the findings of the analyses and interpretation related to the Three-Part Test. The categories of analyses for recycling included:

- Regulatory thresholds
- Tiered regulatory structures
- Entity responsible for regulatory compliance
- Incentives and public awareness
- Cradle-to-grave regulatory oversight

Recycling Recommendations

1) Regulatory Thresholds: Various numerical thresholds for total facility throughput were used by the states analyzed in this investigation as presented in Section 8. No direct comprehensive scientific bases or risk analyses approaches were used in the development of the numerical thresholds related to facility permitting status. For example, recycling facilities handling less than 600 tons of recyclable materials per year were considered small operations in Florida and exempted from regulations, whereas the exemption threshold was established at 100 tons per day in Massachusetts with no foundations provided in the selection of these facility sizes in the respective regulations. Therefore, the research team did not identify and does not recommend at this time the use of highly specific quantitative thresholds of total material throughput for exemptions from regulatory compliance. This recommendation is consistent with the current Three-Part Test. The specification of a total throughput threshold does not provide a means to differentiate between recyclable materials and residual content and thus does not allow for ensuring clean operations for environmental protection and health and safety.

Various material processing operations (e.g., various auto and scrap metal operations, drop-off and buy-back centers) are exempted from permit requirement in California regulations. In addition, certain materials are exempted from inclusion in calculation of residual content (e.g., materials received at buy-back centers or drop-off centers, construction and demolition materials, and compost feedstock). The research team recommends that consideration be given to review and refinement of the current exclusions for both facility types and for materials to be included in

calculation of residual content, in particular for large-scale operations and large quantities of materials. The basis for the exclusion of these exempted operations and materials have not been fully established using scientific analysis and risk assessment. The material exemptions could be interpreted to allow unlimited municipal solid waste feedstock for compost to be processed at a facility without contributing to residual content (i.e., potentially passing the residual content requirement of the Three-Part Test).

California has no provisions related to enclosed (i.e., indoor) recycling operations. The research team recommends that this factor be considered in the regulatory framework as the impact to the environment can be greatly reduced by operating entirely indoors. Indoor operations minimize direct contact between material processing and the surrounding environment. Specifically, migration of airborne particulate matter outside of the facility can be minimized, indoor air quality can be maintained improving worker safety, runoff of contaminants to surface water and groundwater can be prevented, and noise and odor impacts can be reduced. Massachusetts has incorporated the concept of an enclosed facility into their regulatory framework in relation to exemption status (in conjunction with other operating conditions).

In addition, facilities handling source-separated/presorted materials were exempted in regulations in various states including California. During site visits in California, the research team observed that source-separated materials contained significant amounts of solid wastes (i.e., residual content). Therefore, source-separation alone does not indicate low potential for environmental and health and safety impacts from operations. The research team posits that source-separation should not be used as a sole criterion for exemption. Some states use source-separation alone as a criterion for exemption. California currently uses source-separation in conjunction with residual and putrescible content in the Three-Part Test.

Quantity of residuals and presence of putrescibles also is used for exemption status in some states. Regulatory thresholds for residuals were determined to range from 5-15 percent. During site visits in California, the research team observed that typical residual contents ranged from approximately 15-20 percent with an overall range of reported values between 5-22 percent. The variations in residual content were highly region specific as a function of public attitudes about recycling. Public awareness is a significant contributing factor for obtaining low residual levels in recycled materials. Using a fixed fraction of material stream for limiting residual content in a regulatory threshold (as in the Three-Part Test) is problematic as large operations will handle significant quantities of residual materials even if the fraction of residual material is relatively low. It has not been demonstrated that a facility operating at the lower levels of residual fraction observed in California (5-10 percent) does not pose risk to the environment or public health. The research team believes that an absolute threshold of total residual material handled provides a potentially more effective limit for exemption than percentage residual.

For perspective, residual content was observed to be a small fraction of a percent in recycled materials in Japan. This exceedingly low level is directly attributed to high level of public awareness and refined cultural disposal habits in Japan. With such low residual contents, large material flows are possible with minimal environmental risk. The research team believes that such low levels of residual content are not practical expectations for California or the U.S. at large at this time.

Rather than regulating percentages of residual content (as in the Three-Part Test), the research team recommends using an absolute threshold for residual material handling over a given period

of time. As an example to illustrate the approach of using an absolute threshold, a facility could be considered exempt from regulations if their total residual content during a yearlong period was less than 15 tons. This value has been selected to represent the amount of municipal solid waste generated by 20 persons using average per capita waste generation rates. The research team selected a numerical threshold to provide a quantifiable limit for the amount of residual material allowed for a given facility. The per capita rate was used to provide a meaningful conversion to conceptualize the quantity. The research team believes that the waste equivalent to 20 persons provides an example residual amount that a commercial operation can handle in an environmentally safe manner. Other similar approaches could be applied to arrive at a different absolute threshold for residual content. Such a regulatory scheme would allow exemption for clean operations for small and moderate sized businesses, mainly drop-off and buy-back centers. It is expected that large operations would still be fully permitted under this regulatory scheme. The enforceability of an absolute threshold would be more straightforward than monitoring relative fractions of material streams. The suggested absolute threshold for residual content would replace the current 10 percent residual content requirement of the Three-Part Test. The research team believes that an absolute weight-based limit for residual content is a simple regulatory threshold from both operational and enforcement perspectives. In addition, an absolute threshold would provide a direct means to assess environmental risk as it is a quantity that is independent of the scale of the operation and represents the total amount of residual content generated and handled at a given facility.

The presence of putrescibles is limited by various states' regulations. California is the only state that provides a quantitative threshold on the amount of putrescible material. Other states simply have requirements related to the presence or lack thereof of putrescible material. Enforcement of putrescible threshold is relatively difficult due to the significant effort required in quantifying the putrescible content of a recycling material stream including detailed sampling and sorting of incoming materials. The difficulty of sampling and quantifying putrescible content was indicated by numerous California operators during site visits. Specifically, full fractionation of the material stream is required to quantify putrescible content and relatively large samples are required to provide representative values. Standardized and easily adaptable procedures for operational scale are not available for quantifying putrescible content. Other states provide exemption for material streams with no putrescible content (with no further detail provided related to quantity).

For permitted facilities in other states, regulations are present limiting the duration for handling/storage of putrescible materials and range from requiring handling the same day of receipt to storage permitted for up to seven days. California has limits for storage of wastes that range from 48 hours to seven days from receipt of material as a function of the scale of the operation. The research team believes that putrescible material should be included in regulations in some manner. Regulations related to timing of handling and storage are more effective than regulations related to quantity of putrescible content as it is difficult to quantify putrescible fraction. The duration requirements can be enforced more easily while providing environmental protection. An additional environmental benefit of enforcing time limits on putrescible materials is that these limits also will accelerate disposal of nonputrescible residuals in the recycling stream. For permitted sites, the research team recommends the use of a relatively short allowable storage duration for putrescibles in order to prevent development of odors and disease vectors. Specifically, a storage limit on the order of 24 hours for all scales of operation is recommended. This short time limit is similar to regulations in Arkansas (24 hours), New Jersey (processing must begin on the same day of receipt of such material), and large permitted facilities in

California (48 hours). Facilities that exceed the storage duration requirement for putrescibles would be subject to enforcement action.

The research team recommends that material quantities be measured and reported on a weight basis to provide consistent sets of values. Necessary calculations and comparisons can be made directly using measured weights for regulatory compliance. Indirect volume measurements and conversions using assumed parameters (i.e., density or unit weight) are not recommended to ensure representative and repeatable reporting of any measured quantities. For example, in some facilities in California, the weights of truckloads of incoming recycled materials are determined by converting the approximate volumetric capacity of the trucks to weights using assumed densities. This practice leads to uncertainty in quantities and potential errors in regulatory compliance such as misrepresentation of actual residual contents (artificially lower or higher values). Using solely weight based measurements for compliance with the Three-Part Test (or any regulatory requirement for determination of material quantities) would ensure obtaining true material quantities included in recycling operations without introducing uncertainties in any measured and reported values.

Multiple criteria need to be met simultaneously for exemption in some states. The investigation of the research team indicated that composite criteria that consist of multiple provisions were not developed using scientific bases or risk analyses approaches. The use of composite criteria has potential for better environmental protection than a singular criterion (due to controlling impact of multiple factors), however is relatively complicated for regulatory compliance and enforcement and is not recommended at this time prior to establishing proper scientific basis for ensuring effectiveness of such criteria.

2) Tiered Regulatory Structure: Various states include tiered systems for recycling operations. The tiers are most commonly based on material type and material quantity or facility throughput. Other factors (e.g., indoor operations, residual content) also are used within tiered systems in some states. Tiered regulations have potential for providing increased level of regulations for larger operations and for material streams that pose higher environmental risks. Tiered regulations tend to complicate interpretation of regulations from both operator and enforcement perspectives. A low number of tiers provide for a consolidated regulatory structure, however, such a system will tend to treat a broader range of recycling operations similarly. This may be perceived as over-regulating relatively small and clean operations.

The research team recommends that a simple and robust (i.e., applicable to variable conditions) tiered system be employed. The research team believes that any business-scale (for profit) operation should be permitted to ensure proper environmental protection and to minimize public health risks. The research team believes that such a threshold is more meaningful and easier to enforce than selecting an arbitrary quantity of throughput or size of operation (even though such arbitrary thresholds are used in other states). This recommendation is based on discussions with operators in California and reflects the persistent problems they have encountered with illegal, non-permitted, for profit operations. Based on comments from California operators, it appears that significant improvements can be made to facilitate the permit process including application and reporting requirements. Some operators in California indicated specific problems in attempting to change their operational processes under their permit. The research team believes that provisions should be included in a permit to account for operational changes and to promote advancements in recycling technology at operational facilities in a timely manner. At least one

other state reported a research grade permit, which allowed for experimentation of recycling processes. Adoption of special permit provisions is recommended to facilitate development of advancements in recycling technology at existing permitted facilities. Such provisions could be offered as a separate layer of permitting to account for specific changes to the processes of an operation.

The research team believes that lower-tier (i.e., smaller business) operations should have minimal reporting requirements associated with permitted status, however all operations should have sufficiently onerous permitting application processes to discourage illegal operations and to prevent legalization of operations that pose environmental and health and safety risks. It is envisioned that the process for the application be simple enough to facilitate permitting for law-abiding operations. The research team recommends that CalRecycle investigate various options and strategies for preventing illegal activities from occurring.

3) Entity Responsible for Regulatory Compliance: The entity responsible for regulatory compliance at the state level includes recyclers (most common – regulated for all selected states), and also transporters, handlers, and generators in certain states. The entire process of recycling involves all of these entities. The research team believes that it is prudent to have some level of regulatory oversight for each of these entities. Enforcement is more straightforward for recyclers, transporters, and handlers than for generators. Even though regulating generators is potentially complicated and not common practice across the U.S., the research team believes that such regulation is necessary to effectively promote a more advanced culture of recycling. Full enforcement of regulations for generators may not be possible. However, the presence of regulations for generators would instill refined values in the general public in relation to recycling habits and practices.

Poaching and illegal recycling operations are present in California as observed by the research team and discussed with operators during site visits. These aspects of recycling activities are particularly problematic in that they have potential adverse environmental impacts and disregard for public health and safety. In addition, these illegal operations alter the material streams entering legal operations. A stronger regulatory framework needs to be in place so that accountability of the entity responsible for transporting, handling, and processing recyclable materials is assured.

Locations where financial transactions occur related to recyclable materials (e.g., drop-off and buy-back centers) are acute points for improved regulatory and enforcement structures. All transactions, regardless of amount, should be supported by proper documentation and identification.

4) Incentives and Public Awareness: Public awareness about recycling and overall recycling habits affect waste diversion efforts as well as influence effectiveness of recycling operations. Significant attention should be given to increasing public awareness to improve recycling activities. Even though California has a well-developed (relative to other states) set of educational programs regarding recycling and a dedicated Web site, these attributes do not ensure widespread use and correct attitudes towards recycling. Only a small fraction of the recycling operations visited by the research team had active educational programs and appropriate on-site educational facilities. Educational programs with higher visibility and impact are required both from the regulatory side and from the operators. Mass distribution of educational materials should be used including television and targeted mailing. Priority should be established for K-12 school

programs to best influence future trends. For perspective, the facility in Japan had classroom-style seating for approximately 50 people and glass-enclosed viewing platform for observing the operations of the recycling facility. The research team believes that great benefit exists in having the public view recycling facilities firsthand to better understand the operations and the impact of their own personal waste disposal and recycling habits. Regulatory incentives may be considered to promote active participation of the operators in educational efforts. Such educational programs would directly benefit the operators in the long-term by improving the quality of their material stream. Some of the grant funds available within California should be devoted to establishing on-site educational programs. This would provide incentive to operators for developing staff and facilities required for effective outreach activities. The research team recommends that California continue to serve as a leader in recycling education.

The new regulatory structure in the State of California (CalRecycle) may provide an opportunity to revise and improve the state bottle bill. By improving framework for public buy-back facilities and emphasizing convenience for customers (e.g., reverse vending machines), the rates of recycling could be increased.

5) Cradle-to-Grave Regulatory Oversight: Cradle-to-grave regulatory oversight (i.e., provisions for appropriate siting, design, operation, closure, and post-closure of facilities) is present in California to varying degrees. Currently, exempt facilities are not required to provide siting, design, operation, or closure plans. The research team recommends incorporating these aspects into the regulatory framework. The research team envisions template siting, operation, and closure requirements (standard requirements that serve as a master or pattern that can be slightly modified for different facilities) to be in place for all facilities. To streamline the regulatory process for smaller operations, a common set of requirements is envisioned, rather than requiring site-specific plans be developed. Larger operations should be required to develop site-specific plans.

The research team recommends that increased regulations be used for siting recycling operations in relation to impact to the natural and developed environment. As an example, facilities should not be located near airports and proper buffer zone should be required between the activities at the facility and any surrounding developed community.

California has no regulatory requirements related to post-closure planning for recycling facilities. While recycling facilities may have long service lives (as compared to waste containment facilities), requirements for post-closure plans are prudent for assuring that operators remain liable in the long term for any release of contaminants to the environment due to operational activities. The research team recommends that post-closure plans be included in the regulatory structure.

Summary of Recycling Recommendations and Impact on California Infrastructure

A summary of recommendations resulting from the recycling analysis is presented in Table 23. The table includes specific recommendations, how the recommendations compare to the Three-Part Test, and the impact on infrastructure.

Table 23. Recycling Recommendations and Impact on Infrastructure

Recycling Recommendation	Comparison with Three-Part Test	Impact on Infrastructure
Avoid using total facility throughput as a threshold for exemption	Consistent with current Three-Part Test	None
Consider review and refinement of excluded activities and materials	Currently exclusions are provided for a variety of waste material handling operations and specific materials for omission in calculation of residual content	High – Would require potential regulatory compliance by additional waste material handling operations
Consider requirement for indoor operations	Currently not included in Three-Part Test	High – Would require construction/addition of new buildings for numerous facilities
Avoid use of source-separation as sole criterion for exemption	Consistent with current Three-Part Test	None
Use absolute threshold for residual material handling instead of percentage of residual material	This could be used to replace the 10 percent residual component of the Three-Part Test	Low – Quantities are already measured, recommended method would avoid the requirement for calculating percentages
Regulate the duration for putrescible material storage and handling to less than 24 hours	Rather than regulate quantity of putrescible content (which is quite difficult to determine and to enforce), as is done currently in the Three-Part Test, the duration for storage/processing of putrescible can be regulated for permitted facilities. This provision would not be used to determine exemption status.	Medium – This recommendation would simplify the regulatory framework. Operators would be required to closely monitor the processing of putrescible materials
For measured material quantities, use weight basis to provide a consistent set of values	Currently not specified in Three-Part Test	Low - Would simplify material quantity reporting. Would require that all facilities have scales installed (most have this capacity, so minimal impact on operators is envisioned)

Recycling Recommendation	Comparison with Three-Part Test	Impact on Infrastructure
Avoid the use of composite criteria if not developed using scientific basis or risk analysis approaches	Inconsistent with current Three-Part Test	Function of level of change considered
Promote timely modifications to permits for advancing recycling technology at operational facilities	Limited direct connection to Three-Part Test, part of broader regulatory framework	Low - Potentially lead to improvements in the equipment for processing recycled materials. Regulators would have to monitor the effects of the new equipment on the overall operations and impact on the environment
Investigate options for preventing illegal activities from occurring	In some cases, illegal operations are affecting regulatory compliance with the Three-Part Test	Function of the extent and nature of increased enforcement of illegal activities
Maintain some level of regulatory oversight for entire recycling process, including generators	Additional regulations than what are currently in place that may result in significant long-term gains in recycling and would improve compliance with the Three-Part Test	Low - Minimal enforcement of generators is envisioned in practice. If regulated, convenient opportunities for recycling (e.g., reverse vending machines) need to be available to generators
Require proper documentation and identification for transactions involving recycled materials	New provision, especially for small scale operations, in order to prevent illegal activities. This would improve compliance with the Three-Part Test	Low - Increased record keeping will increase enforcement efforts. This point of enforcement has high potential to identify and prevent illegal operations
Promote educational programs that include on-site components at operational facilities	Increased public awareness and better recycling habits would improve compliance with the Three-Part Test in the long term	Medium - Producing such programs would require initial investment from operators and regulators
Increased regulations be used for siting operations in relation to impact to the natural and developed environment	Limited direct connection to Three-Part Test, part of broader regulatory framework.	Medium - May limit geographic location for recycling facilities to avoid adverse impacts on the surrounding environment and communities
Include regulatory provisions for post-closure plans for permitted facilities	Limited direct connection to Three-Part Test, part of broader regulatory framework.	Medium – minimal impact on the day-to-day operations and enforcement, but potential financial impact for post-closure developments

Composting

Recommendations provided in this section are developed based on the data collected and analyses conducted in this investigation including nationwide survey results; detailed analyses of state and country Web sites; e-mail and telephone correspondence with state representatives; observations and discussions from site visits in California; discussions with LEAs; and analyses of case histories obtained from literature; as well as the general expertise of the research team.

The analyses conducted for the development of recommendations for composting included identification of best management practices in regulatory schema for protection of the environment and public health and safety; enforceability of regulations (indicating consistency and reproducibility of regulations); and applicability to California, including comparisons to the green material contamination provision. In general, comprehensive and strict regulations were deemed more effective for environmental protection and providing high level of public safety and protection compared to more lenient regulations. The research team observed that other states used comprehensive regulations for composting including regulating compost and composting operations as a function of feedstock type and end uses for finished compost product. These states are ahead of California in promoting best use (i.e., safe practices) for composting activities. The research team believes that advancements in the safe use of compost would have positive impact on composting applications and activities. The research team did not identify a single state with a complete set of regulatory methods and models that represented best management practices in themselves. Therefore, specific relevant and highly applicable features were identified for states analyzed by the research team and recommendations for composting were developed based on this compilation of features.

Recommendations provided for composting were based on the themes used in the analyses of this entire investigation. Specific references are made to the green material contamination criterion when appropriate within the categories analyzed. A list of specific recommendations is provided to summarize the findings of the analyses and interpretation related to the green material contamination criterion. The categories of analyses for composting included:

- Regulatory thresholds.
- Front-end (i.e., incoming material) versus back-end (i.e., outgoing material including product and residual) regulatory enforcement.
- Tiered regulatory structures.
- Entity responsible for regulatory compliance.
- Incentives and public awareness.
- Cradle-to-grave regulatory oversight.

Composting Recommendations

1) Regulatory Thresholds: Various numerical thresholds were used by the states analyzed in this investigation (Sections 5-8). No direct comprehensive scientific bases or risk analyses approaches were used in the development of the numerical thresholds related to facility permitting status

(with the exception of Oregon's new risk-based regulatory structure). The thresholds for scales of operation that qualify for exemption range from backyard operations (defined as 100 yd^3 in Colorado, not quantified in Florida), to less than 3,000 yd^3 per year of yard waste (New York), to less than 20 to 100 tons depending on compost type and operational details (Oregon), to less than 50 tons (or 500 yd^3) per year (Arkansas). The numerical thresholds are highly variable with no foundations provided in the selection of these facility sizes in the respective regulations. Therefore, the research team did not identify and does not recommend at this time the use of highly specific quantitative thresholds for facility size and capacity for exemptions from regulatory compliance.

Various on-site operations including landscaping, farming, and industrial wastes are exempted in other states' regulations. Similarly, various activities are excluded in California as not constituting compostable material handling operations or facilities and are not required to meet requirements set forth in composting regulations. Exclusions are based on composted material type, as well as beneficial use, which constitute specific end use applications. In addition, multiple criteria need to be met for exemption in other states as well as in California. Examples include combined composted material type and total facility capacity criteria, such as the provisions used in Colorado and New York. Examples in California include composted material type and size of operation as well as composted material type and amount of product sold / given away. The investigation of the research team indicated that composite criteria were not developed using scientific bases or risk analyses approaches. The use of composite criteria has potential for better environmental protection than a singular criterion (due to controlling impact of multiple factors), however is relatively complicated for regulatory compliance and enforcement and is not warranted at this time prior to establishing proper scientific basis for ensuring effectiveness of the criteria. The research team recommends a review and refinement of the current exclusions.

Based on the findings of the analyses and observations, the research team recommends that only backyard on-site residential composting operations be considered for exemption. Specifically this refers to materials generated, processed, and applied at a contiguous residential site without any transport of material off site, or financial transactions (i.e., sales of material). The research team recommends that all other types of operations be regulated. The rationale for this recommendation is that compost is derived from a wide variety of material streams, including solid waste components. Proper material handling at facilities is necessary to minimize adverse environmental and health and safety impacts while promoting the environmental benefits of composting.

In California, the only quantitative threshold that is directly related to feedstock quality is the 1 percent contamination criterion applicable to green materials. Quality of feedstock is not assessed for other types of feedstock. A scientific basis for the selection of the 1 percent criterion has not been identified. Nevertheless, the research team believes that this threshold represents a reasonable level regulatory level in the absence of scientific studies. While the 1 percent threshold is deemed acceptable, the determination of the contamination level is problematic. The regulations require that feedstock undergo load checking to ensure that physical contaminants are no greater than 1 percent of total weight using both visual observation of incoming waste loads and load sorting to quantify percentage of contaminants. A minimum of 1 percent of daily incoming feedstock volume or at least one truck per day, whichever is greater, is required to be inspected visually. If a visual load check indicates a contamination level greater than 1 percent, a representative sample is taken, whereby physical contaminants are collected, weighed, and the

percentage of physical contaminants are determined. The research team does not believe that a true assessment of the presence of a maximum of 1 percent contamination by weight can be done visually on a truckload. The research team recommends the development of a detailed test protocol for representative measurement of the amount of contamination level if this requirement is to be maintained in the regulations for incoming materials.

2) Front-End Versus Back-End Regulatory Enforcement: The survey results indicated that front- and back-end regulatory enforcement included determination of amount of incoming and outgoing materials; regulatory criteria developed as a function of incoming feedstock type; and determination of physical characteristics and quality of outgoing product to maintain mature compost that is free of heavy metal contamination, pathogens, and dangerous materials such as man-made contaminants and foreign matter.

Compost regulations for some of the selected states have requirements for only inflow measurements, while some of the selected states have requirements for both inflow and outflow measurements. Weights and/or volumes are required for material flow measurements. Problems arise when conversions are made between weights and volumes without discrete measurements of both quantities or when multiple modes of measurements are conducted. California compost regulations are not consistent in the use of volume (cubic yards) versus weight (tons).

For example, the following sections (Title 14, California Code of Regulations [14 CCR]) include parameters with volumetric requirements (cubic yards):

- Article 2. Regulatory Tiers for Composting Operations and Facilities

    14 CCR Section 17855. Excluded Activities

    14 CCR Section 17856. Agricultural Material Composting Operations

    14 CCR Section 17857.1. Green Material Composting Operations and Facilities

    14 CCR Section 17862. Research Composting Operation

Weight measurements are provided in the following section:

- Article 2. Regulatory Tiers for Composting Operations and Facilities

    14 CCR Section 17862.1. Chipping and Grinding Operations and Facilities

Both volume and weight are used in the following article:

- Article 7. Environmental Health Standards

    14 CCR Section 17868.1. Sampling Requirements. – Volume measurements are specified in the section, except for the case of biosolids for which metric tons are specified

The 1 percent green material contamination rule is based on weight measurements as described in 14 CCR Section 17868.5.

The research team recommends that total inflow, total outflow, and compost outflow quantities be recorded using weight basis to characterize overall site operations in a consistent manner.

Measurement of additional parameters (e.g., other material in, recycling out, other material out as used by other states) are deemed unnecessary as such measurements add to processing and recordkeeping, without adding inherent value to the compost operations or the permitting process.

Classes of composting facilities and grades of compost were defined in regulations based on type of incoming feedstock in some states (e.g., Arkansas, Colorado, Florida, Maryland). In addition, categories of end uses are defined for outgoing compost based on feedstock type in some states (e.g., Arkansas, Florida, Maryland). In California, the only criterion used related to quality of feedstock is the 1 percent green material contamination provision, which defines the amount of residual in green material feedstock and is not broadly applicable to other types of feedstock. Provisions are not available in regulations in California related to end use of compost as a function of incoming feedstock. The types of incoming feedstock and the classification of the feedstock used in Colorado provide a straightforward, yet thorough, system for detailed compost characterization. The research team recommends that consideration be given to adopting a similar system in California. The recommended classification includes:

Type 1—Agricultural crop residues, manure, untreated wood wastes, yard, paper, and green wastes.

Type 2—Animal material, animal mortalities, and source-separated food wastes.

Type 3—Biosolids, solid waste, processed solid waste, and sludges.

The proposed use of this classification system is intended to provide consumers with details of the source of compost and not to classify the composting facility type. It is important to identify feedstock type as essentially no criterion exists for the variable compost feedstocks except for green material contamination criterion. For mixed feedstocks, the research team recommends that all types included in a mixture be monitored for the benefit of the consumer. In addition, the research team recommends developing guidance on intended use for composts derived from different types of feedstock. Currently, California regulations provide criteria related to chemical constituents and pathogens for different uses of compost; however, no consideration is given to type of feedstock in determination of final use. The composting of medical waste; hazardous waste; and unprocessed mammalian tissue, including but not limited to, flesh, organs, hide, blood, bone, and marrow, are prohibited, except when the tissue is from the food service industry, grocery stores, or residential food scrap collection, or as part of a research composting operation. The recommended criteria by the research team for end use as a function of feedstock include non-restricted use for compost derived from Type 1 feedstock; partially restricted use for compost derived from Type 2 feedstock including no agricultural applications and no applications with direct human contact; and highly restricted use for compost derived from Type 3 feedstock allowing for use only in waste containment facilities similar to other states. The research team believes that requiring identification of feedstock type used in compost generation and regulating the end use of compost as a function of feedstock type will provide better environmental and health protection than the current regulatory schema where only a threshold of 1 percent contamination (i.e., residual content) is considered in green material feedstock and no specific criteria or provisions are provided for variable types of feedstock or end uses.

Outgoing compost is regulated according to physical characteristics and quality. Physical characteristics include particle size, which is generally market-driven, and the research team believes does not need to be regulated. For quality, testing requirements for heavy metals,

pathogens, pH, salts, and foreign matter are common in composting regulations. The metal contaminant limits are based on EPA 40 CFR 503. For heavy metals, other states have limits that are equal to or more stringent than those in EPA 40 CFR 503. In some states the heavy metal limits are used specifically as thresholds for characterizing compost grades. Pathogen testing is required in all selected states. The majority of states use limits that are identical to those presented in EPA 40 CFR 503. Other characteristics for outgoing compost that are measured for selected states include: C/N ratio, organic content, stability, dangerous materials/man-made materials/foreign matter, and PCBs.

The research team recommends continued regulation of quality of outflow from composting operations including metal and pathogen characteristics, the amount of residual/foreign matter, and stability. The research team recommends that the sampling rates for outgoing compost quality be reviewed and potentially refined to reflect the feedstock type. Specifically, the research team recommends more stringent sampling requirements (e.g., higher frequency of sampling) for solid waste feedstocks than for green waste feedstocks to ensure that metal and pathogen characteristics (and other potential parameters) are monitored in a manner for maximum environmental and health and safety protection. For the metal and pathogen parameters, the research team recommends that more stringent limits (i.e., lower concentrations) be enforced for outgoing compost similar to requirements in Maine and Washington. In addition, the EU regulations for chemical composition of compost are significantly more stringent in terms of contaminant limits than the criteria used in the U.S. (Appendix E).

A highly detailed testing protocol for determining the quantity of man-made materials is outlined in the Illinois regulations (further described in Section 8). The research team recommends that a similarly detailed approach be adopted for use in California for providing a repeatable test method and for ensuring quality of outgoing compost. For quantity of man-made materials (i.e., contaminants), the research team recommends the use of a maximum upper limit of 1 percent (by weight), used in other states, even though scientific basis has not been established for this specific value.

For stability characterization, the research team recommends that specific numerical results from standardized tests be used instead of qualitative descriptors such as color for assessing regulatory compliance. Compost is classified as “stable” (i.e., mature) or “unstable” (i.e., unmature), where the term "stable" is often used to describe compost that has ceased undergoing rapid decomposition and compost with nutrients that are readily available for release into the soil. Unstable compost, in contrast, can detrimentally affect plant growth. The respiration rate test method is considered to be the most accurate and repeatable method for determining stability. The test describes a method to determine the rate of oxygen utilization as an indirect measure of biological activity. For horticultural applications, < 20 mg O_2 / kg compost dry solids per hour is considered stable. For field agricultural applications, < 100 mg O_2 / kg compost dry solids per hour is considered stable. There are several test methods discussed on the CalRecycle Web site for determining stability. However, none of these test methods is required by current regulations.

Guidelines are provided for “Purchasing Compost and Mulch” in the CalRecycle Web site (http://www.calrecycle.ca.gov/organics/products/Quality/Needs.htm) for consumers. The CalRecycle Web site provides guidance for “Compost Quality: Performance Requirement Characteristics” and includes guidance for “Quality Standards for Finished Compost.” The guidelines include detailed description of finished product compost parameters as well as include

statements related to the effect of feedstock on the quality of finished compost. The research team believes that consideration should be given to incorporating these recommendations for compost quality into the compost regulations.

In addition, the research team recommends adoption of a highly detailed labeling system for compost, similar to systems available in Rhode Island and Maryland. The label requirements include information on type and/or origin of compost (as described above), physical data, health and safety provisions, suitable applications, and application rates. The data included in the "Compost Quality: Performance Requirements" guidelines in the CalRecycle Web site can be adopted readily for developing labeling criteria.

Overall, the research team observed that other states' regulations extended beyond the compost facility and included provisions for end product use in the analyses of other states' regulations as described in Sections 6 and 8. The recommendations provided herein for end product use are outside the direct scope of this agreement. However, based on the presence of similar regulations in other states, the research team recommends that California consider adopting regulations including end use provisions. Composting can be advanced by adopting regulations that recognize the interconnectedness of the entire composting process including feedstock type, facility operations, quality of product, application, environmental protection, and public health and safety. The research team believes that including regulatory provisions for the entire composting process will elevate public confidence in composting and ultimately result in higher compost usage rates.

3) Tiered Regulatory Structures: Type of inflow material (i.e., feedstock) and size of operation are used to designate specific tier of permitting for composting operations. The benefits of a tiered system include increased regulatory oversight of operations that are large and/or contain material streams that pose higher environmental risks. In concept, enforcement agencies can focus on high-risk facilities and use their resources more effectively in a multi-tiered regulatory structure. The drawbacks of a tiered system are that regulatory compliance and enforcement are complicated and that the thresholds used to define divisions between the tiers are inevitably arbitrary due to lack of scientific foundation for such decision making. A low number of tiers provides for a consolidated regulatory structure, yet such a system will tend to treat a broader range of recycling operations similarly. This may be perceived as over-regulating small and clean operations.

Currently, the California regulations include broad exemptions from regulatory oversight (except for yearly inspections by the LEA) for agricultural composting activities selling less than 1,000 cubic yards of compost product per year; include notification status for green material composting operations if less than 12,500 cubic yards of materials are present on-site at any one time (including feedstock and finished compost); and provide three tiered levels for chipping and grinding operations including less than 200 tons/day (no Permit), 200 to 500 tons/day (Registration Permit), and >500 tons/day (Permit). The selection of the particular weight or volume criteria for permit status has not been based on scientific or risk based analyses. The research team recommends that a simple and robust (i.e., applicable to variable conditions) tiered system be employed to ensure proper environmental protection and to minimize public health risks. The research team believes that any business-scale (for profit) operation should be permitted. The recommended tier system includes exemption for backyard composting operations and full permit for all other operations. The research team does not believe that proper scientific

basis is present for the current multipart tiered system and the particular thresholds used for delineating the tier levels employed in California. The research team does not recommend the use of a complicated, multi-provision tier system, at least until sufficient scientific foundation is available for establishing appropriate threshold delineations.

4) Entity Responsible for Regulatory Compliance: The entity responsible for regulatory compliance at state level includes composters (most common—regulated for all selected states), and handlers (in California). The research team believes that these entities should continue to be regulated and does not recommend any changes to the current regulatory schema in regard to the entity responsible for regulatory compliance.

5) Incentives and Public Awareness: Public awareness about composting and overall green waste disposal habits affect waste diversion efforts as well as influence effectiveness of composting operations. Attention should be given to increasing public awareness to improve composting activities. Even though California has a relatively well-developed set of educational programs regarding composting and a dedicated Web site, the research team recommends that more educational information be provided related to backyard composting, the overall composting process, and information for larger-scale operators. In addition, the research team recommends that the State consider expanding collection programs to increase composting rates throughout the state. Specifically, further development of separate green waste collection programs in rural areas would positively impact statewide diversion rates.

6) Cradle-to-Grave Regulatory Oversight: Cradle-to-grave regulatory oversight (i.e., provisions for appropriate siting, design, operation, closure and post-closure of facilities) is present in California to varying degrees. Currently, exempt facilities are not required to provide siting, design, operation, or closure plans. The research team recommends incorporating these aspects into the current exemption regulatory framework. The research team envisions template siting operation, and closure requirements (standard requirements that serve as a master or pattern that can be slightly modified for different facilities) to be in place for all facilities. To streamline the regulatory process for smaller operations, a common set of requirements is envisioned, rather than requiring site-specific plans to be developed. Larger operations should be required to develop site-specific plans. Streamlined permitting for compost facilities will require coordination with local planning agencies and may not be possible in all cases.

For design and operation plans for compost facilities in California, the research team recommends including more specific details in the regulations. Examples from regulatory schema used in New York, Oregon, and Rhode Island (as described in detail in Section 8) include specific distances to property boundaries from composting areas, requirements for geotechnical reports, and requirements for adequate geotechnical liner systems to reduce nuisances including dust and odor and to prevent leakage of leachate from composting operations to surface water and groundwater for better protection of environment and human health.

Site restoration requirements in California regulations (14 CCR Section 17870) provide minimal criteria for closure with no requirements for a post-closure plan. Composting facility operators are required to provide the EA written notice of intent to perform site restoration, at least 30 days prior to beginning site restoration; provide site restoration necessary to protect public health, safety, and the environment; and perform certain site restoration procedures, which include cleaning of all residues from operation and facility grounds, ponds, and drainage areas, cleaning of all machinery, and cleaning of compost materials, dust, particulates, or other residues from all

structures. By comparison Title 27, Subchapter 5, Articles 1, 2, and 3 provide rigorous requirements for the Closure and Post-Closure of Waste Management Units for Solid Waste. Article 4, Standards for Composting Facilities, is reserved and has not yet been published.

Numerous states require that a closure plan be initiated after a period of time over which no material has been received at a composting facility. Colorado and Illinois define this period as 180 days, whereas New York defines this period as one year. It is recommended that California require the implementation of a closure plan based upon a period of no material intake. This period of time should be allowed to be adjusted on a case-by-case basis depending on how a specific operation functions. Implementing a closure plan based upon a period of no material intake will benefit the environment because it can prevent non-operational facilities from harming the environment. Implementing a closure plan based upon a period of no material intake will be readily enforceable using material flows records.

California has no regulatory requirements related to post-closure planning for composting facilities. While composting facilities may have long service lives (as compared to waste containment facilities), requirements for post closure plans are prudent for assuring that operators remain liable in the long-term for any release of contaminants to the environment due to operational activities. The research team recommends that post-closure plans be included in the regulatory structure.

Summary of Composting Recommendations and Impact on California Infrastructure

A summary of recommendations resulting from the composting analysis is presented in Table 24. The table includes specific recommendations, how the recommendations compare to the California regulations, in particular, the green material contamination provision, and the impact on infrastructure.

Table 24. Composting Recommendations and Impact on Infrastructure

Composting Recommendation	Comparison with California Regulations, Green Material Contamination	Impact on Infrastructure
Avoid using composite criteria such as combined composted material type and total facility capacity as criterion for exemption	Currently regulations have exemptions as a function of type of composted material and facility capacity	Medium – The existing capacity thresholds are relatively low, thereby affecting only some operations
Consider review and refinement of excluded activities	Currently exclusions are provided for a variety of composting operations	High – Would require regulatory compliance by additional composting operations
Provide exemptions for only backyard, on-site residential operations	Exemptions are provided for a multitude of operations as described above	High – Would require regulatory compliance by a wide variety of composting operations
Maintain 1 percent green material contamination regulation	Current status	None
Enforce direct measurement of 1 percent green material contamination	Both visual observation and measurement are used	Medium – Facilities already are required to be capable of conducting direct measurements; measurement only requirement would increase test durations
Develop detailed test protocol for determining 1 percent green material contamination criterion	Limited detail is provided for obtaining representative consistent measurements	Medium – Facilities already have capabilities to measure contamination; the new protocol may require longer test durations, but would streamline operations
For measured material quantities, use weight basis to provide a consistent set of values	Currently, both volume and weight are specified in regulations related to exclusions, weight is used for green material contamination	Low – Would simplify material quantity reporting. Would require that all facilities have scales installed (many have this capacity, so minimal impact on operators is envisioned)
Adopt a classification system for feedstock	Currently not required	Low – Modifications are required in regulations, it is expected that composting operations would not be significantly affected as the requirement only refers to identification of feedstock type

Composting Recommendation	Comparison with California Regulations, Green Material Contamination	Impact on Infrastructure
Develop guidance for compost end use as a function of feedstock	Currently not available	Medium – May limit the use of certain types of feedstock for specified applications
Better regulate sampling requirements for outgoing compost as a function of the type of feedstock	Currently sampling requirements for green material feedstock may be less stringent than the requirements for biosolids or municipal solid waste feedstock	Medium – May affect some operations as a function of feedstock type; all operations already conduct some form of sampling
Lower the concentration limits for metals and pathogens in line with other states and Europe	Currently California regulations are less stringent than selected other states and European standards	Medium – The research team believes that lower concentrations can be achieved in California, as they are already used elsewhere; may require modifications to some operations
Adopt/develop testing procedures for determining the quantity of contaminants and stability of outgoing compost	Currently, these parameters are not determined	High – Equipment and personnel or outside testing services would be required for completing the measurements
Implement labeling requirements	Currently outgoing compost does not have labeling requirements	Low – Composters already obtain majority of the data that would be included in a label; the requirement simply ascertains that compost characteristics be made available to the consumers
Avoid the use of multipart tier criteria if not developed using scientific basis or risk analysis approaches	Inconsistent with current composting regulations	Function of level of change considered
Increased regulations be used for design and operation of composting facilities to promote better environmental protection	Specific details regarding distances to property boundaries; requirements for geotechnical reports; requirements for adequate geotechnical liner systems; requirements for minimizing surface water and groundwater impacts are not included	Medium - May limit geographic location for recycling facilities and require construction of liner/drainage systems

Composting Recommendation	Comparison with California Regulations, Green Material Contamination	Impact on Infrastructure
Include regulatory provisions for post-closure plans for permitted facilities	Currently not required by regulations	Medium – minimal impact on the day-to-day operations and enforcement, but potential financial impact for post-closure developments

Additional Recommendations

A set of additional recommendations based on the entire investigation is provided that are applicable for both recycling and composting. The research team recommends that California increase the use of standardized testing procedures, improve the overall clarity of regulatory format and language, consolidate the regulatory framework, and develop a stronger scientific and risk analysis basis for numerical regulatory thresholds.

The research team recommends that the use of standardized test procedures be increased within the regulatory framework for determining characteristics and parameters associated with recycling and composting operations in a representative and repeatable manner.

The research team recommends that the entire regulatory framework both for recycling and composting operations be consolidated into a single state agency to provide clarity and simplicity for the permitting and enforcement processes. Both recycling and compost operations are regulated by several state agencies including the California Air Resources Board (and local Air Pollution Control Districts), Regional Water Quality Control Boards (stormwater runoff and leachate), and others. During site visits, some operators indicated dissatisfaction over this complex regulatory system. A “one stop shop” within CalRecycle for coordination with the other responsible State agencies would streamline permitting and enforcement.

Scientific bases or risk analyses approaches were not used in the development of numerical thresholds related to facility permitting status in California. The research team recommends that investigations be conducted to establish proper scientific justification for specifying thresholds. With such a scientific foundation, a proper risk analysis would be possible. The risk assessment methodology associated with Oregon’s new composting regulations could be used as a guide. The research team recommends that California regulators closely monitor progress of this new initiative in Oregon and identify specific opportunities and challenges for adapting a similar regulatory practice to California.

10. Synthesis

This investigation was conducted to assess regulatory oversight of waste and material handling activities of other states throughout the U.S. and to compare to the other states’ regulatory schema to California regulations for recycling and composting, in particular in relation to Three-Part Test and green material contamination rules, respectively. Current management practices used in California to comply with the Three-Part Test and green material contamination also were evaluated in the project. Analyses were conducted by: using surveys developed in the investigation; extensive examination of state regulatory Web sites; communication with state regulatory agency representatives; site visits to recycling and composting facilities in California; and discussions with LEAs.

Analyses of other states’ regulations indicated common use of three categories of regulations for recycling and composting: no regulation, regulations for all operations, and intermediate regulations as a function of operational conditions (size of facility,

throughput of material, type of facility, and type of materials handled/processed). Numerical thresholds were used to a limited extent in regulations. Residual, and in particular putrescible, content generally were not quantified for regulatory purposes. Duration of storage of materials at recycling and composting facilities were regulated. Other states also had standards for composition or quality of waste that may be composted and for the quality of compost intended for different applications. More than one-third of the states indicated their status as "considering or in the process" of changing regulations. California was similar to the majority of other states in regulating and requiring permits for recycling and composting activities. California regulations include numerical thresholds for residual and putrescible content and size of facilities. California does not have requirements for duration of on-site storage of processed materials in recycling facilities. California does not have standards addressing the composition or quality of waste that may be composted and standards for the quality of compost in relation to end use. Use of thresholds for contamination levels for incoming materials (i.e., feedstock) at composting facilities is not common. Residual content threshold typically was used for outgoing finished compost products.

Regulations were developed to minimize impact to the environment or nuisance to nearby residents. Specific criteria related to science and engineering fundamentals, health or safety impacts, risk assessment, or cost and feasibility aspects have not been identified in other states. The regulations use qualitative descriptions to address health, safety, and environmental protection. Several states indicated use of science and engineering principles and science-based risk assessment in the development of their regulations. However, in-depth examination of the regulations generally did not provide specific use of current science, market dynamics, and new technology aspects or risk assessment for environmental and public health and safety protection in the development of the regulatory criteria or for use in enforcement of regulations. As an exception, new composting regulations adopted in Oregon in fall 2009 include use of risk assessment tools for assessing composting facilities and permitting decisions.

The visits to recycling facilities in California indicated that the residual content varied between approximately 5-22 percent with a common range between 15-20 percent. Therefore, the majority of the facilities did not meet the residual content requirement in the Three-Part Test. The amount of putrescible materials was not monitored by the majority of the sites. Composting facility operators reported compliance with the green material contamination rule at facilities receiving only commercial and curbside materials. The fraction of contaminants was determined by visual inspection and both operators and LEAs expressed concerns regarding the complexity of measurements. At facilities with both recycling and composting activities, feedstock quality was highly variable, especially in comparison to composting only facilities and the feedstock (which contained municipal solid waste in some cases) did not meet the green material contamination rule.

Regulatory models for recycling and composting present in other states' regulatory schema extend beyond the current regulatory requirements in California. The recycling regulations in California are generally in line with regulations of other states, both in terms of content and level of strictness with the exception of duration limits for storage of processed recycled materials and stricter quantitative thresholds for residual content. The

composting regulations in other states are generally more comprehensive than the regulations in California in terms of content and more rigorous in terms of level of strictness. Other states' regulations include criteria for facilities composting various types of feedstock and provisions for facility operation as well as for final product specifications and associated end use limits. In general, use of absolute quantity of residual instead of fractions of throughput is recommended. Consideration should be given to review of exemptions and exclusions both for recycling and composting. Standardized procedures and weight-based measurements are recommended to be used for regulatory compliance. Development of fundamental engineering and science basis for regulations and use of risk assessment in regulatory schema is recommended. Review and reassessment of both recycling and composting regulations are recommended for maintaining the regulatory schema current and for improved environmental and health and safety protection.

Appendix A - Selected Details of State Regulations

Table A-1. State Recycling Regulation Web sites

State	Recycling Regulation Web site	Comments
Alabama	http://www.adem.state.al.us/alEnviroRegLaws/files/Division13.pdf	"Processing and Recycling" is reserved.
Alaska	No recycling regulations	
Arizona	http://www.azdeq.gov/environ/waste/solid/1f.html	
Arkansas	http://www.adeq.state.ar.us/regs/files/reg22_final_080426.pdf	
California	http://www.calrecycle.ca.gov/Laws/Regulations/Title14/ch3a64.htm	
Colorado	http://www.cdphe.state.co.us/regulations/solidwaste/100702part1SWRegs.pdf	
Connecticut	http://www.ct.gov/dep/cwp/view.asp?a=2714&q=324894&depNav_GID=1645	
Delaware	No recycling regulations	
Florida	http://www.dep.state.fl.us/waste/quick_topics/rules/documents/62-701.pdf http://www.dep.state.fl.us/waste/quick_topics/rules/documents/62-722.pdf	
Georgia	http://rules.sos.state.ga.us/docs/391/3/4/04.PDF	
Hawaii	http://gen.doh.hawaii.gov/sites/har/AdmRules1/11-58.pdf	
Idaho	Regulation Web site not available	Recycling, similar to solid waste collection, is an optional service provided at the discretion of local governments or by private companies.

State	Recycling Regulation Web site	Comments
Illinois	No recycling regulations	
Indiana	Regulation Web site not available	
Iowa	http://www.iowadnr.gov/waste/policy/administrative.html	
Kansas	http://www.kdheks.gov/waste/regsstatutes/sw_laws.pdf	
Kentucky	http://www.lrc.ky.gov/kar/title401.htm	
Louisiana	http://www.deq.state.la.us/portal/LinkClick.aspx?fileticket=kEpd%2bdU3AKU%3d&tabid=1674	
Maine	http://www.maine.gov/dep/rwm/rules/index.htm	
Maryland	http://www.dsd.state.md.us/comar/SubtitleSearch.aspx?search=26.04.07.*	
Massachusetts	http://www.mass.gov/dep/service/regulations/310cmr16.pdf http://www.mass.gov/dep/service/regulations/310cmr19.pdf	
Michigan	http://www.legislature.mi.gov/%28S%28jh3pdp45cacsirrsx0dkiw55%29%29/mileg.aspx?page=getobject&objectname=mcl-451-1994-II-3-115&query=on&highlight=Solid%20AND%20Waste%20AND%20Management	
Minnesota	https://www.revisor.mn.gov/rules/?id=7035.2845	
Mississippi	http://www.deq.state.ms.us/newweb/MDEQRegulations.nsf?OpenDatabase	Regulation Web site not available, this Web site mentions recyclables.
Missouri	http://www.sos.mo.gov/adrules/csr/current/10csr/10c80-2b.pdf	
Montana	http://www.deq.mt.gov/SolidWaste/docs/PreliminaryVersionOfNewSolidWasteRules.pdf	

State	Recycling Regulation Web site	Comments
Nebraska	http://www.deq.state.ne.us/	Title 132, Chapter 1, Sections 097 & 098, and Chapter 2, Section 002
Nevada	http://www.leg.state.nv.us/NRS/NRS-444A.html	
New Hampshire	http://des.nh.gov/organization/commissioner/legal/rules/	
New Jersey	http://www.state.nj.us/dep/dshw/resource/2009%20RULES/26A%20RECYCLING.pdf	
New Mexico	http://www.nmenv.state.nm.us/swb/documents/Solid_Waste_Rules_Regulations.pdf	
New York	http://www.dec.ny.gov/regs/4404.html	
North Carolina	http://www.ncga.state.nc.us/EnactedLegislation/Statutes/HTML/ByArticle/Chapter_130A/Article_9.html	Regulation Web site not available, this Web site mentions recovered materials
North Dakota	No recycling regulations	
Ohio	http://codes.ohio.gov/orc/1502	Regulation Web site not available, this Web site mentions that recycling should occur
Oklahoma	No recycling regulations	
Oregon	http://arcweb.sos.state.or.us/rules/OARs_300/OAR_340/340_090.html	
Pennsylvania	http://www.pacode.com/secure/data/025/chapter272/chap272toc.html	

State	Recycling Regulation Web site	Comments
Rhode Island	http://www.dem.ri.gov/pubs/regs/index.htm#WM	
South Carolina	No recycling regulations	
South Dakota	http://legis.state.sd.us/statutes/DisplayStatute.aspx?Statute=34A-6&Type=Statute	Regulation Web site not available, this Web site mentions that recycling should occur
Tennessee	http://www.michie.com/tennessee/lpext.dll?f=templates&fn=main-h.htm&cp=tncode	Title 68, Chapter 211, Part 8
Texas	http://www.tceq.state.tx.us/permitting/waste_permits/msw_permits/MSW_amIregulatedrecycling.html	
Utah	http://www.hazardouswaste.utah.gov/Rules/Adobe/SWRules/R315-312.eff.pdf	
Vermont	http://www.anr.state.vt.us/dec/wastediv/solid/pubs/SWMRules.pdf	
Virginia	http://www.deq.virginia.gov/waste/wastereg80.html	
Washington	http://apps.leg.wa.gov/WAC/default.aspx?cite=173-350-210	
West Virginia	http://www.legis.state.wv.us/WVCODE/Code.cfm	Chapter 22, Article 15; Chapter 22, Article 15A; Chapter 22C, Article 3 and Chapter 22C, Article 4
Wisconsin	http://dnr.wi.gov/org/aw/wm/information/wiacssr.htm	
Wyoming	http://deq.state.wy.us/shwd/downloads/SWRules_pdf/1388.pdf	

Table A-2. State Composting Regulation Web sites

State	Composting Regulation Web site	Comments
Alabama	Regulation Web site not available.	
Alaska	Only large composting facilities require a permit, however there are no large facilities in Alaska	Survey Response
Arizona	http://www.azdeq.gov/environ/waste/solid/1c.html	Regulations have not yet been developed
Arkansas	http://www.sos.arkansas.gov/elections/elections_pdfs/register/2008/may_2008/014.00.07-012.pdf	
California	http://www.calrecycle.ca.gov/Laws/Regulations/Title14/ch31.htm	
Colorado	http://www.cdphe.state.co.us/regulations/solidwaste/100702part1SWRegs.pdf	
Connecticut	http://www.ct.gov/dep/cwp/view.asp?a=2704&q=323516 http://www.ct.gov/dep/lib/dep/regulations/22a/22a-208i%28a%29-1.pdf	
Delaware	http://regulations.delaware.gov/AdminCode/title7/1000/1300/Split1301/index.shtml	
Florida	http://www.dep.state.fl.us/waste/quick_topics/rules/documents/62-709.pdf	
Georgia	http://rules.sos.state.ga.us/docs/391/3/4/16.pdf	
Hawaii	http://hawaii.gov/health/environmental/waste/sw/pdf/11-581.pdf	
Idaho	http://adm.idaho.gov/adminrules/rules/idapa58/0106.pdf	
Illinois	http://www.ilga.gov/commission/jcar/admincode/035/03500830sections.html	
Indiana	http://www.in.gov/legislative/ic/code/title13/ar20/ch10.html	
Iowa	http://www.legis.state.ia.us/Rules/2000/iac/567iac/567116/567105.pdf	
Kansas	http://www.kdheks.gov/pdf/regs/28-29.pdf	

State	Composting Regulation Web site	Comments
Kentucky	http://www.lrc.state.ky.us/kar/401/048/200.htm	
Louisiana	http://www.deq.louisiana.gov/portal/LinkClick.aspx?fileticket=kEpd%2bdU3AKU%3d&tabid=1674	
Maine	http://www.maine.gov/sos/cec/rules/06/096/096c410.doc	
Maryland	http://www.dsd.state.md.us/comar/SearchTitle.aspx?scope=15	
Massachusetts	http://www.mass.gov/dep/service/regulations/310cmr16.pdf http://www.mass.gov/dep/service/regulations/310cmr19.pdf	
Michigan	http://www.legislature.mi.gov/%28S%28qth4esaxmx3e1j55m2ogjpzo%29%29/mileg.aspx?page=getObject&objectName=mcl-324-11521	
Minnesota	https://www.revisor.mn.gov/rules/?id=7035.2836 http://www.pca.state.mn.us/waste/compost.html	
Mississippi	http://www.deq.state.ms.us/MDEQ.nsf/pdf/SW_RevisedMississippiNonhazardousSolidWasteManagementRegulations/$File/Non%20Haz%20SW%20Mgmt%20Regs%20%28REVISED%29.pdf?OpenElement	
Missouri	http://www.sos.mo.gov/adrules/csr/current/10csr/10c80-2a.pdf	
Montana	http://www.deq.mt.gov/dir/Legal/Chapters/CH50-04.pdf	
Nebraska	http://www.deq.state.ne.us/Publica.nsf/0/f629cb37ee89ff7e06256b7300570e26?OpenDocument	
Nevada	http://leg.state.nv.us/NRS/NRS-444.html#NRS444Sec560	
New Hampshire	http://des.nh.gov/organization/commissioner/legal/rules/index.htm#solid	
New Jersey	http://www.nj.gov/dep/dshw/resource/26sch02b.pdf	
New Mexico	http://www.nmcpr.state.nm.us/nmac/parts/title20/20.009.0003.htm	

State	Composting Regulation Web site	Comments
New York	http://www.dec.ny.gov/regs/4411.html	
North Carolina	http://www.wastenotnc.org/swhome/Rules/SWStatutes_RulesAug2008/Section.1400.pdf	
North Dakota	http://www.legis.nd.gov/information/acdata/pdf/33-20-02.1.pdf http://www.legis.nd.gov/information/acdata/pdf/33-20-03.1.pdf http://www.legis.nd.gov/information/acdata/pdf/33-20-04.1.pdf http://www.legis.nd.gov/information/acdata/pdf/33-20-13.pdf	
Ohio	http://www.epa.state.oh.us/dsiwm/pages/3745_27.aspx	
Oklahoma	http://www.deq.state.ok.us/rules/515.pdf	
Oregon	http://arcweb.sos.state.or.us/rules/OARs_300/OAR_340/340_093.html	
Pennsylvania	http://www.pacode.com/secure/data/025/chapter281/chap281toc.html	
Rhode Island	http://www.dem.ri.gov/pubs/regs/regs/waste/swrg05_8.pdf	
South Carolina	http://www.scdhec.net/environment/lwm/regs/R61-107_4.pdf http://www.scdhec.net/environment/lwm/regs/R61-107_10.pdf http://www.scdhec.net/environment/water/regs/r61-43.pdf http://www.scdhec.net/environment/water/regs/r61-9.pdf	
South Dakota	http://denr.sd.gov/des/wm/sw/documents/COMPGEN.pdf	
Tennessee	http://www.state.tn.us/sos/rules/1200/1200-01/1200-01-07.pdf	
Texas	http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=332 http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=5&ti=30&pt=1&ch=328&sch=A&rl=Y	
Utah	http://www.rules.utah.gov/publicat/code/r315/r315-312.htm	
Vermont	http://www.anr.state.vt.us/dec/wastediv/solid/pubs/SWMRules.pdf	

State	Composting Regulation Web site	Comments
Virginia	http://www.deq.virginia.gov/waste/wastereg101.html http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+9VAC20-80-330	
Washington	http://apps.leg.wa.gov/WAC/default.aspx?cite=173-350-220	
West Virginia	http://apps.sos.wv.gov/csrdocs/worddocs/33-03.doc	
Wisconsin	http://www.legis.state.wi.us/rsb/code/nr/nr502.pdf http://dnr.wi.gov/org/aw/wm/solid/rulemodsnr502-12.htm	
Wyoming	http://deq.state.wy.us/shwd/downloads/SWRules_pdf/1388.pdf	

Table A-3. List of Contacts for Other States – Recycling Programs

State	Name	Recycling Contact Position and Affiliation
Alabama	Gavin Adams	Chief of Materials Management Section, Recycling and Scrap Tires Program, Land Division, Alabama Department of Environmental Management
Alaska	Doug Huntman	Environmental Specialist, Solid Waste Program, Division of Environmental Health, Alaska Department of Environmental Conservation
Arizona	Juli Boles	Recycling Unit Manager, Recycling and Brownfields Unit, Waste Programs Division, Arizona Department of Environmental Quality
Arkansas	Robert Hunter	Branch Manager, Solid Waste Management Division, Arkansas Department of Environmental Quality
Colorado	Wolf Kray	Environmental Protection Specialist, Hazardous Materials and Waste Management Division, Colorado Department of Public Health and Environment
Connecticut	David McKeegan	Environmental Analyst, Waste Engineering and Enforcement, Connecticut Department of Environmental Protection
Delaware	Michael Parkowski and Rich VonStetten	Legal Counsel (Michael), Senior Manager of Statewide Recycling (Rich), Delaware Solid Waste Authority
Florida	Ron Henricks	Environmental Manager, Recycling Program, Florida Department of Environmental Protection
Georgia	Randy Hartmann	Director of Office of Environmental Management, Georgia Department of Community Affairs
Hawaii	Jennifer Tosaki	State Recycling Coordinator, Solid and Hazardous Waste Branch, Hawaii Department of Health
Idaho	Dean Ehlert	Solid Waste Program Coordinator, Idaho Department of Environmental Quality
Illinois	Ellen Robinson	Project Manager, Bureau of Land, Illinois Environmental Protection Agency
Indiana	Jerome Rud	Chief of Solid Waste Permits Section, Indiana Department of Environmental Management
Iowa	Becky Jolly	Permitting Section, Solid Waste Permitting Section, Land Quality Bureau, Iowa Department of Natural Resources
Kansas	Rodney Ferguson	Public Service Executive, Bureau of Waste Management, Kansas Department of Health and Environment

State	Name	Recycling Contact Position and Affiliation
Kentucky	Chris Fitzpatrick	Branch Manager, Recycling and Local Assistance, Division of Waste Management, Kentucky Department for Environmental Protection
Louisiana	Hoa Van Nguyen	Environmental Chemical Specialist, Waste Permits Group, Engineering Section, Louisiana Department of Environmental Quality
Maine	Mark A. King	Environmental Specialist, Division of Solid Waste Management, Maine Department of Environmental Protection
Maryland	Hilary Miller, David Mrgich, Edward Dexter	Program Manager (Hilary), Department of the Environment Recycling Coordinator (David), Administrator for the MDE Solid Waste Program (Edward), Recycling and Operations Program, Solid Waste Program, Maryland Department of Environment
Massachu-setts	John Fischer	Branch Chief for Waste and Toxics Planning, Massachusetts Department of Environmental Protection
Michigan	Duane Roskoskey	Environmental Quality Specialist, Michigan Department of Environmental Quality
Minnesota	Geoffrey Strack	Senior Engineer, Solid Waste Section, Municipal Division, Minnesota Pollution Control Agency
Mississippi	Billy Warden	Chief, Solid Waste and Mining Permitting Branch, Mississippi Department of Environmental Quality
Missouri	Katy D'Agostino	Planner, Solid Waste Management Program, Missouri Department of Natural Resources
Montana	Dusti Johnson	Recycling and Market Development Specialist, Energy and Pollution Prevention Bureau, Montana Department of Environmental Quality
Nebraska	Steve Danahy	Planning & Aid Unit Supervisor, Waste Management Division, Nebraska Department of Environmental Quality
Nevada	Kathryn Fergus	Southern Nevada Recycling Coordinator, Nevada Division of Environmental Protection
New Hampshire	Donald E. Maurer	Supervisor, New Hampshire Department of Environmental Services
New Jersey	Anthony Fontana	Bureau Chief, Bureau of Transfer Stations and Recycling Facilities, New Jersey Department of Environmental Protection
New Mexico	Tim Gray	Environmental Specialist, Outreach/Recycling Coordinator, New Mexico Environment Department
New York	Gus Ribeiro	Environmental Program Specialist, Bureau of Solid Waste, Reduction, & Recycling, New York State Department of Conservation
North Carolina	Mark Poindexter	Field Operations Supervisor, North Carolina Department of Environment and Natural Resources

State	Name	Recycling Contact Position and Affiliation
North Dakota	Christy Smith	Environmental Scientist, Solid Waste Program, Division of Waste Management, North Dakota Department of Health
Ohio	Andrew Booker	Manager, Planning Section of Solid and Infectious Wastes, Ohio Environmental Protection Agency
Oklahoma	Fenton Rood	Environmental Programs Manager, Land Protection Division, Oklahoma Department of Environmental Quality
Oregon	Loretta Pickerell	Solid Waste Manager, Solid Waste Policy and Program Development, Oregon Department of Environmental Quality
Pennsylvania	Larry Holley	Waste Minimization and Planning Division Chief, Pennsylvania Department of Environmental Protection
Rhode Island	Alyson Silva	Junior Sanitary Engineer, Commercial Recycling Coordinator, Rhode Island Department of Environmental Management
South Carolina	Richard Chesley	Manager, Education, Technical Assistance and Reporting Section, Office of Solid Waste Reduction and Recycling, South Carolina Department of Health and Environmental Control
South Dakota	Andrew McCloud	Recycling Coordinator, South Dakota Department of Environment and Natural Resources
Tennessee	Larry Christley and Matt Maynard	Environmental Assistance Program Manager, Division of Solid and Hazardous Waste Management, Tennessee Department of Environment and Conservation
Texas	Dr. Richard Carmichael and Wayne Harry	Municipal Solid Waste Permits Section Manager (Richard) and Technical Specialist (Wayne), Texas Commission on Environmental Quality
Utah	Ralph Bohn	Section Manager, Solid Waste Section, Utah Department of Environmental Quality
Vermont	Mark Roy	Chief of Recycling Section, Vermont Department of Environmental Conservation
Virginia	Daniel S. Gwinner	Office of Waste Programs, Virginia Department of Environmental Quality
Washington	Gretchen Newman	Environmental Specialist, Solid Waste and Financial Assistance Program, Washington Department of Ecology
West Virginia	Carol Throckmorton	Chief of Recycling Market Development and Planning, Recycling Market Development & Planning, West Virginia Solid Waste Management Board
Wisconsin	Cynthia Moore	Recycling Program Coordinator, Wisconsin Department of Natural Resources

State	Name	Recycling Contact Position and Affiliation
Wyoming	Bob Doctor	Program Manager, Solid Waste Permitting and Corrective Action, Solid and Hazardous Waste Division, Wyoming Department of Environmental Quality

Table A-4. List of Contacts for Other States – Composting Programs

State	Name	Composting Contact Position and Affiliation
Alabama	Phil Davis	Head of Solid Waste Branch, Land Division, Alabama Department of Environmental Management
Alaska	Deric Marcorelle	Solid Waste Specialist, Alaska Department of Environmental Conservation
Arizona	Juli Boles	Recycling Unit Manager, Recycling and Brownfields Units, Waste Programs Division, Arizona Department of Environmental Quality
Arkansas	Bryan Leamons and Susan Speake	Engineer Supervisor, Tech Branch (Bryan), Programs Branch Manager (Susan), Solid Waste Management Division, Arkansas Department of Environmental Quality
Colorado	Roger Doak	Permitting Unit Leader, Solid Waste Unit, Colorado Department of Public Health and Environment
Connecticut	K.C. Alexander	Environmental Analyst III, Bureau of Materials Management and Compliance, Waste Engineering and Enforcement, Connecticut Department of Environmental Protection
Delaware	Andrea Barbieri	Environmental Scientist, Waste Reduction, Reuse, and Recycling Section, Solid and Hazardous Management Branch, Delaware Department of Natural Resources and Environmental Control
Florida	Francine Joyal	Environmental Specialist, Bureau of Solid and Hazardous Waste, Solid Waste Section, Florida Department of Environmental Protection
Georgia	Randy Hartmann	Director of Office of Environmental Management, Georgia Department of Community Affairs
Hawaii	Jennifer Tosaki	State Recycling Coordinator, Solid and Hazardous Waste Branch, Hawaii Department of Health
Idaho	Dean Ehlert	Solid Waste Program Coordinator, Idaho Department of Environmental Quality
Illinois	Ellen Robinson	Project Manager, Bureau of Land, Illinois Environmental Protection Agency
Indiana	Jerome Rud	Chief of Solid Waste Permits Section, Indiana Department of Environmental Management

State	Name	Composting Contact Position and Affiliation
Iowa	Matt McDonald	Environmental Specialist, Iowa Department of Natural Resources
Kansas	Ken Powell	Environmental Scientist, Solid Waste Permits Section, Bureau of Waste Management, Kansas Department of Health and Environment
Kentucky	Bob Bickner	Supervisor of the Solid Waste Branch, Division of Waste Management, Kentucky Department for Environmental Protection
Louisiana	Hoa Van Nguyen	Environmental Chemical Specialist, Waste Permits Group, Engineering Section, Louisiana Department of Environmental Quality
Maine	Mark A. King	Environmental Specialist, Division of Solid Waste Management, Maine Department of Environmental Protection
Maryland	Donald Lewis	Compost Coordinator, State Chemist Section, Maryland Department of Agriculture
Massachusetts	John Fischer	Branch Chief for Waste and Toxics Planning, Massachusetts Department of Environmental Protection
Michigan	Duane Roskoskey	Environmental Quality Specialist, Michigan Department of Environmental Quality
Minnesota	Geoffrey Strack	Senior Engineer, Solid Waste Section, Municipal Division, Minnesota Pollution Control Agency
Mississippi	Billy Warden	Chief, Solid Waste and Mining Permitting Branch, Mississippi Department of Environmental Quality
Missouri	Chris Nagel and Jane Davis	Compliance and Enforcement Section Chief (Chris), Planner (Jane), Solid Waste Management Program, Missouri Department of Natural Resources
Montana	Dusti Johnson	Recycling and Market Development Specialist, Energy and Pollution Prevention Bureau, Montana Department of Environmental Quality
Nebraska	Dave Johnson	Program Specialist, Waste Management Section, Nebraska Department of Environmental Quality
Nevada	Jon Taylor	Staff Engineer, Bureau of Waste Materials, Nevada Department of Environmental Protection
New Hampshire	Donald E. Maurer	Supervisor, New Hampshire Department of Environmental Services
New Jersey	Joseph Staab and Guy Watson	Principal Environmental Engineer (Joseph), Bureau Chief (Guy), New Jersey Department of Environmental Protection
New Mexico	Gregory Baker	Environmental Scientist, Solid Waste Bureau, New Mexico Environmental Department

State	Name	Composting Contact Position and Affiliation
New York	Ly Lim	Environmental Engineer, Bureau of Solid Waste, Reduction & Recycling, Division of Solid & Hazardous Materials, New York State Department of Conservation
North Carolina	Michael Scott	Supervisor, Compost Branch, Division of Waste Management, North Carolina Department of Environment and Natural Resources
North Dakota	Christy Smith	Environmental Scientist, Division of Waste Management, Solid Waste Program, North Dakota Department of Health
Ohio	Angel Arroyo-Rodriguez, Joe Goicochea, and Alison Shockley	Environmental Specialist (Angel), Environmental Supervisor (Joe), Environmental Supervisor (Alison), Division of Solid and Infectious Waste Management, Ohio Environmental Protection Agency
Oklahoma	Fenton Rood	Environmental Programs Manager, Land Protection Division, Oklahoma Department of Environmental Quality
Oregon	Charlie Landman	Legal Policy Advisor, Land Quality Division, Oregon Department of Environmental Quality
Pennsylvania	Patti Olenick	Waste Specialist, Permitting, Pennsylvania Department of Environmental Protection
Rhode Island	Christopher Shafer	Senior Environmental Scientist, Waste Management Division, Rhode Island Department of Environmental Management
South Carolina	Woody Barnes	Regulation Development, Bureau of Land and Waste Management, South Carolina Department of Health and Environmental Control
South Dakota	Steve Kropp	Natural Resources Engineering Specialist, Waste Management Program, South Dakota Department of Environmental and Natural Resources
Tennessee	Larry Christley	Environmental Assistance Program Manager, Division of Solid and Hazardous Waste Management, Tennessee Department of Environment and Conservation
Texas	Wayne Harry	Rule Project Manager, Municipal Solid Waste Permits Section, Texas Commission on Environmental Quality
Utah	Ralph Bohn	Section Manager, Solid Waste Section, Utah Department of Environmental Quality
Vermont	Cathy Jamieson	Solid Waste Program Manager, Waste Management Division, State of Vermont Department of Environmental Conservation
Virginia	Jason Williams	Solid Waste Permit Coordinator, Virginia Department of Environmental Quality

State	Name	Composting Contact Position and Affiliation
Washington	Chery Sullivan	Organics Specialist, Washington State Department of Ecology
West Virginia	Carol Throckmorton	Chief of Recycling Market Development and Planning, Recycling Market Development & Planning, West Virginia Solid Waste Management Board
Wisconsin	Cynthia Moore	Recycling Program Coordinator, Wisconsin Department of Natural Resources
Wyoming	Bob Doctor	Program Manager, Solid Waste Permitting and Corrective Action, Solid and Hazardous Waste Division, Wyoming Department of Environmental Quality

Table A-5. Tiered Regulations for Recycling

State	Tiered Regulatory Details for Recycling
Arkansas	**Reg.22.1001- Applicability** (a) This Chapter pertains to the construction and operation of construction and demolition recovery facilities (C&DRF) and material recycling facilities (MRF). (b) Exemptions from Permitting - The following facilities and activities are exempt from permitting: (1) Material recycling facilities and facilities engaged solely in the handling and processing of nonputrescible, "source separated recovered materials" as defined in Reg.22.102. Operation of the MRF shall be in conformance with the requirements of Reg.22.1002; **Reg.22.1002- Material Recycling Facilities** (a) Exemption from Permitting - In accordance with Reg.22.1001, MRFs are exempt from regulation under this Chapter provided that the operation of the facility is consistent with the requirements of this section. Facilities that fail to comply with the requirements of this section shall be subject to permitting in accordance with Chapter 9 or Chapter 10 as applicable, and enforcement action in accordance with Chapter 15.
California	Article 6.0: Transfer/Processing Operations and Facilities Regulatory Requirements Article 6.1: Siting and Design Article 6.2: Operating Standards Article 6.3: Record Keeping Requirements Article 6.35: Additional Operating Requirements for Facilities Only "Putrescible Wastes" include wastes that are capable of being decomposed by micro-organisms with sufficient rapidity as to cause nuisances because of odors, vectors, gases or other offensive conditions, and include materials such as, but not limited to food wastes, offal and dead animals. The EA shall determine on a case-by-case basis whether or not a site is handling putrescible wastes. **17402.5. Definitions and Related Provisions Regarding Activities That Are Not Subject to the Transfer/Processing Regulatory Requirements.** (c) Activities included in one of the following definitions are not subject to the requirements of Articles 6.0, 6.1, 6.2, 6.3 and 6.35 of this Chapter, provided that these activities do not include the acceptance of solid waste which has not been separated for reuse. If an activity defined in this section is accepting solid waste which has not been separated for reuse, it must meet the requirements of subdivision (d) of this section or else it shall be subject to the requirements of Articles 6.0, 6.1, 6.2, 6.3 and 6.35 of this Chapter. (3) "Buy Back Center" means a person or business entity engaging in those activities defined in Public Resources Code Sections 14518, or 14520. (4) "Drop-off Center" means a person or business entity engaging in those activities defined in Public Resources Code Section 14511.7. (d) A "Recycling Center" means a person or business entity that meets the

State	Tiered Regulatory Details for Recycling
California (con't.)	requirements of this subdivision. A recycling center shall not be subject to the requirements of Articles 6.0, 6.1, 6.2, 6.3 and 6.35 of this Chapter. (1) A recycling center shall only receive material that has been separated for reuse prior to receipt. (2) The residual amount of solid waste in the separated for reuse material shall be less than 10% of the amount of separated for reuse material received by weight. (A) The residual amount is calculated by measuring the outgoing tonnage after separated for reuse materials have been removed. (B) The residual amount is calculated on a monthly basis based on the number of operating days. (3) The amount of putrescible wastes in the separated for reuse material shall be less than 1% of the amount of separated for reuse material received by weight, and the putrescible wastes in the separated for reuse material shall not cause a nuisance, as determined by the EA. (A) The amount of putrescible wastes is calculated in percent as the weight of putrescible wastes divided by the total incoming weight of separated for reuse material. (B) The amount of putrescible wastes is calculated on a monthly basis based on the number of operating days. NOTE: If a recycling center does not abide by the regulations for a "Recycling Center", then the facility may be defined as a limited, medium, or large volume transfer operation; the operation will then subsequently be regulated as such. **Section 17403.3. Limited Volume Transfer Operations.** All limited volume transfer operations subject to this Article shall comply with the Enforcement Agency Notification requirements set forth in Title 14, Division 7, Chapter 5.0, Article 3.0 of the California Code of Regulations (commencing with section 18100). These operations shall be inspected by the EA as necessary to verify compliance with minimum standards. Inspections shall be conducted quarterly, unless the EA determines a lesser frequency is necessary, but in no case shall the frequency be less than annual. The operator shall specify the operation's boundary area in the operating record. **Definition** (9) "Limited Volume Transfer Operation" means an operation that receives less than 60 cubic yards, or 15 tons of solid waste per operating day for the purpose of storing the waste prior to transferring the waste to another solid waste operation or facility and which does not conduct processing activities, but may conduct limited salvaging activities and volume reduction by the operator. **Section 17403.6. Medium Volume Transfer/Processing Facilities.** All medium volume transfer/processing facilities subject to this Article shall comply with the Registration Permit requirements set forth in Title 14, Division 7, Chapter 5.0, Article 3.0 of the California Code of Regulations (commencing with section 18104). These facilities shall be inspected monthly by the EA in accordance with PRC section 43218.

State	Tiered Regulatory Details for Recycling
California (con't.)	**Definition** (11) "Medium Volume Transfer/Processing Facility" means a facility that receives equal to or more than 60 cubic yards or 15 tons (whichever is greater) of solid waste per operating day but less than 100 tons of solid waste, for the purpose of storing or handling the waste prior to transferring the waste to another solid waste operation or facility; or a facility that receives any amount of solid waste, up to 100 tons per operating day, for the purpose of processing solid waste prior to transferring the waste to another solid waste operation or facility. **Section 17403.7. Large Volume Transfer/Processing Facilities.** All large volume transfer/processing facilities subject to Articles 6.0 through 6.35 shall obtain a Full Solid Waste Facilities Permit, in accordance with the procedures set forth in Title 27, Division 2, Subdivision 1, Chapter 4, Subchapter 3, Articles 2, 3, and 3.1 of the California Code of Regulations (commencing with section 21570). The Transfer/Processing Report required by section 18221.6 shall constitute the Report of Facility Information required by section 21570(f)(2) of Title 27. These facilities shall be inspected monthly by the EA in accordance with PRC section 43218. **Definition** (8) "Large Volume Transfer/Processing Facility" means a facility that receives 100 tons or more of solid waste per operating day for the purpose of storing, handling or processing the waste prior to transferring the waste to another solid waste operation or facility. NOTE: These sections apply to the calculation of tonnage received for limited, medium, and large volume transfer facilities. (A) In determining the tonnage of solid waste received by the operation, the following materials shall not be included: materials received by a recycling center located within the operation, and by beverage container recycling programs in accordance with Public Resources Code sections 14511.7, 14518, or 14520, if the recycling activities are separated from the solid waste handling activities by a defined physical barrier or where the activities are otherwise separated in a manner approved by the EA. (B) If the operation does not weigh the solid waste received, then the tonnage shall be determined by using a volumetric conversion factor where one cubic yard is equal to 500 pounds. The EA shall approve an alternate conversion factor if the operator demonstrates that it is more accurate than the required conversion factor.
Florida	**62-722.200 Definitions.** (12) "Small quantity" means an amount less than 600 tons per year of the total amount of all recovered materials handled, purchased, received, recovered, sold or used by a person. **62-722.300 Exemptions.**

State	Tiered Regulatory Details for Recycling
Florida (con't.)	(1) The following persons are exempt from the requirements of this chapter: (a) Exempt generators; and (b) Persons who handle, purchase, receive, recover, sell or use recovered materials in small quantities. (2) For purposes of Section 403.7046(3)(b), F.S., persons who are exempt from or otherwise not subject to the requirements of this chapter shall not be required by any local government to provide a copy of any certification under this chapter to a local government. **62-722.400 Procedures for Certification and Reporting.** (1) Beginning January 1, 1995, any person in this state who handles, purchases, receives, recovers, sells or is an end user of recovered materials must annually apply for certification to the Department, no later than April 1 **62-722.600 Procedures for Registration and Reporting.** (1) Beginning January 1, 1995, any person in this state who handles, purchases, receives, recovers, sells or is an end user of recovered materials must register with a county, or municipality with a population greater than 35,000, which has established a registration process in accordance with Section 403.7046, F.S., and this chapter, in which the registrant is located, unless such person is exempt pursuant to Rule 62-722.300, F.A.C., or is otherwise not subject to the requirements of this chapter. All counties, and municipalities whose population exceeds 35,000, if such local governments elect to establish a local reporting process pursuant to Section 403.7046(3)(b), F.S., shall be limited, with regards to recovered materials only, to the registration process, the reporting format and reporting frequency established by this rule.
Massachusetts	**19.003: Applicability** 310 CMR 19.000 shall apply to all solid waste management activities and facilities including, without limitation, landfills, dumping grounds, transfer stations, solid waste combustion facilities, solid waste processing and handling facilities, recycling facilities, refuse composting facilities and other works or sites for the storage, transfer, treatment, processing or disposal of solid waste and the beneficial use of solid waste. **19.013: Exemptions** (1) Facilities and Operations Not Subject to 310 CMR 19.000. Facilities and operations exempted from site assignment by the Site Assignment for Solid Waste Facilities Regulations, 310 CMR 16.05: *Applicability*, are exempted from the requirements of 310 CMR 19.000. **16.05: Applicability** (3) Conditionally Exempt Recycling Operations. The following recycling operations or activities do not require a site assignment provided the operation incorporates good management practice, is carried out in a manner that prevents an unpermitted discharge of pollutants to air, water or other natural resources of the Commonwealth

State	Tiered Regulatory Details for Recycling
Massachusetts (con't.)	and results in no public nuisance: (d) Recycling Operations. Operations processing, transferring or temporarily storing recyclables, but not including operations which recycle construction and demolition debris or special wastes, which comply with the following additional conditions: 1. the operation receives only recyclable material pre-sorted by the original generator; 2. the operation receives no more than 100 tons per day (tpd) of recyclable materials, including incidental solid waste, but not including paper; 3. the operation receives, handles and stores recyclable materials, incidental solid waste and residues only within an enclosed handling area or adequately covered containers or trucks; 4. the amount of residue generated by a processing operation does not average more than 15% of the weight of the recyclables processed during any quarter. 5. there is no speculative accumulation of any material. For purposes of 310 CMR 16.05, speculative accumulation shall be presumed to occur if materials, whether in their as-received, in-process or processed condition, are stored for more than 90 days from the date of their receipt at the recycling operation. This time limit may be exceeded in the case of storage of a processed material pending accumulation of a transportable load (one full truck load). 6. accurate records are maintained and certified reports are submitted every 90 days for the first year of operation and once a year thereafter which provide information to enable the Department to determine that the operation has complied with the conditions set forth at 310 CMR 16.05(3)(d)1. through 5. (Reports shall be filed with the appropriate Department regional office and with the board of health); and 7. at least 30 days prior to commencement of operations, the operator, on a form as may be supplied by the Department, notifies the Department and the board of health of the intent to operate.
Missouri	**10 CSR 80-2.010 Definitions** (88) Recycling center means any collection (not manufacturing) facility or system that accepts source-separated recyclable or commingled recyclable materials for processing and resale to markets for resource recovery for example: aluminum cans and scraps, tin, copper, glass, paper products, plastics, bimetal and steel containers, ferrous and nonferrous metals. **10 CSR 80-2.020 Permit Issuance, Construction Permits, Operating Permits, Emergency Permits, and Exemptions**. (9) Permit Exemptions. (A) The following types of activities, solid waste disposal areas or solid waste processing facilities are not required to obtain a permit provided that pollution, a public nuisance or a health hazard is not created:

State	Tiered Regulatory Details for Recycling
Missouri (con't.)	8. A recycling center or drop-off collection point that accepts source-separated or commingled recyclable materials;
New Hampshire	**Env-Sw 401.01 Applicability.** The rules in this chapter shall apply to collection, storage, and transfer (C/S/T) facilities, including transfer stations and recycling facilities. **Env-Sw 402.01 Permit Required.** (a) A permit issued pursuant to the solid waste rules shall be required for construction, operation and closure of a C/S/T facility, unless exempt pursuant to Env-Sw 302.03 or Env-Sw 408. **Env-Sw 408.05 C/S/T Facilities for Unprocessed Select Recyclable Materials.** Subject to Env-Sw 408.02, no permit shall be required to collect, store and transfer unprocessed select recyclable materials from off-site locations provided that: (a) Only source separated recyclable materials shall be collected; (b) The recyclable materials shall be collected and stored in containers as specified by (c) below: (c) The containers shall be: (1) Covered; and (2) Labeled to identify ownership and authorized use(s); (d) No more than 100 cubic yards of recyclable materials shall be stored at the facility; and (e) The facility shall be operated by: (1) A person who owns an authorized facility that shall receive the recyclable materials for processing or reuse, or both; (2) A commercial waste hauler holding a written agreement from an authorized facility that shall receive the recyclable materials for processing or reuse, or both; or (3) A person in responsible charge of a fund drive or similar event sponsored by a community, government or civic non-profit organization.
New Jersey	**7:26A-1.3 Definitions** "Class A recyclable material" means a source separated non-putrescible recyclable material specifically excluded from Department approval prior to receipt, storage, processing or transfer at a recycling center in accordance with N.J.S.A. 13:1E-99.34b, which material currently includes source separated non-putrescible metal, glass, paper, plastic containers, and corrugated and other cardboard. **7:26A-1.4 Activities exempt from general or limited approval** (c) Recycling centers, which receive, store, process, or transfer only Class A recyclable materials, are not subject to the approval requirements in *N.J.A.C. 7:26A-3* but are subject to the operational standards at N.J.A.C. 7:26A-4.

State	Tiered Regulatory Details for Recycling
New Mexico	**20.9.3.27 REGISTRATION OF RECYCLING AND COMPOSTING FACILITIES THAT ACCEPT ONLY SOURCE SEPARATED RECYCLABLE OR COMPOSTABLE MATERIALS, COLLECTION CENTERS AND AIR CURTAIN INCINERATORS.** A. The owner or operator of the following facilities shall file an application for a registration at least 30 days prior to any operations and every five years thereafter. Existing facilities of the type listed below shall apply for a registration at least 30 days prior to the expiration of their existing permit or registration, or within two years after the effective date of these regulations, whichever occurs first. Facilities covered by this section that do not timely file a complete application for registration are hereby deemed unpermitted solid waste facilities, and the owner or operator may be subject to penalties, permit requirements and nuisance abatement orders. Facilities required to register are: (1) recycling facilities that accept only source separated recyclable materials; (2) composting facilities that accept only source separated compostable materials; (3) collection centers; (4) small animal crematoria; and (5) air curtain incinerators. B. Registration is not required for a recycling facility that accepts only source separated recyclable materials and accepts the recyclables for less than seven days in any calendar year. **20.9.3.11 ADDITIONAL PERMIT APPLICATION REQUIREMENTS FOR PROCESSING FACILITIES AND FOR RECYCLING FACILITIES THAT ACCEPT SOLID WASTE THAT ACCOMPANIES THE RECYCLABLE MATERIAL.** A. Any person seeking a permit for a processing facility or for a recycling facility that accepts solid waste shall submit the following information in addition to that required under 20.9.3.8 NMAC: (1) a description of the survey and analysis process used to determine the characteristics of all solid waste expected to be accepted or processed; (2) plans and elevations, drawn to scale, of all structures used for processing, storage, alternate storage, and disposal of waste materials; (3) a process description of the sampling capability and locations designed into the facility so the process stream can be safely sampled and analyzed; (4) a description of the methods to be employed for the containment or removal of residues and spills in a manner that protects the public health, welfare, safety and the environment; and (5) an operation and maintenance manual that addresses all of the operating requirements.
New York	**§360-12.1 Applicability** (d) Registration. (1) The following regulated solid waste management facilities identified in this subdivision are subject to the registration provisions of subdivision 360-1.8(h) of this Part rather than the permit provisions of this Part, provided all the applicable requirements of subdivision 360-1.8(h) and this subdivision are met. Recyclables handling and recovery facilities exclusively handling source separated, nonputrescible solid waste that generate less than two tons or 15 percent of their average intake per day (whichever is greater) as residue based on a full year of operation.

State	Tiered Regulatory Details for Recycling
Washington	**WAC 173-350-210** (2) *Recycling - Permit exemption and notification*. (a) In accordance with RCW 70.95.305, recycling of solid waste is subject solely to the requirements of (b) of this subsection and is exempt from solid waste handling permitting. Any person engaged in recycling that does not comply with the terms and conditions of (b) of this subsection is required to obtain a permit from the jurisdictional health department in accordance with the requirements of WAC 173-350-490. In addition, violations of the terms and conditions of (b) of this subsection may be subject to the penalty provisions of RCW 70.95.315. (b) Recycling shall be conducted in conformance with the following terms and conditions in order to maintain permit exempt status: (i) Meet the performance standards of WAC 173-350-040; (ii) Accept only source separated solid waste for the purpose of recycling; (iii) Allow inspections by the department or jurisdictional health department at reasonable times; (iv) Notify the department and jurisdictional health department, thirty days prior to operation, or ninety days from the effective date of the rule for existing recycling operations, of the intent to conduct recycling in accordance with this section. Notification shall be in writing, and shall include: (A) Contact information for the person conducting the recycling activity; (B) A general description of the recycling activity; (C) A description of the types of solid waste being recycled; and (D) An explanation of the recycling processes and methods; (v) Prepare and submit an annual report to the department and the jurisdictional health department by April 1st on forms supplied by the department. The annual report shall detail recycling activities during the previous calendar year and shall include the following information: (A) Name and address of the recycling operation; (B) Calendar year covered by the report; (C) Annual quantities and types of waste received, recycled and disposed, in tons, for purposes of determining progress towards achieving the goals of waste reduction, waste recycling, and treatment in accordance with RCW 70.95.010(4); and (D) Any additional information required by written notification of the department.

Table A-6. Summary of Recycling Regulations Related to Residual and Putrescible Quantities and Storage/Disposal Requirements

State	Residual Quantities	Residual Storage/Disposal Requirements	Putrescible Quantities	Putrescible Storage/Disposal Requirements
Arkansas	**Source-separated recovered materials**: The term does not require that various types of recovered materials be separated from each other and recognizes de minimis solid waste, in accordance with industry standards and practices, may be included in the recovered materials. 22.102	**Disposal of Residuals** - All solid waste passing through the facility must ultimately be recycled or disposed of at a solid waste management facility authorized by the Department. Storage periods for incoming putrescible solid waste and recovery residuals shall not exceed 24 hours unless in a water-tight enclosed container. 22.1005(g)	**Putrescible wastes** means solid waste which contains organic matter capable of being decomposed by microorganisms and of such a character and proportion as to be capable of attracting or providing food for birds and other potential disease vectors. 22.102 Although there is a definition of putrescible waste, there is no distinction between putrescible and residue in the term 'de minimis'. N/A	**Disposal of Residuals** - All solid waste passing through the facility must ultimately be recycled or disposed of at a solid waste management facility authorized by the Department. Storage periods for incoming putrescible solid waste and recovery residuals shall not exceed 24 hours unless in a water-tight enclosed container. 22.1005(g)
California	The residual amount of solid waste in the separated for reuse material shall be less than 10% of the amount of separated for reuse material received by weight. 17402.5(d)(2)	There are no regulations regarding the storage or disposal requirements of residual solid waste. N/A	"Putrescible Wastes" include wastes that are capable of being decomposed by micro-organisms with sufficient rapidity as to cause nuisances because of odors, vectors, gases or other offensive conditions, and include materials such as, but not limited to food	There is no regulation regarding the storage or disposal requirements for putrescible waste. N/A

State	Residual Quantities	Residual Storage/Disposal Requirements	Putrescible Quantities	Putrescible Storage/Disposal Requirements
California (con't.)			wastes, offal and dead animals. The EA shall determine on a case-by-case basis whether or not a site is handling putrescible wastes. 17402(a)(21) The amount of putrescible wastes in the separated for reuse material shall be less than 1% of the amount of separated for reuse material received by weight, and the putrescible wastes in the separated for reuse material shall not cause a nuisance, as determined by the EA. 17402.5(d)(3)	
Florida	"Source separated" means the recovered materials separated from solid waste where the recovered materials and solid waste are generated. The term does not require that various types of recovered materials be separated from each other and recognizes de minimis solid waste, in accordance with industry standards	There are no regulations regarding the storage or disposal requirements of residual solid waste. N/A	"Putrescible waste" means solid waste that contains organic matter capable of being decomposed by microorganisms and of such a character and proportion as to be capable of attracting or providing food for birds. The term does not include uncontaminated yard trash or clean wood.	There is no regulation regarding the storage or disposal requirements for putrescible waste. N/A

State	Residual Quantities	Residual Storage/Disposal Requirements	Putrescible Quantities	Putrescible Storage/Disposal Requirements
Florida (con't.)	and practices, may be included in the recovered materials. 62-722.200 The survey response indicates a numerical threshold of 10% de minimis, but there is no mention of 10% in the regulations.		62-722.200 Although there is a definition of putrescible waste, there is no distinction between putrescible and residue in the term de minimis. N/A	
Massachusetts	Residue means all solid waste remaining after treatment or processing and includes, without limitation, ash, material which is processed for recycling or composting but is unmarketable or speculatively accumulated due to its inferior quality and other solid waste which is not recovered. Non-recyclable material which is integral to a pre-sorted recyclable product shall not constitute residue for the purpose of calculating residue generation rates. 19.006 The amount of residue generated by a processing operation does not	Recycling operations must receive, handle, and store incidental solid waste and residues only within an enclosed handling area or adequately covered containers or trucks to remain conditionally exempt 16.05(3)(d)	The regulations on the amount of putrescible waste, residual limit could also include putrescible waste. N/A	Recycling operations must receive, handle, and store incidental solid waste and residues only within an enclosed handling area or adequately covered containers or trucks to remain conditionally exempt 16.05(3)(d)

State	Residual Quantities	Residual Storage/Disposal Requirements	Putrescible Quantities	Putrescible Storage/Disposal Requirements
Massachusetts (con't.)	average more than 15% of the weight of the recyclables processed during any quarter. 16.05(3)(d)(4) Reports must be filed with the department so that the department can determine if they are meeting the requirements. N/A			
Missouri	There are no regulations regarding the quantity of residue handled. N/A	There are no regulations regarding the storage or disposal requirements of residual solid waste. N/A	There are no regulations regarding the quantity of putrescible waste handled. N/A	There is no regulation regarding the storage or disposal requirements for putrescible waste. N/A
New Hampshire	There are no regulations regarding the quantity of residue handled. N/A	A waste shall not be stored at a C/S/T facility for a period of time which results in a condition adversely affecting the environment, public health or safety, including conditions that attract insects and vectors, generate odors or leachate, or have the potential to cause fire or explosion. 405.03(c)	"Putrescible material" means any organic material, which can decompose and give rise to foul odors and noxious by-products. Env-Sw 104.17 There are no regulations regarding the quantity of putrescible waste handled. N/A	Putrescible wastes shall be transferred from the facility before producing a noticeable odor or within one week of its receipt by the facility, whichever is earlier. 405.03(d)

State	Residual Quantities	Residual Storage/Disposal Requirements	Putrescible Quantities	Putrescible Storage/Disposal Requirements
New Jersey	There are no regulations regarding the quantity of residue handled. N/A	2. Residue shall not be stored on-site for a period in excess of six months; 3. All residue shall be removed from the recycling center site in accordance with each district's waste plan; 4. All residue shall be stored separately from recyclable material and in a manner which prevents run-off, leakage or seepage from the residue storage area into, on or around the soil of the residue storage area; 7:26A-4.1	There are no regulations regarding the quantity of putrescible waste handled. N/A	Processing of incoming material shall begin within three calendar days of receipt, except that if the incoming material contains grass or other highly putrescible materials, processing of such material shall begin on the same day of receipt of such material. 7:26A-4.5(a)(7)
New Mexico	There are no regulations regarding the quantity of residue handled. N/A	Store waste residues by means that prevent the material and containers from falling, leaking, blowing, and exposure to the weather 20.9.5.13(f)	"Putrescible" means organic material subject to decomposition by microorganisms. 20.9.2.7 There are no regulations regarding the quantity of putrescible waste handled. N/A	There is a definition of putrescible waste but no definition of residual waste. It could be assumed that putrescible waste could be grouped into the regulations regarding residual waste. N/A

State	Residual Quantities	Residual Storage/Disposal Requirements	Putrescible Quantities	Putrescible Storage/Disposal Requirements
New York	Facilities are subject to the registration provisions and not the permit provisions of the regulations if: recyclables handling and recovery facilities exclusively handling source separated, nonputrescible solid waste that generate less than two tons or 15 percent of their average intake per day (whichever is greater) as residue based on a full year of operation. 360-12.1(d)(1)	Solid waste which the facility does not intend to recover and which does not contain putrescible material may be stored for a period not to exceed two weeks unless otherwise acceptable to the department. 360-12.1(a)(2)	Putrescible means the tendency of organic matter to decompose with the formation of malodorous byproducts. For the purpose of this Part, wood is not considered to be putrescible. 360-1.2(b)(125) The regulations on the amount of residue include putrescible waste. N/A	If putrescible material or other solid waste is received at the facility, the facility must comply with the requirements of Subpart 360-11 of this Part (i.e., transfer station): all putrescible solid waste must be removed within seven days of receipt, unless prior written approval is received from the department 360-12.1(a)
Washington	Accept only source separated recyclable materials and dispose of an incidental and accidental residual not to exceed five percent of the total waste received, by weight per year, or ten percent by weight per load; 173-350-310(2)(a)(ii)	There are no regulations regarding the storage or disposal requirements of residual solid waste. N/A	"Putrescible waste" means solid waste which contains material capable of being readily decomposed by microorganisms and which is likely to produce offensive odors. 173-350-100 The regulations on the amount of residue include putrescible waste. N/A	For putrescible waste, control nuisance odors; 173-350-310(5)(a)(i)(H)

N/A – not applicable

Table A-7. Tiered Regulations for Composting

State	Tiered Regulatory Details for Composting
Arkansas	Exemptions (1) The composting of less than 50 (fifty) tons or 500 (five hundred) cubic yards per year of incoming yard waste, silvicultural activities such as tree prunings and land clearing debris, and agricultural waste or other approved wastes not subject to the limitations of paragraph (c). (Assumption: 1 (one) cubic yard of loose, unshredded yard waste excluding manures weighs 200 pounds.) provided: (i) The process follows acceptable methods of composting and is developed, operated, and maintained in a safe, nuisance free manner, (ii) Prior to the commencement of construction, a written notice is provided to the Department describing the facility location, a description of the operation of the facility, and the intended end use for the compost. (2) Small composting operations conducted by an individual treating yard and organic wastes taken solely from that individual's personal residence or property. This exemption may be revoked in the event that the composting operation becomes a nuisance to other persons or property owners either adjacent to or in the vicinity of the composting operation. (3) Composting facilities that receive and treat only animal manures, agricultural wastes, yard wastes and wood wastes if the facility is operated in conjunction with and on the same property as a confined animal facility. Water Division permitting or authorization may be required in such instances. (4) Composting facilities which exclusively receive and treat organic plant wastes from a nursery operation. (5) The recovery and use of chipped, shredded or processed wood waste, excluding yard waste, for reuse as a mulch, composting material or other beneficial use. Permitted facilities are classified into three categories. (1) Type Y: Facilities that receive and treat only: (1) Yard waste and other vegetative materials such as grass clippings, leaves, and shredded or chipped brush, and tree prunings; (2) Other organic waste including animal manure, food wastes, food processing wastes, grease trap waste, organic process wastes, septage and sewage sludge. (3) Solid waste including household garbage and nonhazardous commercial wastes that are amenable to treatment by composting." Reg.22.801 (2) Type O: "Facilities that receive and treat only source separated organic wastes, such as paper, food wastes, food-processing wastes, other compostable materials, or yard waste in combination with these wastes..." (3) Type S: "Facilities that receive and treat mixed solid wastes such as household garbage, nonhazardous commercial wastes, or yard waste or source separated organic wastes in combination with these wastes."

State	Tiered Regulatory Details for Composting
Arkansas (con't.)	(4) Facilities that receive and treat municipal sewage sludge in combination with wastes in paragraphs (1) and (2) above shall be classified as type O compost facilities. Facilities that receive and treat sewage sludge with wastes in paragraph (3) above shall be classified as type "S" facilities. Reg.22.802
California	**Section 17855. Excluded Activities.** (a) The activities listed in this section do not constitute compostable material handling operations or facilities for the purposes of this Chapter and are not required to meet the requirements set forth herein. Nothing in this section precludes the EA or the board from inspecting an excluded activity to verify that the activity is being conducted in a manner that qualifies as an excluded activity or from taking any appropriate enforcement action. (1) An activity is excluded if it handles agricultural material derived from an agricultural site, and returns a similar amount of the material produced to that same agricultural site, or an agricultural site owned or leased by the owner, parent, or subsidiary of the composting activity. No more than an incidental amount of up to 1,000 cubic yards of compost product may be given away or sold annually. (4) Handling of green material, feedstock, additives, amendments, compost, or chipped and ground material is an excluded activity if 500 cubic yards or less is on-site at any one time, the compostable materials are generated on-site and if no more than 1,000 cubic yards of materials are either sold or given away annually. The compostable material may also include up to 10% food material by volume. (9) Beneficial use of compostable materials is an excluded activity. Beneficial use includes, but is not limited to slope stabilization, weed suppression, alternative daily cover, and similar uses, as determined by the EA; land application in accordance with California Department of Food and Agriculture requirements for a beneficial use as authorized by Food and Agricultural Code section 14501 et seq.; and reclamation projects in accordance with the requirements of the Office of Mine Reclamation of the Department of Conservation as authorized by Public Resources Code section 2770 et seq. **Section 17857.1. Green Material Composting Operations and Facilities.** (a) A green material composting operation that has up to 12,500 cubic yards of feedstock, compost, or chipped and ground material on-site at any one time shall comply with the EA Notification requirements set forth in Title 14, California Code of Regulations, Division 7, Chapter 5.0, Article 3.0 (commencing with section 18100). (b) A green material composting operation that has up to 12,500 cubic yards of feedstock, compost, or chipped and ground material on-site at any one time shall be inspected by the EA at least once every three (3) months, unless an operator request for a reduced inspection frequency of no less than annually is approved by the EA. The EA shall only approve a lesser inspection frequency, if the EA finds that it will not pose an additional risk to public health and safety and the environment. The EA shall forward a copy of the request and approval to the Board. (c) A green material composting facility that has more than 12,500 cubic yards of

State	Tiered Regulatory Details for Composting
California (con't.)	feedstock, compost, or chipped and ground material on-site at any one time shall obtain a Compostable Materials Handling Facility Permit pursuant to the requirements of Title 27, California Code of Regulations, Division 2, Subdivision 1, Chapter 4, Subchapter 1 and Subchapter 3, Articles 1, 2, 3, and 3.1 (commencing with section 21450) prior to commencing operations.
Colorado	**Exemptions** This Section 14 does not apply to the following composting operations, unless the Department determines that the composting operation described below and otherwise exempt may adversely affect human health and the environment: (A) Backyard composting: Type 1 feedstocks and foodwaste only, operations up to 100 cubic yards qualify as Backyard composting; (B) A business that processes yard or landscaping waste, generated through routine operations, into mulch for product distribution (the owner or operator must register as a recycler under Section 8 of these Solid Waste Regulations); (C) A business that accepts finished compost for bagging or handling; (D) Agricultural composting operations where either: (1) Compost materials include only agricultural waste generated on-site, subject to the following conditions: (a) The compost is produced at a manufacturing facility registered by the Colorado Department of Agriculture (CDA), pursuant to § 35-12-101 et seq., C.R.S.; and (b) Finished compost distributed off-site shall meet the specifications for compost established by the CDA; or (2) Compost materials include only agricultural waste generated on-site, and imported wood chips and tree branches, subject to the following conditions: (a) Importation of wood chips and tree branches only in quantities necessary for effective composting of the agricultural waste generated on-site; (b) Storage of imported wood chips and tree branches is limited to nine (9) months;(c) The facility keeps records to support adherence to this time limit; (d) The compost is produced at a manufacturing facility registered by the CDA, pursuant to §35-12-101et seq., C.R.S.; (e) Finished compost is subject to the specifications for compost established by the CDA; and (f) The finished compost is only used on agricultural zoned property, as defined by the local requirements. (E) The composting of biosolids at a wastewater treatment plant provided that the facility has received a permit in accordance with the Department's Biosolids Regulations No. 64, 5 CCR 1002-64, promulgated pursuant to Section 25-8-205(1)(e), C.R.S. Facilities are classified into five categories based on feedstock types where: **Type 1:** Agricultural crop residues, manure, untreated wood wastes, yard, paper and green wastes. **Type 2:** Animal material, animal mortalities and source separated food wastes. **Type 3:** Biosolids, solid waste, processed solid waste and sludges. **14.2.1 Class I Composting Facility** A Class I composting facility is one that: (A) Is permitted to receive Types 1, 2 or 3

State	Tiered Regulatory Details for Composting
Colorado (con't.)	feedstocks; (B) Is not restricted as to the volume of feedstocks, bulking agent or in-process material that may be present on the site at any given time; and (C) May accept feedstocks from multiple generators at one location for processing. **14.2.2 Class II Composting Facility** A Class II composting facility is one that: (A) Is permitted to receive only Type 1 and Type 2 feedstocks; (B) Is not restricted as to the volume of feedstocks, bulking agent or in-process material that may be present on the site at any given time; and (C) May accept feedstocks from multiple generators at one location for processing. **14.2.3 Class III Composting Facility** A Class III composting facility is one that: (A) Receives only Type 1 feedstocks; (B) Is limited to a total volume of 50,000 cubic yards of feedstock, in-process and bulking material on-site at any one time (finished compost does not count toward this total); and (C) May accept feedstocks from multiple generators at one location for processing. **14.2.4 Class IV Composting Facility** A Class IV composting facility is one that: (A) Receives only Type 1 feedstocks and/or foodwaste; (B) Is limited to a total volume of 5,000 cubic yards of feedstock, in-process and bulking material onsite at any one time (finished qualified product does not count toward this total); (C) Limits composting activities to waste generated on-site and to an area two (2) acres in size or less; and (D) Fits into one of the following facility categories: (1) A vermicomposting operation that uses Type 1 feedstocks and/or food waste as growth media; or (2) A horticultural or landscaping operation that accumulates and composts only tree and yard waste from their business operations and only imports other compatible material types and only in quantities necessary for effective composting. Composting occurs at the location where tree and yard waste is processed; or (3) Institutions that compost waste at the site where they are generated and only imports other compatible material types and only in quantities necessary for effective composting. Institutions may include, but are not limited to, correctional facilities, schools, parks, community centers and golf courses. **14.2.5 Class V Composting Facility** The Class V composting facility classification is for agricultural composters that do not meet the requirements in Section 14.1.2(D). A Class V composting facility is one that: (A) Conducts composting operations at the site of waste generation or on agriculturally zoned property owned by the generator; and (B) Uses only agricultural waste generated on site and other compatible material types and only in quantities necessary for effective composting.
Florida	Chapter 62-709: Yard trash processing facilities (including yard trash transfer stations or a yard trash recycling facilities, but not including facilities used for the disposal of yard trash) require a permit. Exemptions are available for the following operations: The following activities are not regulated by this rule provided no public nuisance or any condition adversely affecting the environment or public health is created and the activity

State	Tiered Regulatory Details for Composting
Florida (con't.)	does not violate other state or local laws, ordinances, rules, regulations, or orders. (a) Backyard composting and the resulting compost. (b) Normal farming operations. For purposes of this rule, composting of only yard trash or manure by persons on their own property for their own use on that property as part of agronomic, horticultural or silvicultural operations will also be considered as normal farming operations. Any compost which is sold for use by persons other than the generator shall meet the requirements of Rules 62-709.530 through .600, F.A.C.
Illinois	The following types of facilities or activities are not required to have a permit: a) landscape waste composting operation for landscape wastes generated by such facility's own activities which are stored, treated, or disposed of within the site where such wastes are generated (Section 21(q)(1) of the Act); b) Applying landscape waste or composted landscape wastes at agronomic rates (Section 21(q)(2) of the Act); c) A landscape waste composting facility on a farm which meets all of the criteria set forth at Section 830.106 (Section 21(q)(3) of the Act).
New York	**Exemptions** The following facilities are exempt from this Part provided the facility is operated in a manner that does not produce dust or odors that unreasonably impact on neighbors of the facility, as determined by the department, and no material accepted at the facility remains on-site unprocessed for more than 36 months. (1) A composting facility that accepts animal manure and associated bedding material. (2) A composting facility that accepts no more than 3,000 cubic yards of yard waste per year. This quantity limit does not include brush or other wood materials that are not intended for composting. (3) A composting facility that accepts a combination of wastes that would be exempt if operating individually for each type of waste, such as a composting facility that accepts no more than 3000 cubic yards of yard waste and accepts animal manure. **Registration** (1) Eligible facilities. The following solid waste management facilities are eligible for the registration provisions of subdivision 360-1.8(h) of this Part, provided the facility complies with subdivision 360-1.8(h) and paragraph (2) of this subdivision. Any eligible or registered facility which is not operated in compliance with these conditions requires a permit pursuant to this Part and will be subject to applicable enforcement provisions in this Part and the ECL Article 70. (i) A composting facility that accepts more than 3,000 cubic yards but not more than 10,000 cubic yards of yard waste per year. This quantity limit does not include brush and other wood materials that are not intended for composting. (ii) A composting facility that accepts no more than 1,000 cubic yards of source-separated organic waste per year. (iii) A composting facility for food processing waste.

State	Tiered Regulatory Details for Composting
Oregon	**Exemptions** (3) All composting facilities, except those composting facilities exempt under (3)(a) of this rule, must comply with OAR 340-096-0080: Screening. (a) The following composting facilities are exempt from the requirements of OAR 340-096-0080: Screening, 340-096-100: Registration, and 340-096-0110 Composting Permit unless the department determines the composting facility may adversely affect human health or the environment: (A) Any composting facility composting less than 100 tons of Type 1 feedstock, Type 2 feedstock, or both during any calendar year; (B) Any composting facility composting less than 20 tons of Type 3 feedstock during any calendar year; (C) Any composting facility composting less than 40 tons of Type 3 feedstock in any calendar year when conducting in-vessel composting in containers designed to prohibit vector attraction and prevent nuisance and odor generation; (D) Any composting facility that produces silage on a farm for animal feed; and (E) Any home composting facility **Special Rules Relating to Composting: Registration** (1) All composting facilities required to register with the department by OAR 340-096-0080(3)(a) must comply with this rule. Except as provided in OAR 340-096-0060(5), all facilities subject to this rule must complete registration before a facility may operate. (2) After a facility has completed the requirements of OAR 340-093-0100 with respect to public notice and comment, if the department determines that the facility has met all of the requirements of OAR Divisions 93, 96, 97, and all other applicable statutes and regulations, the department will register the facility. The registration is a permit for purposes of OAR chapter 340, division 18 and chapter 340 divisions 93, 96, and 97, except the following: OAR 340-093-0070(3); 340-093-0130; and 340-093-0140. (3) All composting facilities registered under this rule must comply with the following: (a) For facilities with department Conditions of Approval for operation of the facility, comply with all conditions; (b) If required by the department, submit an annual report of the weight of feedstocks used for composting on a form provided by the department; (c) If a composting facility discharges leachate or stormwater under a permit issued by the department, submit an annual report to the department with the sampling data required by the permit or permits; (d) Immediately notify the department of any violation of the facility Conditions of Approval or OAR 340-096-0070: Performance Standards; (e) Immediately notify the department of any significant change of status of the composting facility, including any change in the ownership or operation of the facility, the location of the composting operation, the type or volume of feedstocks used, and the composting process used by the facility; (f) Keep all required records. If required by the department, maintain records for a minimum of ten years. In the case of a change in ownership of the composing facility, the owner is responsible for ensuring that the records are transferred from the previous owner and maintained for the required ten years; (g) At the request of the department, submit any records or reports the department may require to ensure compliance with conditions of OAR chapter 340, Divisions 93, 96, and 97; and (h) If required by the department, demonstrate financial assurance as provided in OAR 340-096-0001. The department may tailor the financial assurance requirements to the nature of the facility and may exempt a facility if, based on the information submitted under OAR 340-096-0070, an Operations Plan approved under OAR 340-0096-0090, and any

State	Tiered Regulatory Details for Composting
Oregon (con't.)	other information available to the department, the department determines that the facility is not likely to generate significant amounts of residual waste materials or contamination from the operation of the facility that will remain at closure; and (i) If required, pay the Engineering Review fee under OAR 340-097-0120(5). **Special Rules Pertaining to Composting: Composting Permit** (1) All composting facilities required by OAR 340-096-0060 to operate under a Composting Permit must comply with this rule. Except as provided in OAR 340-096-0060(5), all facilities subject to this rule must receive a Composting Permit before a facility may operate. (2) After a facility has completed OAR 340-096-0090: Operations Plan Approval and the department has approved the facility Operations Plan, to receive a Composting Permit, the facility must: (a) Pay the plan approval fee required by OAR 340-097-0120(4); and (b) If required, pay the Engineering Review fee under OAR 340-097-0120(5). (3) After a facility has completed the requirements of section (2) of this rule, and after completing the requirements of OAR 340-093-0100 with respect to public notice and comment, if the department determines that the facility has met all of the requirements of OAR Divisions 93, 96, 97, and all other applicable statutes and regulations, the department will issue a Compost Permit for the facility. The Compost Permit is a permit for purposes of OAR chapter 340, division 18 and chapter 340 divisions 93, 96, and 97, except the following: OAR 340-093-0070(3); 340-093-0130; and 340-093-0140. (4) All composting facilities permitted under this rule must comply with the following: (a) Comply with OAR 340-096-0700: Performance Standards; (b) Comply with all requirements of the facility Operations Plan; (c) If required by the department, submit an annual report of the weight of feedstocks used for composting on a form provided by the department; (d) If a composting facility discharges leachate or stormwater under a permit issued by the department, submit an annual report to the department with the sampling data required by the permit or permits; (e) Immediately notify the department of any violation of the facility Operations Plan, Conditions of Approval, or OAR 340-096-0070: Performance Standards; (f) Immediately notify the department of any significant change of status of the compost operation, including any change in the ownership or operation of the facility, the location of the facility, type or volume of feedstocks used, and the composting process used by the facility; (g) Keep all required records. If required by the department, maintain records for a minimum of five years. In the case of a change in ownership of the composing facility, the owner is responsible for ensuring that the records are transferred from the previous owner and maintained for the required five years; (h) Comply with OAR 340-097-0120(6)(c) with respect to fees; (i) At the request of the department, submit any records or reports the department may require to ensure compliance with conditions of OAR chapter 340, divisions 93, 96, and 97; and (j) If required by the department, demonstrate financial assurance as provided in OAR 340-096-0001. The department may tailor the financial assurance requirements to the nature of the facility and may exempt a facility if the department determines, based on the information submitted under OAR 340-096-0070, an Operations Plan approved under OAR 340-0096-0090, and any other information available to the department, the facility is not likely to generate significant amounts of residual waste materials or contamination from the operation of the facility that will remain at closure.

State	Tiered Regulatory Details for Composting
Texas	**§332.3. Applicability.** **Permit required.** (1) operations that compost mixed municipal solid waste; (2) operations that add any amount of mixed municipal solid waste as a feedstock in the composting process; and (3) operations that commercially compost grease trap waste on or after September 1, 2003. Grease trap waste is material collected in and from an interceptor in the sanitary sewer service line of a commercial, institutional, or industrial food service or processing establishment, including the solids resulting from de-watering processes (further grease trap details provided in regulations). **Registration required.** (1) operations that compost municipal sewage sludge, except those facilities that compost municipal sewage sludge with mixed municipal solid waste; (2) operations that compost positively-sorted organic materials from the municipal solid waste stream; (3) operations that compost source-separated organic materials not exempted under subsection (d) of this section; (4) operations that compost disposable diapers or paper products soiled by human excreta; (5) operations that compost the sludge byproduct generated from the production of paper if the executive director determines that the feedstock is appropriate under §332.33 of this title (relating to Required Forms, Applications, Reports, and Request to Use the Sludge Byproduct of Paper Production); and (6) operations that incorporate any of the materials set forth in paragraphs (1) - (5) of this subsection with source-separated yard trimmings, clean wood material, vegetative material, paper, manure, meat, fish, dairy, oil, grease materials, or dead animal carcasses. **Operations requiring notification.** (1) operations that compost any source-separated meat, fish, dead animal carcasses, oils, greases, or dairy materials; and (2) operations that incorporate any of the materials set forth in paragraph 1 of this subsection with source-separated yard trimmings, clean wood material, vegetative material, paper, or manure. Operations exempt from facility notification, registration, and permit requirements. (1) operations that compost only materials listed in subparagraphs (A) and (B) of this paragraph: (A) source-separated yard trimmings, clean wood material, vegetative material, paper, and manure; (B) source-separated industrial materials listed in §332.4(10) of this title excluding those

State	Tiered Regulatory Details for Composting
	items listed in §332.4(10)(A), (F) - (H), and (J) of this title; (2) agricultural operations that generate and compost agricultural materials on-site; (3) mulching operations; (4) land application of yard trimmings, clean wood materials, vegetative materials, and manure at rates below or equal to agronomic rates as determined by the Texas Agricultural Extension Service; (5) application of paper that is applied to land for use as an erosion control or a soil amendment; and (6) on-site composting of industrial solid waste at a facility that is in compliance with §335.2 of this title (relating to Permit Required) and §335.6 of this title (relating to Notification Requirements).
Texas (con't.)	**Exemptions:** (1) operations that compost only materials listed in subparagraphs (A) and (B) of this paragraph: (A) source-separated yard trimmings, clean wood material, vegetative material, paper, and manure; (B) source-separated industrial materials listed in §332.4(10) of this title excluding those items listed in §332.4(10)(A), (F) - (H), and (J) of this title; (2) agricultural operations that generate and compost agricultural materials on-site; (3) mulching operations; (4) land application of yard trimmings, clean wood materials, vegetative materials, and manure at rates below or equal to agronomic rates as determined by the Texas Agricultural Extension Service; (5) application of paper that is applied to land for use as an erosion control or a soil amendment; and (6) on-site composting of industrial solid waste at a facility that is in compliance with §335.2 of this title (relating to Permit Required) and §335.6 of this title (relating to Notification Requirements).

Table A-8. Regulations Related to Grading/Restricted Use of Compost

State	Composting Grading/Restricted Use Regulations
Florida:	(2) Compost shall be classified as follows (where concentration equivalent codes are defined in Table 13): (a) Type Y is compost made only from yard trash, which is mature or semi-mature, and is fine, medium or coarse. For such compost, a foreign matter content of less than 2% and a metal concentration equivalent to code 1 is assumed. (b) Type YM is compost made from only manure or yard trash with manure, which is mature or semi-mature and is fine, medium or coarse. For such compost, a foreign matter content of less than 2% and a metal concentration equivalent to code 1 is assumed. (c) Type A is compost made from solid waste, other than only yard trash and manure, which is mature and is fine. The foreign matter content shall be less than or equal to 2%, and the metal concentration shall fall under code 1. Further, it shall contain no foreign matter, such as glass or metal shards, of a size and shape that can cause injury. (d) Type B is compost made from solid waste, other than only yard trash or manure, which is mature or semi-mature and is fine or medium. The foreign matter content shall be less than or equal to 4%, and the metal concentration shall fall under codes 1 or 2. Further, it shall contain no foreign matter, such as glass or metal shards, of a size and shape that can cause injury. (e) Type C is compost made from solid waste, other than only yard trash or manure, which is mature or semi-mature and is fine, medium or coarse. The foreign matter content shall be less than or equal to 10%, and the metal concentration shall fall under codes 1, 2 or 3. (f) Type D is compost made from solid waste, or from only yard trash or manure, which is fresh and is fine, medium or coarse. It shall have a foreign matter content of less than or equal to 10%, and the metal concentration shall fall under codes 1, 2 or 3. Foreign matter content and metal concentration is assumed for fresh compost made from only yard trash or manure. (g) Type E is compost made from solid waste, other than only yard trash or manure, which has a metal concentration that falls under code 4.
Illinois	Illinois has two classes of compost: General Use Compost: (a) End-product compost which meets the standards set forth in Section 830.503 and (b) Designated Use Compost: End-product compost which does not qualify as general use end-product compost. Designated use compost must be used only *as daily cover or vegetative amendment in the final layer* at a landfill. The Section 530.503 Performance Standards are include: a Must be free of any materials which pose a definite hazard to human health due to physical characteristics, such as glass or metal shards; b) Must not contain man-made materials larger than four millimeters in size exceeding 1% of the end-product compost, on a dry weight basis; c) Must have a pH between 6.5 and 8.5; d) Must have reached stability, as demonstrated by one of the methods prescribed in Section 830.Appendix B; e) Must not exceed, on a dry weight basis, the inorganic concentrations set forth in Section 830.Table A; and f) Must not contain fecal coliform populations that exceed 1000 MPN per gram of total solids (dry weight basis), or Salmonella species populations that exceed 3 MPN per 4 grams of total solids (dry weight basis).
Maryland	Maryland classifies compost into either General Use, Limited Use, or Restricted Use. Each classification has unique metal concentration requirements along with the differences explained in the regulations below. (2) A General Use compost:

State	Composting Grading/Restricted Use Regulations
Maryland (con't.)	(a) Shall pass through a 12mm (1/2 inch) screen; (b) Shall be stabilized; (c) May not have an objectionable odor; and (d) May be distributed as a soil conditioner for use by the general public or for any use allowed by this chapter. (2) A Limited Use compost: (a) Shall pass through an 18mm (3/4 inch) screen; (b) Shall be stabilized; (c) May not have an objectionable odor; and (d) May only be distributed for use by a commercial, agricultural, institutional, or governmental operation, or for restricted use as provided by this chapter. (2) A Restricted Use compost: (a) May not be a hazardous waste, as defined in COMAR 26.13.02.03; (b) May not be stockpiled or disposed of unless authorized by the Maryland Department of the Environment; (c) May not be distributed or sold to the general public; (d) Is restricted to distribution for use as a final, intermediate, or alternate daily landfill cover, as provided by COMAR 26.04.07, or on marginal land or in land reclamation efforts if applied at rates not to exceed limits established in Table 2 of Regulation .12 of this chapter; and (e) Includes any compost exceeding any parameter limit for Limited Use compost, as provided in Regulation .05C of this chapter, or any compost designated by the registrant as Restricted Use classification. All compost classes have limits on heavy metal concentrations.
Oregon	Oregon classifies compost by feedstock. Type 1 feedstocks include source-separated yard and garden wastes, wood wastes, agricultural crop residues, wax-coated cardboard, vegetative food wastes including department approved industrially produced vegetative food waste, and other materials the department determines pose a low level of risk from hazardous substances, physical contaminants and human pathogens. Oregon does not have heavy metal limits for Type 1 feedstocks. Salmonella or fecal coliform analyses must be performed to meet the following standards: (a) Salmonella analysis must result in less than 3 Most Probable Number per 4 grams of total solids (dry weight). (b) Fecal coliform analysis must result in less than 1,000 Most Probable Number per gram of total solids (dry weight).
Rhode Island	Rhode Island classifies their compost into Class A, B, or C. They distinguish between the different classes by heavy metal limits, PCB quantities, % foreign matter, particle size distribution, and maturity or stability. (A) Class "A" Compost. (1) Class "A" Compost Utilization: Unrestricted use - this class of compost may be distributed for agricultural and non-agricultural use including, but not limited to, the following: (a) Agricultural uses. (b) Homeowner use. (c) Nurseries and tree farms. (d) Floriculture and turf-grass production. (e) Other agricultural and horticultural uses. (f) For landscape applications, including also highway medians and roadsides. (g) For public parks and grounds, sports fields and stadiums, golf courses, cemeteries, and similar applications. (h) On forest land. (i) For land reclamation. (B) Class "B" Compost Utilization and Distribution: This class of compost may be distributed for agricultural and non-agricultural applicants with Department approval, and must be limited to bulk distribution only. Restrictions apply on use where crops are produced for direct human consumption, residential/homeowner use, any use with unrestricted public access, or any use where excessive ingestion of soil/dust may occur by children under seventy two (72) months of age. All projects and/or locations utilizing Class "B" compost must obtain advance approval from the Department. (1) Agricultural Utilization of Class "B" Compost - This subrule applies to the utilization of Class "B" compost as a

State	Composting Grading/Restricted Use Regulations
Rhode Island (con't.)	fertilizer and/or soil amendment to enhance agricultural lands. Such uses may include, but are not limited to nurseries and tree farms, floriculture, and turfgrass production. (C) Class "C" Compost Utilization and Distribution - This class of compost is restricted to use in locations with limited public access and must be limited to bulk distribution only. All projects and/or locations utilizing Class "C" compost must obtain advanced approval from the Department, and allowable uses are limited to the following: (1) Landfill cover material (if approved by the landfill) (2) Other uses, if approved by the Department, on a case-by-case basis, and which may be subject to satisfying either: (a) federal annual pollution loading rate limits or Department determined annual pollution loading rate limits, or (b) federal cumulative pollution loading rate limits or Department-determined cumulative pollution loading rate limits. Pathogen limits are the same as EPA 40 CFR 503.
Texas	A detailed section on classification is used that includes multiple categories of parameters resulting in 3 grades of compost. (1) Grade 1 Compost: (A) Shall contain no foreign matter of a size or shape that can cause human or animal injury; (B) Shall not exceed all Maximum Allowable Concentrations for Grade 1 Compost in Table 1 of this section; (Figure 1: 30 TAC 332.72(d)(1)(B)); C) Shall not contain foreign matter in quantities which cumulatively are greater than 1.5% dry weight on a 4mm screen; (D) Shall meet the requirements of cured compost as described in Table 2 of this section; (Figure 2: 30 TAC 332.72(d)(1)(D)); (E) Shall meet the requirements for pathogen reduction for Grade 1 Compost as described in Table 3 of this section; (Figure 3: 30 TAC 332.72(d)(1)(E)); and (F) Shall meet the requirements for salinity and pH for Grade 1 Compost as described in Table 3 of this section. (Figure 3: 30 TAC 332.72(d)(1)(E)). (2) Grade 2 Compost: (A) Shall contain no foreign matter of a size or shape that can cause human or animal injury; (B) Shall not exceed all Maximum Allowable Concentrations for Grade 2 Compost in Table 1 of this section at a compost organic matter content which is equivalent to a mature compost when maturity is determined by reduction in organic matter during the interim period or a maturity test which is part of an approved maturity test protocol; (Figure 1: 30 TAC 332.72(d)(1)(B)); (C) Shall not contain foreign matter in quantities which cumulatively are greater than 1.5% dry weight on a 4mm screen; (D) Shall meet the requirements of semi-mature compost, mature compost or cured compost as described in Table 2 of this section; (Figure 2: 30 TAC 332.72(d)(1)(D)); (E) Shall meet the requirements for pathogen reduction for Grade 2 Compost as described in Table 3 of this section; and (Figure 3: 30 TAC 332.72(d)(1)(E)); and (F) Shall meet the requirements for salinity and pH for Grade 2 Compost as described in Table 3 of this section. (Figure 3: 30 TAC 332.72(d)(1)(E)). (3) Waste Grade Compost: (A) Exceeds any one of the Maximum Allowable Concentrations for Grade 2 final product in Table 1 of this section, and (Figure 1: 30 TAC 332.72(d)(1)(B)); (B) Does not meet the other requirements of Grade 1 or Grade 2 Compost. (§332.72) Grade 1 and 2 composts also have heavy metal concentration limits.

Appendix B - Recycling Survey and Analysis

Survey on Recycling Regulation Framework--2009

Introduction

A study is being conducted by California Polytechnic State University (San Luis Obispo) on behalf of the California Integrated Waste Management Board (CIWMB) to evaluate regulatory framework for recycled materials.

A wide variety of jurisdictions (50 states plus several foreign countries) are being surveyed to obtain information on the effectiveness of regulatory models and methods for recycling centers, transfer stations, and green material operations.

For perspective, California currently uses the Three-Part Test to determine whether a material handling operation is regulated as a solid waste facility. Public Resources Code section 40200(b)(2) provides that the Board does not have jurisdiction over facilities whose primary function is to process wastes that have already been separated for reuse and are not intended for disposal. The transfer/processing facilities and operations regulations set forth a Three-Part Test, which was established to help determine if a business qualifies for the exclusion from the Board's jurisdiction. The Three-Part Test provides a measurable method to allow for statewide consistency regarding regulatory exclusions. When an activity meets the Three-Part Test to qualify as a recycling center, it is not subject to the Board's regulations. If it fails any part of

the Three-Part Test, the activity is considered a solid waste operation or facility subject to the Board's jurisdiction. The components of the Three-Part Test include:

1) An activity shall only receive material that has been separated for reuse prior to receipt (section 17402.5 (d)(1)). "Source Separated" means materials, including commingled recyclables, that have been separated or kept separate from the solid waste stream, at the point of generation, for the purpose of additional sorting or processing those materials for recycling or reuse in order to return them to the economic mainstream in the form of raw material for new, reused, or reconstituted products which meet the quality standards necessary to be used in the marketplace.

2) Determination that the residual amount of solid waste in the material is less than 10 percent of the amount of separated for reuse material received by weight (section 17402.5(d)(2)). The allowance for 10 percent residual is recognition of the fact that it is not uncommon for materials that are legitimately separated for reuse to still include minimal levels of contamination.

3) Determination that the amount of putrescible wastes in the separated for reuse material is less than 1 percent of the amount of separated for reuse material received by weight and the putrescible wastes in the separated for reuse material shall not cause a nuisance, as determined by the EA (section 17402.5 (d)(3)). The restriction of 1 percent putrescible wastes is recognition of the fact that putrescible wastes can pose a significant risk to public health, safety, and the environment and, therefore, any site receiving putrescible wastes should be regulated. The regulation allows up to 1 percent putrescible wastes rather than taking a zero tolerance stance because it is not uncommon for materials that are legitimately separated for reuse to still include minimal levels of putrescible wastes.

The research team is seeking to assemble information on recycling efforts in your jurisdiction and particularly, the methods and models used to determine whether recycling operations are considered solid waste streams for regulatory purposes. The regulatory methods being evaluated include those that preserve public health and the environment including reducing nuisances, vectors, and odors.

The intent is that this survey will take approximately 15-25 minutes to complete. The research team and the State of California appreciate your contributions to this effort.

1.	What State do you represent?
	[- Select One -]

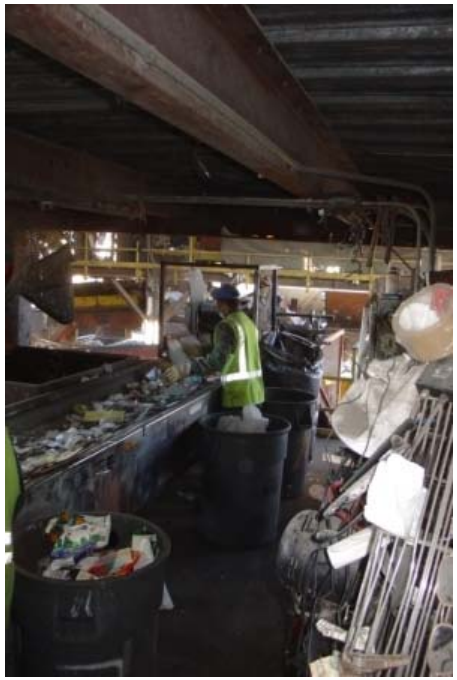
2.	Answer the following:	
	Name of agency and governmental association (e.g., State of XYZ Department of Environment)	_____ _____ _____ _____ _____
	Contact Person	_____ _____ _____ _____ _____
	E-mail address (e-mail to be used to share final report, e-mail addresses will be kept confidential and not shared with anyone)	_____ _____ _____ _____ _____

3.	What is the approximate total amount of solid waste processed per year in your state?		
		Tons/Yr	Percentage %
	Total Solid Waste Generated	_____	_____
	Solid Waste Recycled	_____	_____
	Solid Waste Composted	_____	_____
	Solid Waste Incinerated	_____	_____
	Solid Waste Landfilled	_____	_____
	Other	_____	_____

4.	Does your state charge a deposit (and subsequently, provide a cash refund) for bottles and cans?	
	○	No
	○	Yes

5.	Does your state have other incentives for recycling, including regulatory and other economic incentives?	
	○	No
	○	Yes

If yes, please describe briefly:	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____



6.	Is recycling regulated at the state level in your state?	
	○	No
	○	Yes

7.	Does the regulation of recycled materials differ from regulation of municipal solid waste in your state?	
	○	No
	○	Yes

8.	Are there numerical thresholds or definitions used to distinguish recycled materials from municipal solid waste?	
	○	No
	○	Yes

If yes, please list:	_____ _____ _____ _____ _____ _____ _____ _____ _____

9.	Does the regulation of recycled materials differ from compost in your state?	
	○	A single set of regulations apply to both sets of materials
	○	Separate regulations apply to recycled materials and compost
	○	Other

If other, please explain:	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

This survey is intended to obtain information related to recycled materials and recycling operations unless your state does not have a distinction between recycled materials and compost. Please respond to the remaining questions for only recycled materials and recycling operations and not compost operations.

10.	Who is regulated in your state for recycled materials? (please check all that apply)	
	☐	Generators
	☐	Handlers
	☐	Transporters
	☐	Recyclers
	☐	Other

If other, please explain:	_____ _____ _____ _____ _____ _____ _____

	_____ _____ _____

11.	Is there a single set of regulations for the entire state?	
	○	No
	○	Yes

If no, please comment on the variation in application of regulations (e.g., urban vs. rural areas, county-based regulations, socio-economic delineations, etc.).	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

12.	What types of operations/activities (all together termed recycling facilities) are located in your state? (please check all that apply):	
	☐	Recycling Centers (for purposes of this survey, a Recycling Center is defined as a facility that only receives materials that have been separated for reuse prior to receipt)
	☐	Material Recovery Facilities (for purposes of this survey, a Material Recovery Facility is defined as a Recycling Center with mechanized sorting and processing of recycled materials)
	☐	Transfer Stations (for purposes of this survey, a Transfer Station is defined as a facility that receives solid wastes for processing, storage, and transfer from one vehicle to another)
	☐	Others
	☐	None

If others, please list:	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

13.	Approximately how many recycling facilities are located in your state?	
	Recycling Centers	_____
	Material Recovery Facilities	_____
	Transfer Stations	_____
	Others	_____

14.	Are permits required for operating recycling facilities in your state?
	○ No
	○ Yes

If yes, are there conditions where permits are not required?	_____ _____ _____ _____ _____ _____ _____ _____

15.	Are any of the above recycling facilities regulated as solid waste facilities?		
		No	Yes
	Recycling Centers	○	○
	Material Recovery Facilities	○	○
	Transfer Stations	○	○
	Others	○	○

16.	What criteria (if any) are used to determine if a recycling facility is regulated as a waste handler (please describe)?	_____ _____ _____ _____ _____

		_____ _____ _____ _____ _____

17.	What level of permitting is applied to recycling facilities?	
	○	Equal to landfills
	○	Less stringent than landfills
	○	Not regulated as waste

18.	Are there fees associated with permitting or operating under a permit?	
	○	No
	○	Yes

19.	Overall, are the regulations prescriptive or performance-based?	
	○	Prescriptive Based
	○	Performance Based

20.	What material properties are quantified at recycling facilities for regulatory oversight? (please check all that apply):				
		Weight	Volume	Other Property (please list)	Comments:
	Total materials incoming to facility	☐	☐	☐	_____ _____ _____
	Total materials outgoing from facility	☐	☐	☐	_____ _____ _____
	Outgoing recyclable materials	☐	☐	☐	_____ _____ _____
	Total incoming paper	☐	☐	☐	_____ _____ _____
	Total incoming plastics	☐	☐	☐	_____ _____ _____

20.	What material properties are quantified at recycling facilities for regulatory oversight? (please check all that apply):				
		Weight	Volume	Other Property (please list)	Comments:
	Total incoming metals	☐	☐	☐	_____ _____ _____
	Total incoming glass	☐	☐	☐	_____ _____ _____
	Total incoming other materials (please list)	☐	☐	☐	_____ _____ _____
	Total outgoing paper	☐	☐	☐	_____ _____ _____
	Total outgoing plastics	☐	☐	☐	_____ _____ _____

20.	What material properties are quantified at recycling facilities for regulatory oversight? (please check all that apply):				
		Weight	Volume	Other Property (please list)	Comments:
	Total outgoing metals	☐	☐	☐	_____ _____ _____
	Total outgoing glass	☐	☐	☐	_____ _____ _____
	Total outgoing other materials (please list)	☐	☐	☐	_____ _____ _____
	Other material types/forms (please list)	☐	☐	☐	_____ _____ _____
	None	☐	☐	☐	_____ _____ _____

21.	Is putrescible content quantified for regulatory purposes?	
	○	No
	○	Yes

If yes, please describe the mechanism:	_____ _____ _____ _____ _____ _____ _____

	_____ _____ _____

22.	Is residual content (or contaminant content) quantified for regulatory purposes?	
	○	No
	○	Yes

If yes, please describe the mechanism:	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

23.	How are material quantities determined?	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

24.	What is the method used for sampling weights and measures at the facilities in your jurisdiction to assure compliance with regulations?	
	○	Discrete spot measurements
	○	Material flows averages

If discrete spot measurements are used, what is the frequency of such measurements?		
	○	Continual (i.e., every load)
	○	Multiple times per day
	○	Daily

If discrete spot measurements are used, what is the frequency of such measurements?		
	○	Less frequent than daily, but more frequent than weekly
	○	Weekly
	○	Less frequent than weekly, but more frequent than monthly
	○	Monthly
	○	Other

Please expand upon other:	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

If material flows averages are used, what is the period of duration considered for average material flow for measurements for assuring compliance period.		
	○	Continual (i.e., every load)
	○	Multiple times per day
	○	Daily
	○	Less frequent than daily, but more frequent than weekly
	○	Weekly
	○	Less frequent than weekly, but more frequent than monthly
	○	Monthly
	○	Other

Please expand upon other:	_____ _____ _____ _____ _____ _____ _____ _____ _____

25.	Are any properties of specific outgoing recyclable materials (e.g., paper, plastics, metals, etc.) measured and reported besides the quantity (weight or volume) of these materials?	
	○	No
	○	Yes

If yes please explain. (we are particularly interested in finding out about any regulatory requirements for quality of outgoing recyclable materials).	_____ _____ _____ _____ _____ _____

	_____ _____ _____ _____

26.	Does your state have regulations related to the duration that materials can be stockpiled or stored on site at a recycling facility?	
	○	No
	○	Yes

If yes, please describe.	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

27.	Does your state have regulations related to beneficial re-use of waste materials?	
	○	No
	○	Yes

If yes, please describe.	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

28.	The following set of questions relates to any criteria that may have been used in the initial development of the current regulations used in your state:			
		No	Yes	If yes, please comment:
	1.) Have specific/quantitative science and engineering principles been used in the development of regulatory criteria?	○	○	_____ _____ _____ _____ _____ _____ _____
	2.) Have specific/quantitative economic and feasibility principles been used in the development of regulatory criteria?	○	○	_____ _____ _____ _____ _____ _____
	3.) Has scientifically-based risk assessment been used in the development of regulatory criteria?	○	○	_____ _____ _____

28.	The following set of questions relates to any criteria that may have been used in the initial development of the current regulations used in your state:			
		No	Yes	If yes, please comment:
				_____ _____ _____ _____
	4.) Have other principles/criteria not included above been used in the development of regulatory criteria?	○	○	_____ _____ _____ _____ _____ _____ _____

29.	Do you have a sense for how your jurisdiction compares to others in regulatory rigor?	
	○	Significantly more stringent than other jurisdictions
	○	Somewhat more stringent than other jurisdictions
	○	Similar to other jurisdictions
	○	Somewhat less stringent than other jurisdictions
	○	Significantly less stringent than other jurisdictions
	○	Do not know

30.	Do your regulations have provisions for (or are flexible enough to account for) new technologies (such as anaerobic digestion, hydrolysis, and gasification)?	
	○	No
	○	Yes

31.	Are the recycling operations inspected by your agency?	
	○	No
	○	Yes

If yes, how often and what format of inspection?	_____ _____ _____

	_____ _____ _____ _____ _____ _____ _____

32.	If inspections are conducted, do the inspections contain objective components (e.g., data collection, numerical ratings)?	
	○	No
	○	Yes

33.	If inspections are conducted, do the inspections contain subjective components (e.g., observation of dust and odors)?	
	○	No
	○	Yes

34.	What type of enforcement is used for	_____ _____

	violations?	_____ _____ _____ _____ _____ _____ _____ _____

35.	Do you assess any type of penalties?	
	○	No
	○	Yes

36.	Are recycling facilities required to submit reports related to their material flows to meet regulatory requirements?	
	○	No
	○	Yes

If yes, please provide details:	_____ _____

	_____ _____ _____ _____ _____ _____ _____ _____

37.	Do you feel that operational efficiency at recycling facilities is affected by regulations?	
	○	No
	○	Yes

38.	Are you satisfied with the current model of regulation?	
	○	Very satisfied
	○	Satisfied
	○	Neither satisfied nor dissatisfied
	○	Dissatisfied
	○	Very dissatisfied

39.	Do you experience problems with the current model? Please comment:	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

40.	Is your state considering or in the process of changing regulations for recycling activities?	
	○	No
	○	Yes

If yes, please describe the status and direction and/or priorities for new regulations.	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

41.	Please share any additional thoughts or comments related to your regulatory methods in the space below:	
	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____	

42.	Please provide relevant regulation numbers/titles and corresponding Web addresses (if applicable) for further reading for the research team:	
	_____ _____ _____ _____ _____	

42.	Please provide relevant regulation numbers/titles and corresponding Web addresses (if applicable) for further reading for the research team:	
	_____ _____ _____ _____ _____	

43.	Please provide any case histories that relate to application of the recycling regulatory framework in your state to the research team. The case histories may relate to a successful or unsuccessful application of the regulations and may involve meetings and hearings related to the application of the regulations. The research team is interested in case histories to better understand and assess your state's regulatory framework. Materials can be provided to the research team as a Web address or sending any relevant materials to Dr. Jim Hanson.	
	_____ _____ _____ _____ _____ _____ _____ _____	

43.	Please provide any case histories that relate to application of the recycling regulatory framework in your state to the research team. The case histories may relate to a successful or unsuccessful application of the regulations and may involve meetings and hearings related to the application of the regulations. The research team is interested in case histories to better understand and assess your state's regulatory framework. Materials can be provided to the research team as a Web address or sending any relevant materials to Dr. Jim Hanson.	
	_____ _____	

44.	Your answers to the survey have been saved. If you have entirely completed the survey (will not be returning to it), please check the “completed” box below and the submit survey button. If you have not entirely completed the survey (and would like to return or have someone else return to add content), please check the “not completed – will return” box. You or someone else can return to the survey and complete the remaining questions. The first survey question and your answer (your state) will bring up your previous answers that have been saved up to that point. It is important that only one person be entering information for a given state at any one instant in time.	
	○	Completed
	○	Not Completed - Will Return

Thank you for your time in completing this survey.

Jim Hanson, Ph.D., PE
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1 Grand Ave.
San Luis Obispo, CA 93407-0353
Tel: 805-756-6227
Fax: 805-756-6330
E-mail: jahanson@calpoly.edu

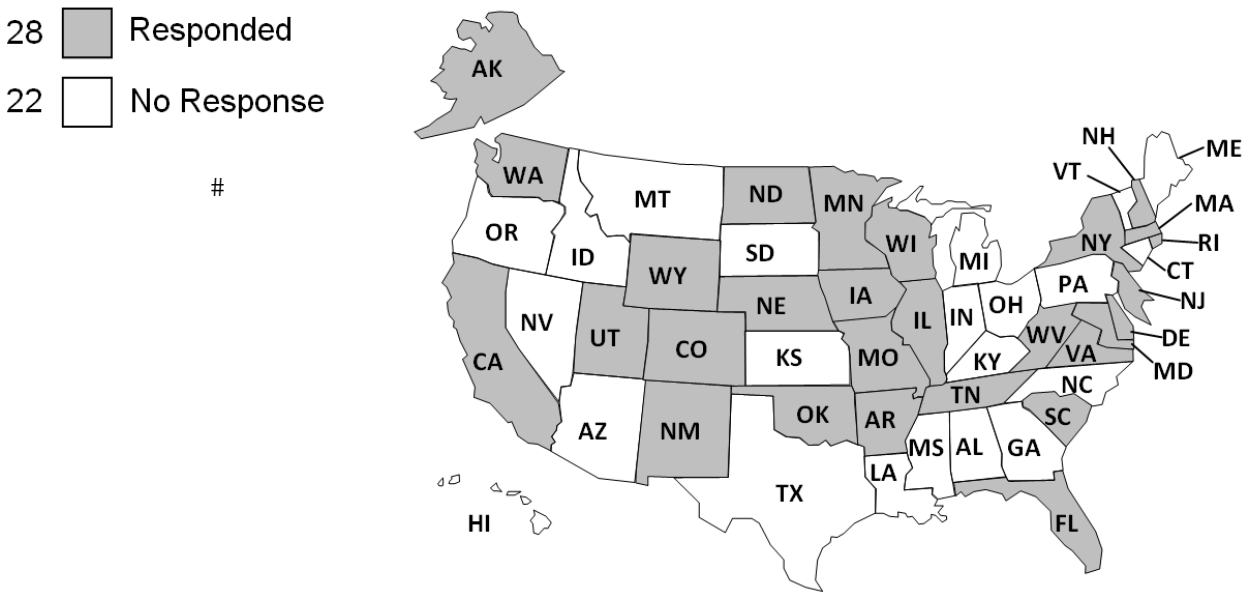

Figure B-1. - Survey Responses

Figure B-2. (Question 3a) - What is the approximate total amount of solid waste processed per year in your state? - Total Solid Waste Generated (million tons/yr)

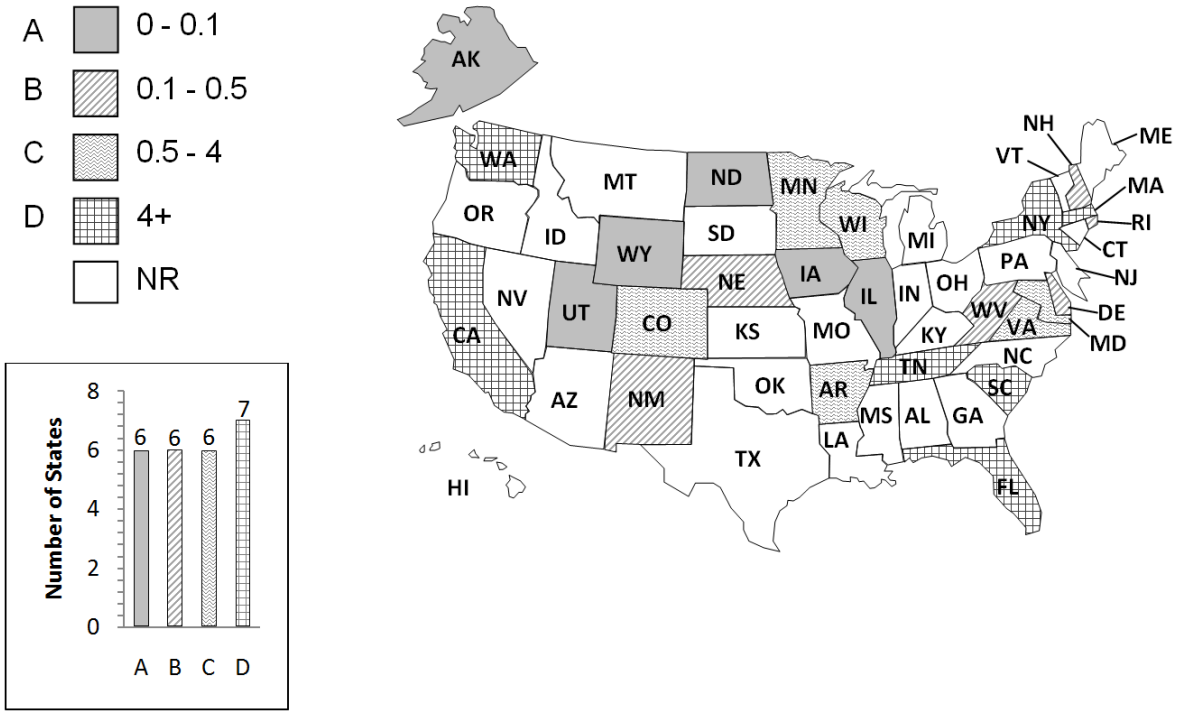

Figure B-3. (Question 3b) - What is the approximate total amount of solid waste processed per year in your state? - Total Solid Waste Recycled (million tons/yr)

Figure B-4. (Question 3c) - What is the approximate total amount of solid waste processed per year in your state? - Total Solid Waste Composted (thousand tons/yr)

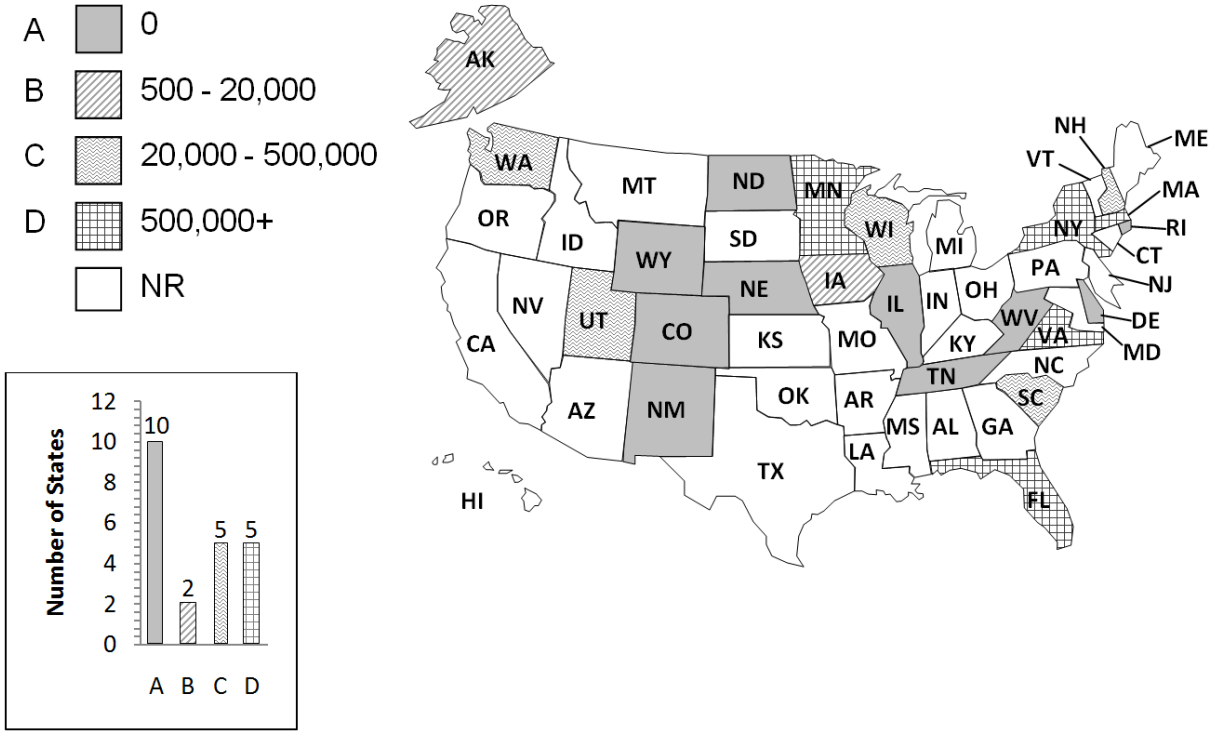

Figure B-5. (Question 3d) - What is the approximate total amount of solid waste processed per year in your state? - Total Solid Waste Incinerated (tons/yr)

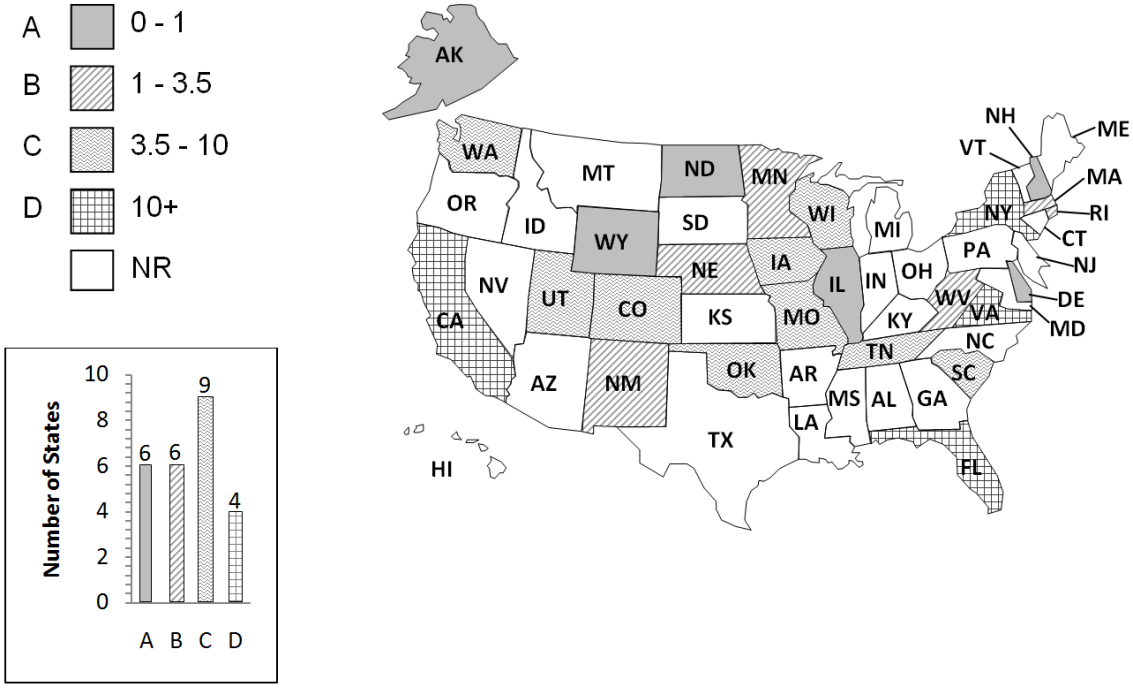

Figure B-6. (Question 3e) - Total Solid Waste Landfilled (million tons/yr)

Figure B-7. (Question 4) - Does your state charge a deposit (and subsequently, provide a cash refund) for bottles and cans?

Figure B-8. (Question 5) - Does your state have other incentives for recycling, including regulatory and other economic incentives?

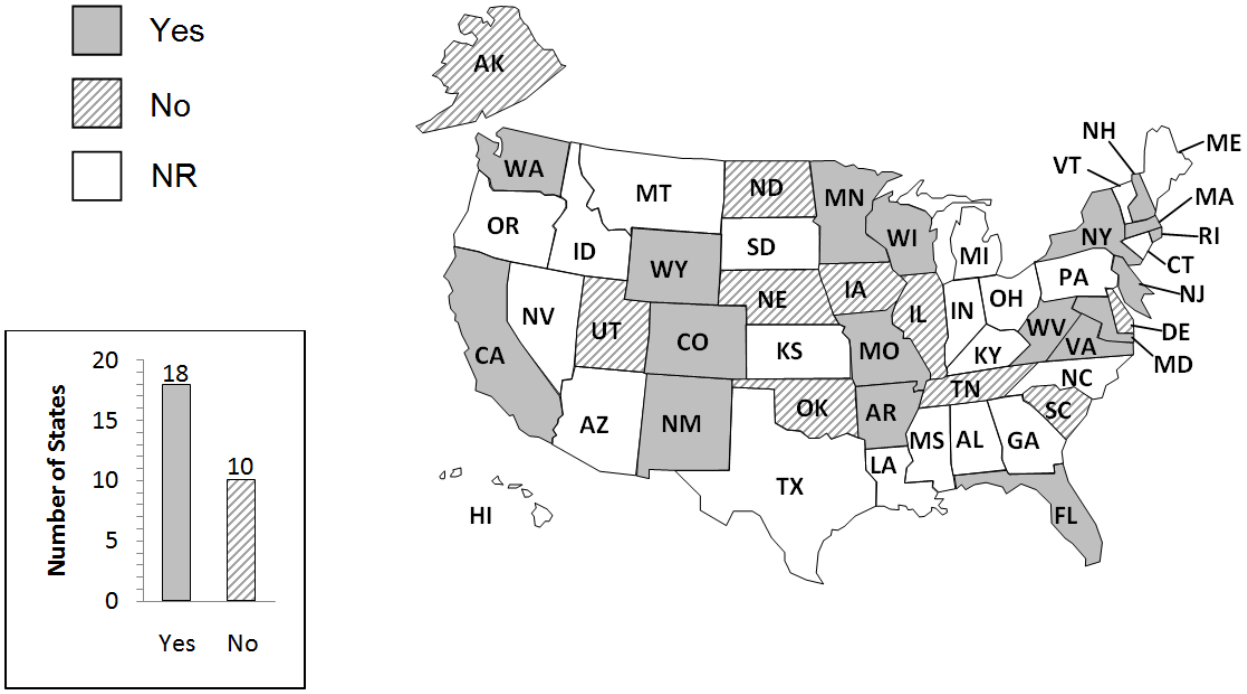

Figure B-9. (Question 6) - Is recycling regulated at the state level in your state?

Figure B-10. (Question 7) - Does the regulation of recycled materials differ from regulation of municipal solid waste in your state?

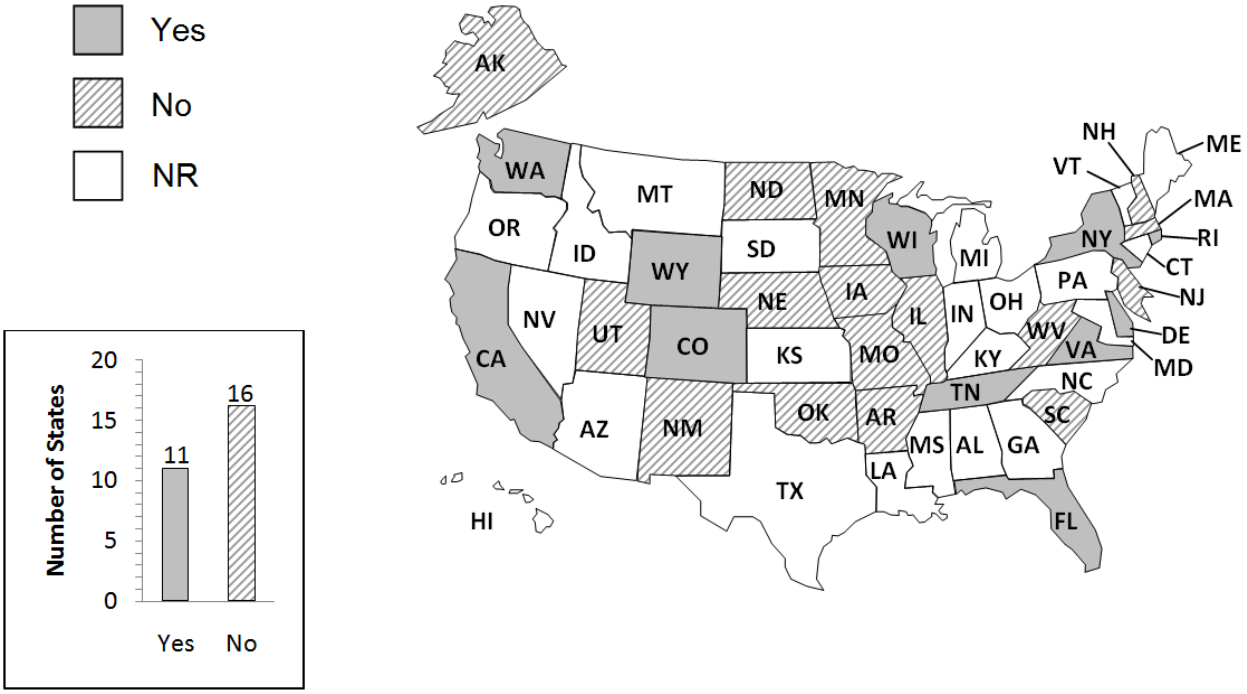

Figure B-11. (Question 8) - Are there numerical thresholds or definitions used to distinguish recycled materials from municipal solid waste?

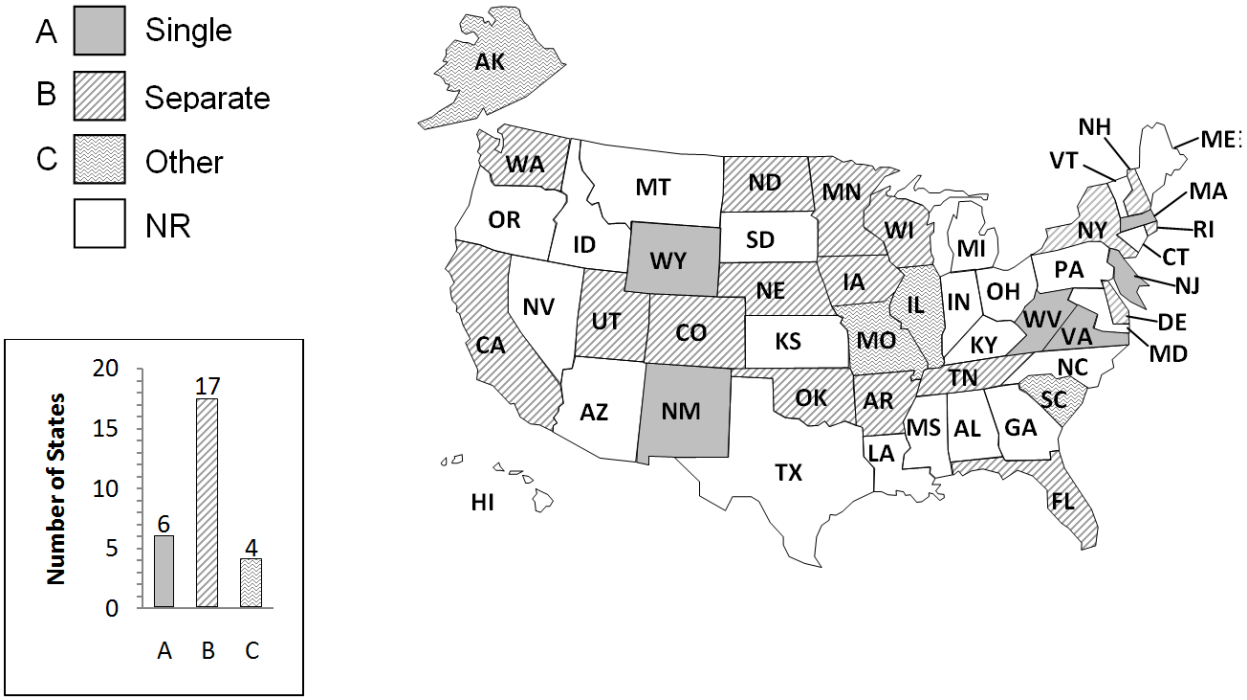

Figure B-12. (Question 9) - Does the regulation of recycled materials differ from compost in your state?

Figure B-13. (Question 10a) - Who is regulated in your state for recycled materials? - Generators

Figure B-14. (Question 10b) - Who is regulated in your state for recycled materials? - Handlers

Figure B-15. (Question 10c) - Who is regulated in your state for recycled materials? - Transporter

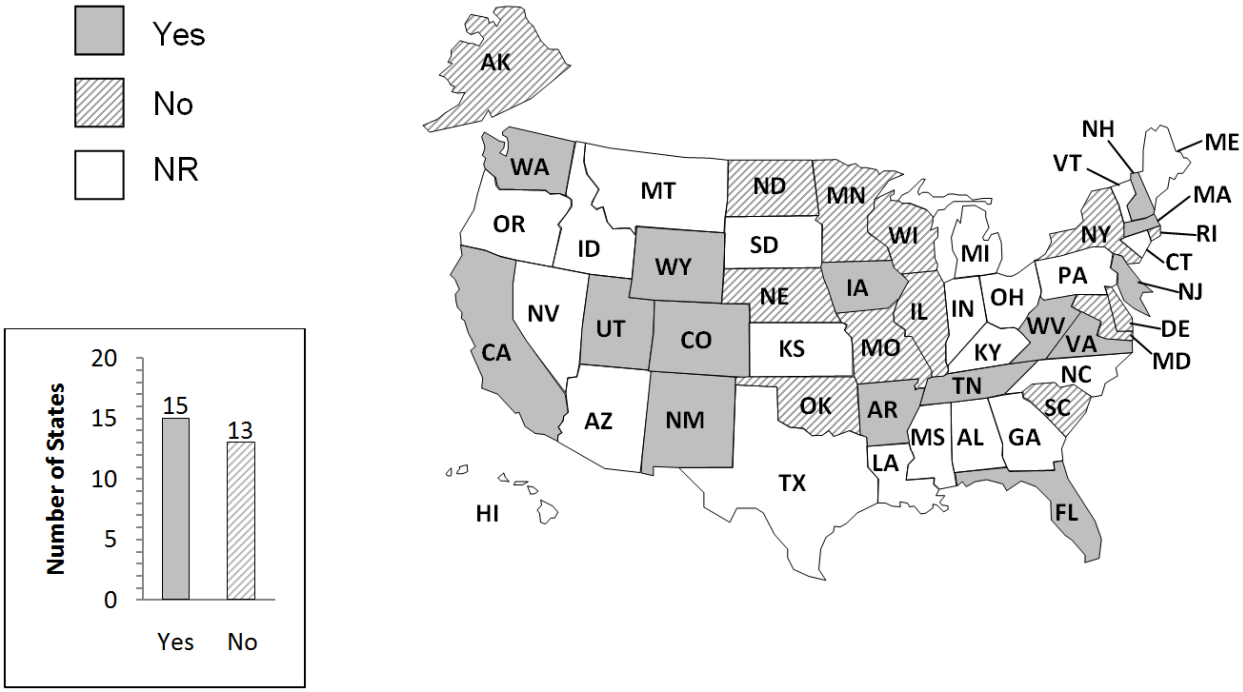

Figure B-16. (Question 10d) - Who is regulated in your state for recycled materials? - Recyclers

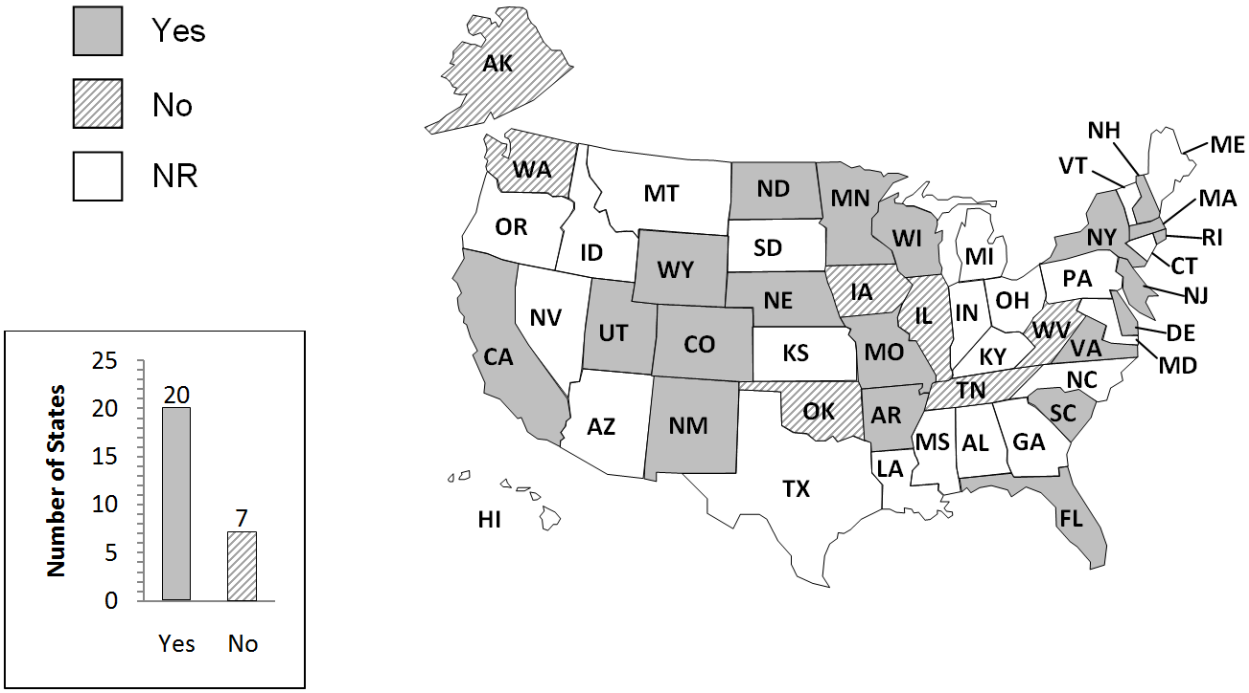

Figure B-17. (Question 11) - Is there a single set of regulations for the entire state?

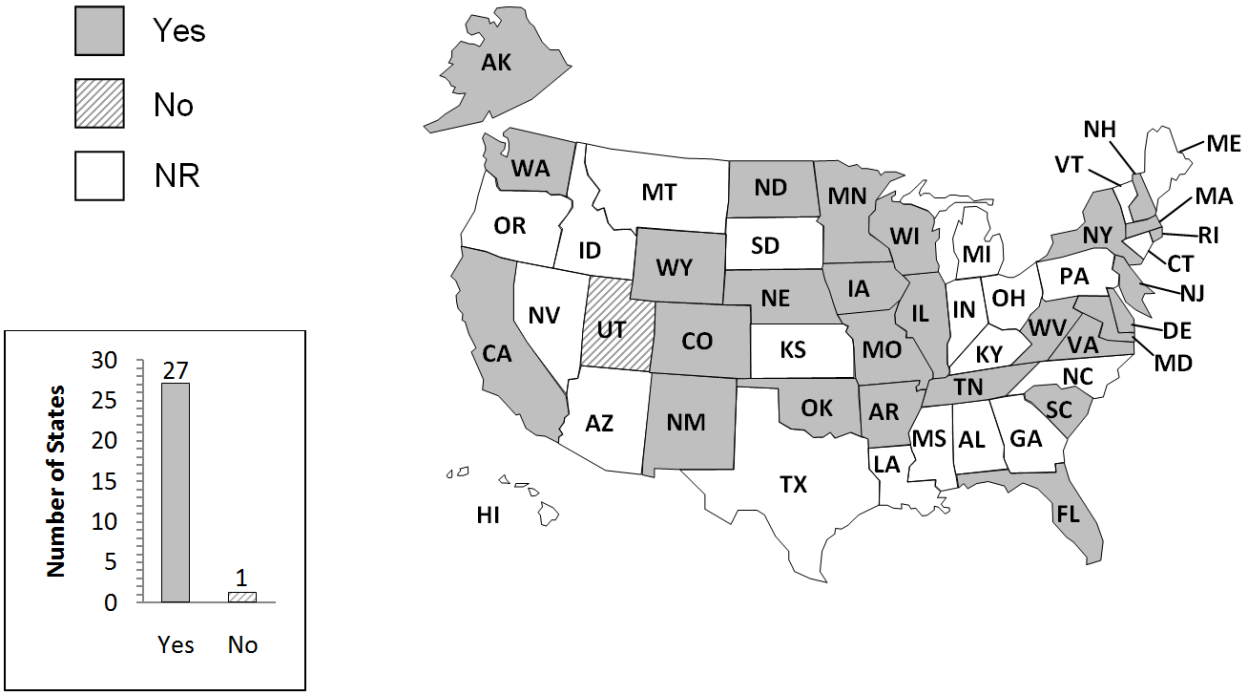

Figure B-18. (Question 12a) - What types of operations/activities (all together termed recycling facilities) are located in your state? - Recycling Center

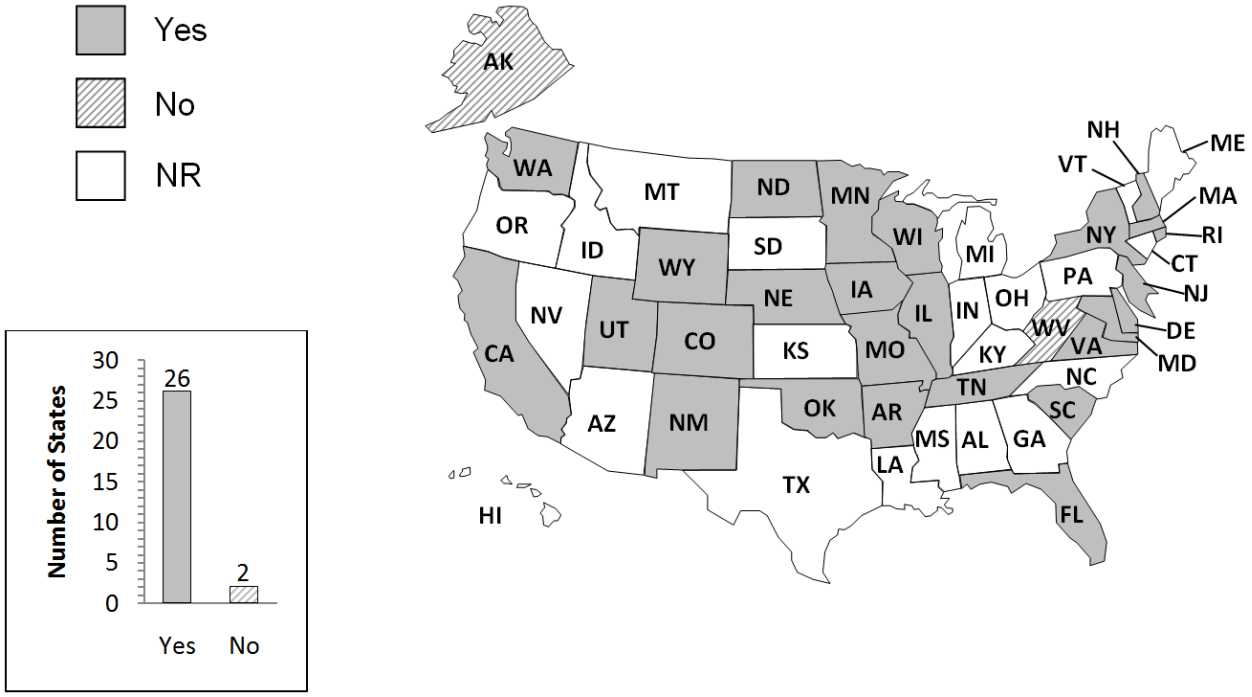

Figure B-19. (Question 12b) - What types of operations/activities (all together termed recycling facilities) are located in your state? - MRF

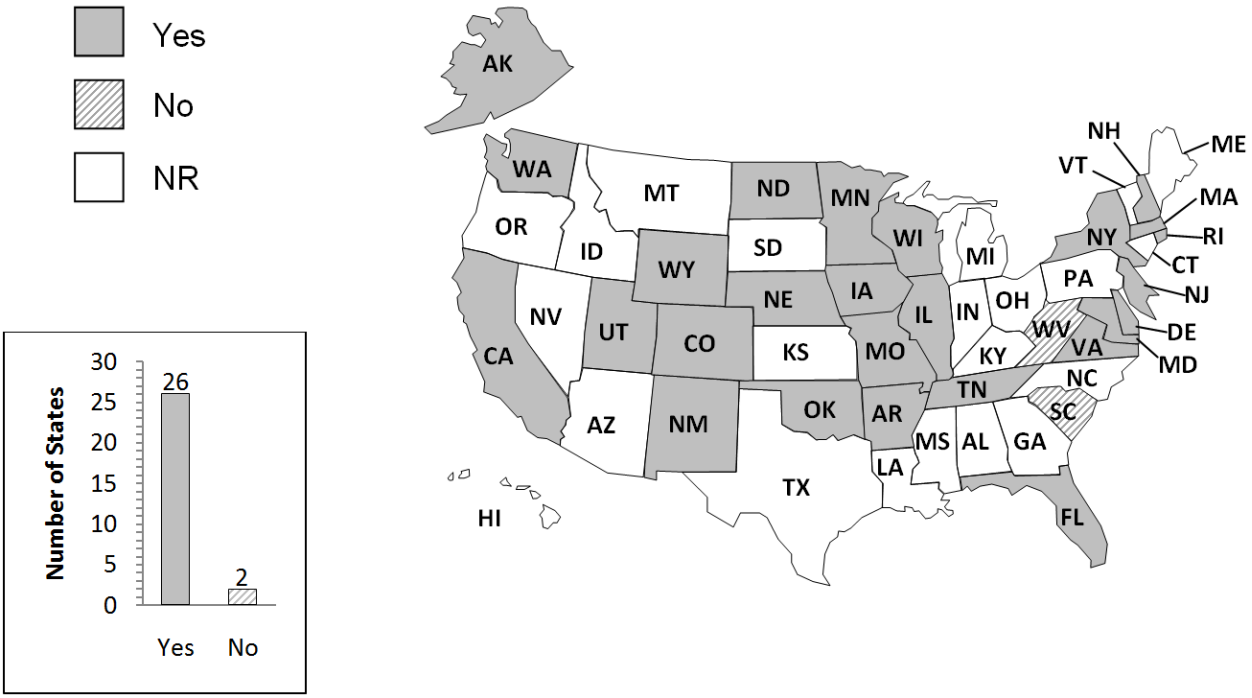

Figure B-20. (Question 12c) - What types of operations/activities (all together termed recycling facilities) are located in your state? - Transfer Station

Figure B-21. (Question 12d) - What types of operations/activities (all together termed recycling facilities) are located in your state? - Other

Figure B-22. (Question 13a) - Approximately how many recycling facilities are located in your state? Recycling Centers

Figure B-23. (Question 13b) - Approximately how many recycling facilities are located in your state? - MRF

Figure B-24. (Question 13c) - Approximately how many recycling facilities are located in your state? - Transfer Station

Figure B-25. (Question 13d) - Approximately how many recycling facilities are located in your state? - Other

Figure B-26. (Question 13e) - Approximately how many recycling facilities are located in your state? - Total

Figure B-27. (Question 14) - Are permits required for operating recycling facilities in your state?

Figure B-28. (Question 15a) - Are any of the above recycling facilities regulated as solid waste facilities? - Recycling Center

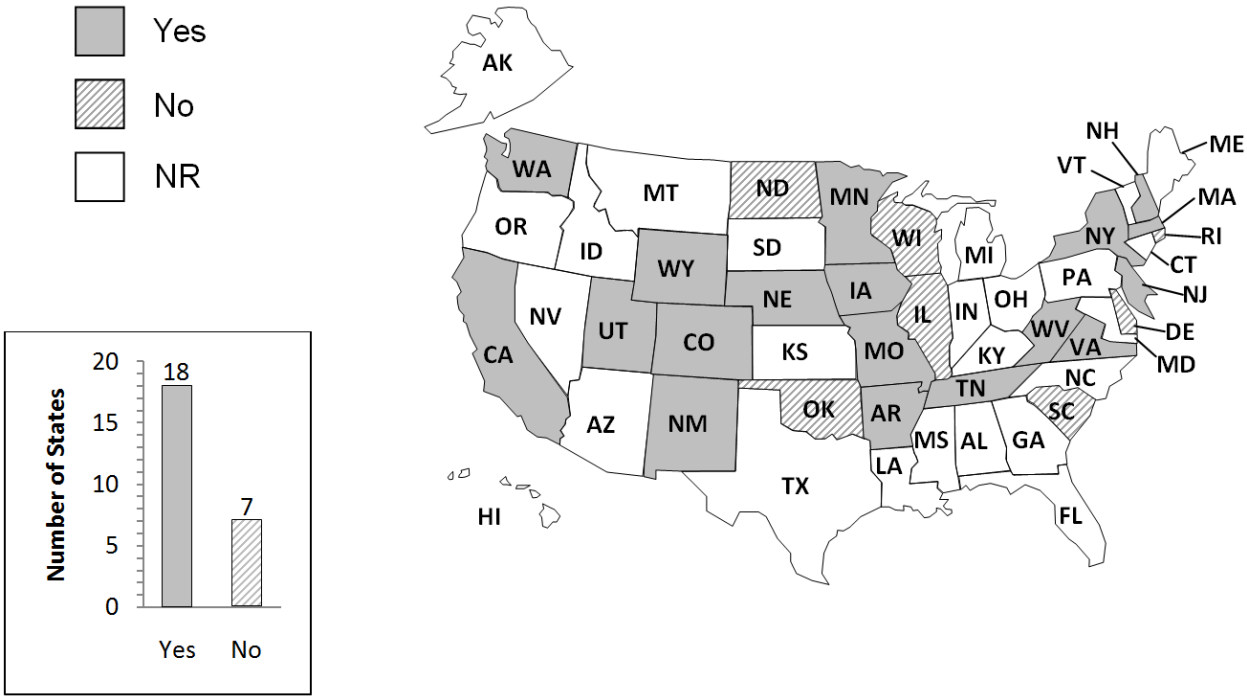

Figure B-29. (Question 15b) - Are any of the above recycling facilities regulated as solid waste facilities? - MRF

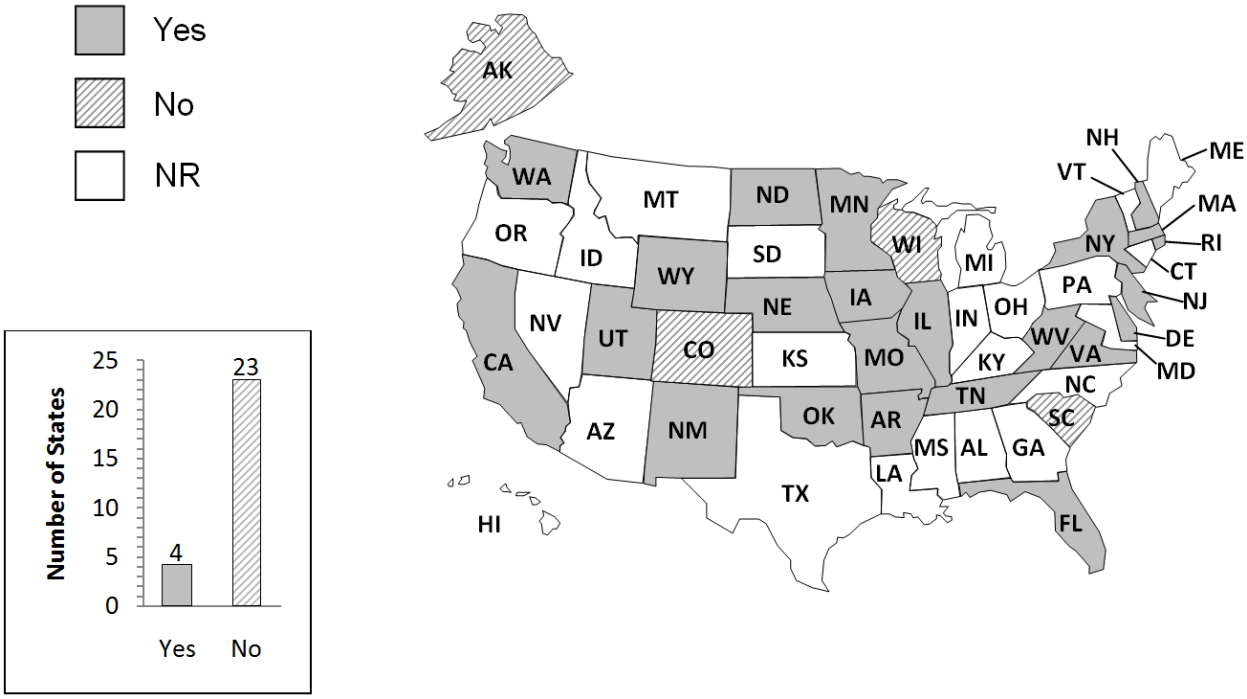

Figure B-30. (Question 15c) - Are any of the above recycling facilities regulated as solid waste facilities? - Transfer Station

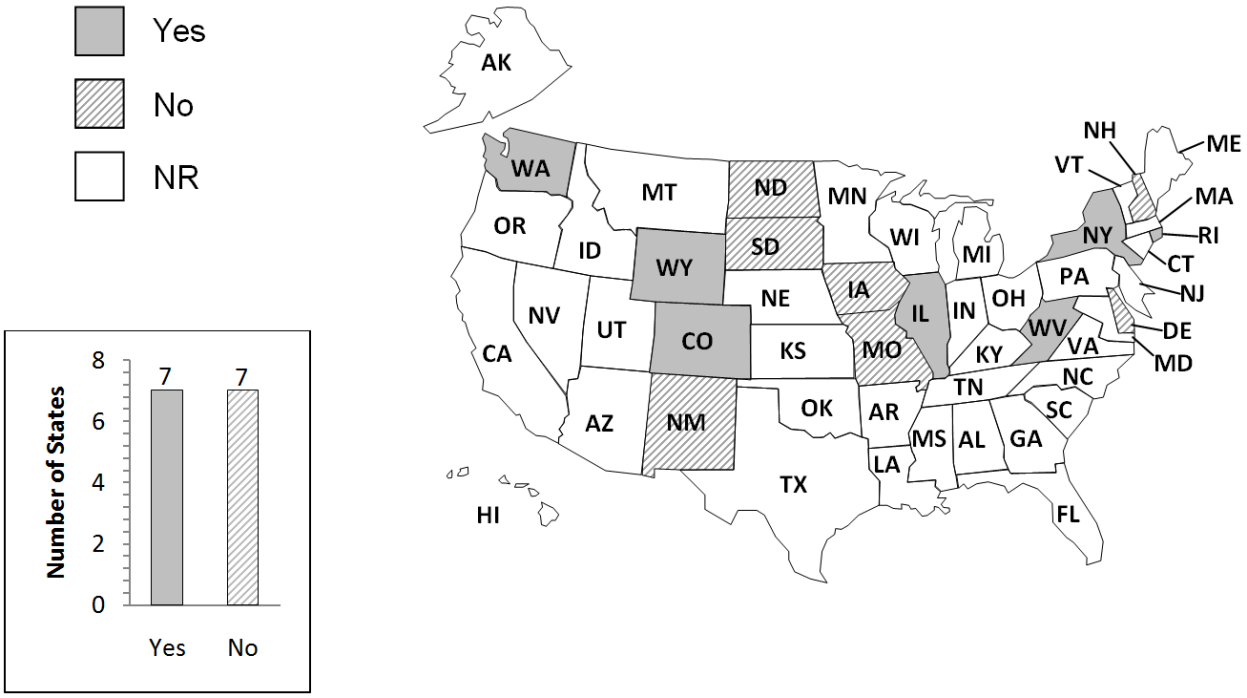

Figure B-31. (Question 15d) - Are any of the above recycling facilities regulated as solid waste facilities? - Other

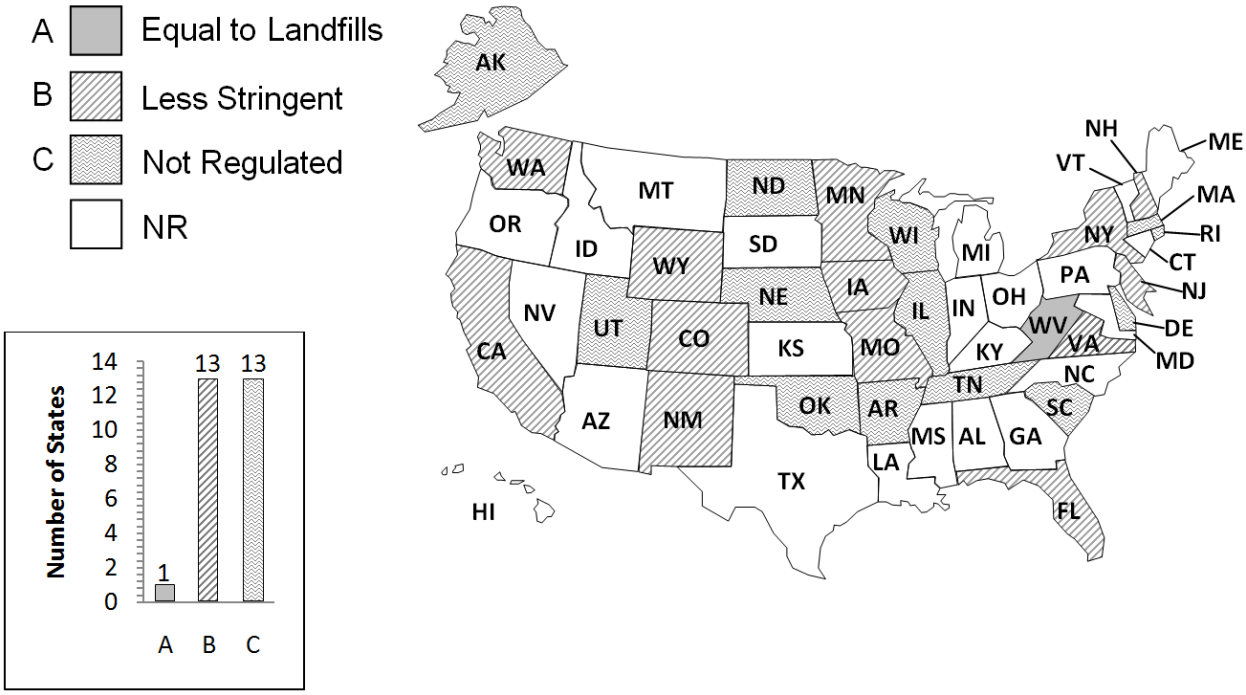

Figure B-32. (Question 17) - What level of permitting is applied to recycling facilities?

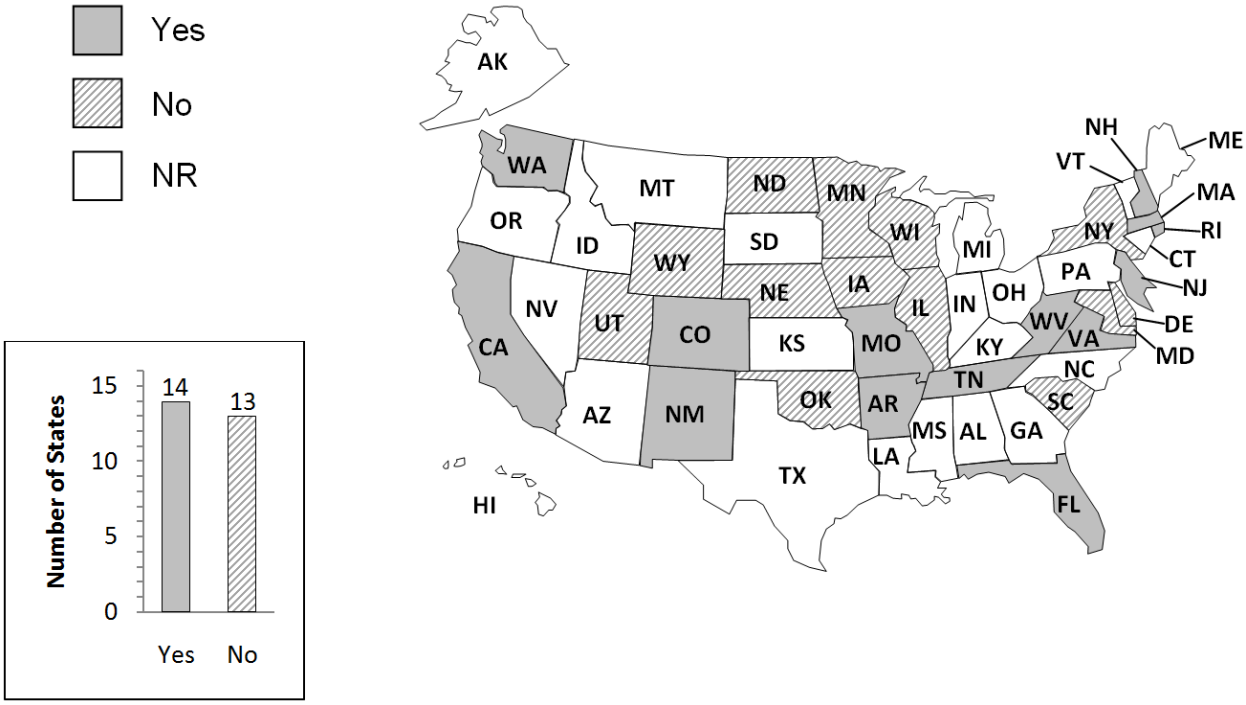

Figure B-33. (Question 18) - Are there fees associated with permitting or operating under a permit?

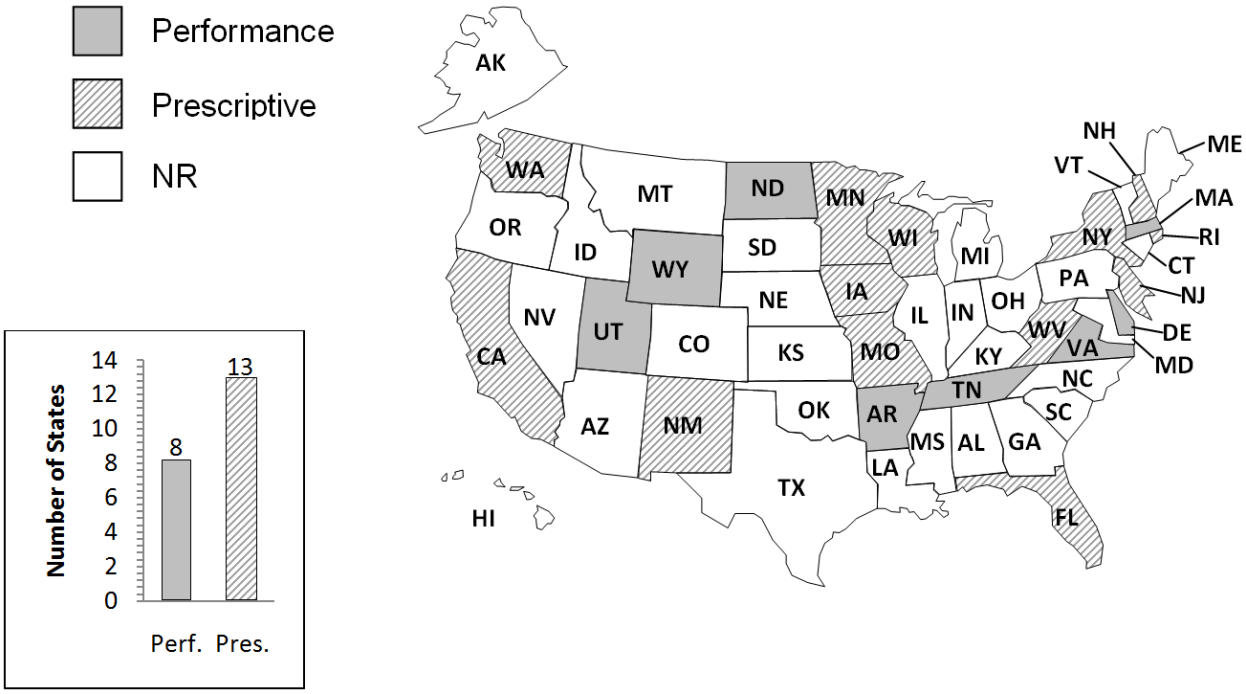

Figure B-34. (Question 19) - Overall, are the regulations prescriptive or performance-based?

Figure B-35. (Question 20a) - What material properties are quantified at recycling facilities for regulatory oversight? (Total materials incoming to facility - Weight)

Figure B-36. (Question 20b) - What material properties are quantified at recycling facilities for regulatory oversight? (Total materials incoming to facility - Volume)

Figure B-37. (Question 20c) - What material properties are quantified at recycling facilities for regulatory oversight? (Total materials outgoing from facility - Weight)

Figure B-38. (Question 20d) - What material properties are quantified at recycling facilities for regulatory oversight? (Total materials outgoing from facility - Volume)

Figure B-39. (Question 21) - Is putrescible content quantified for regulatory purposes?

Figure B-40. (Question 22) - Is residual content (or contaminant content) quantified for regulatory purposes?

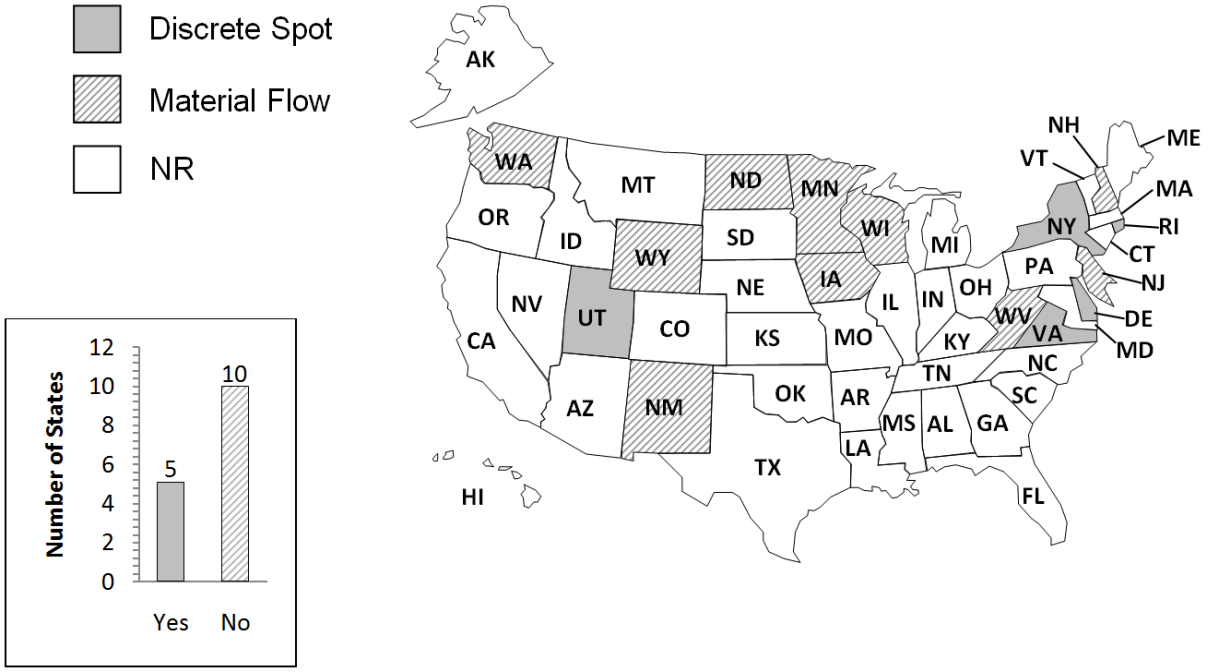

Figure B-41. (Question 24) - What is the method used for sampling weights and measures at the facilities in your jurisdiction to assure compliance with regulations?

Figure B-42. (Question 25) - Are any properties of specific outgoing recyclable materials (e.g., paper, plastics, metals, etc.) measured and reported besides the quantity (weight or volume) of these materials?

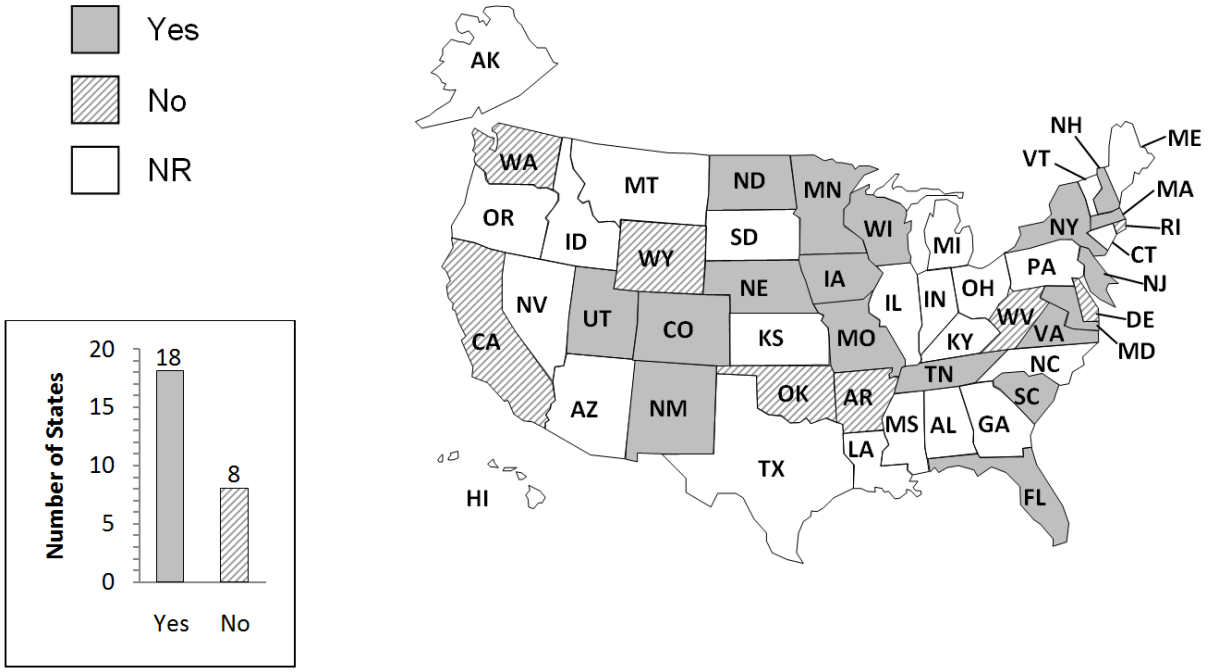

Figure B-43. (Question 26) - Does your state have regulations related to the duration that materials can be stockpiled or stored on-site at a recycling facility?

Figure B-44. (Question 27) - Does your state have regulations related to beneficial re-use of waste materials?

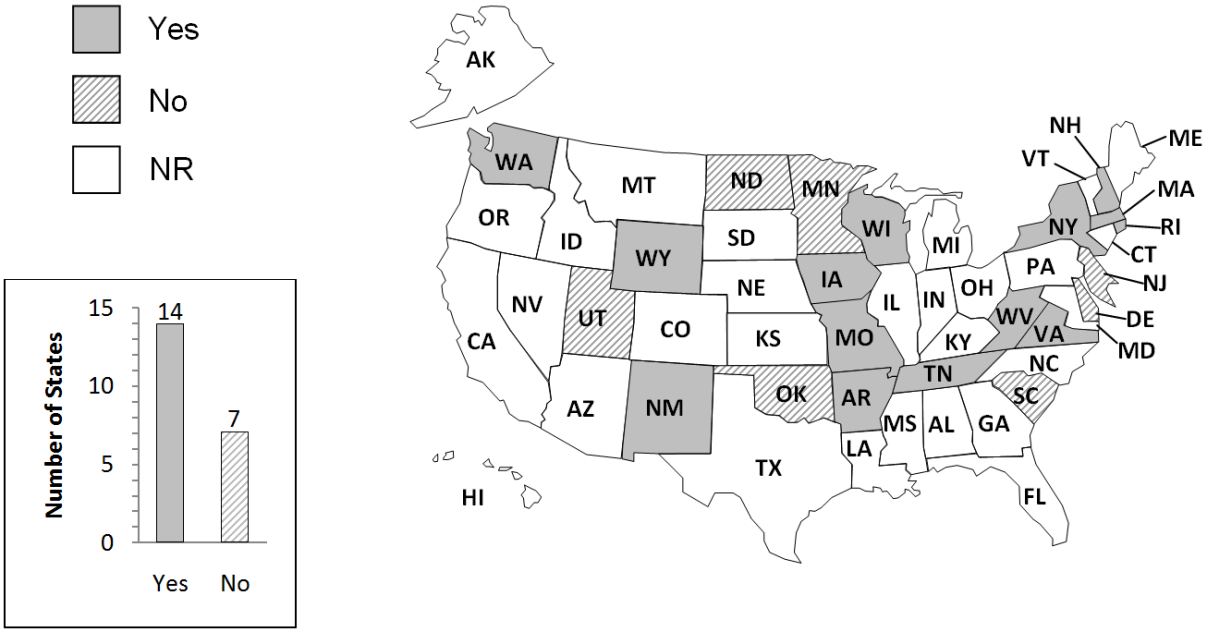

Figure B-45. (Question 28a) - The following set of questions relates to any criteria that may have been used in the initial development of the current regulations used in your state: 1.) Have specific/quantitative science and engineering principles been used in the development of regulatory criteria?

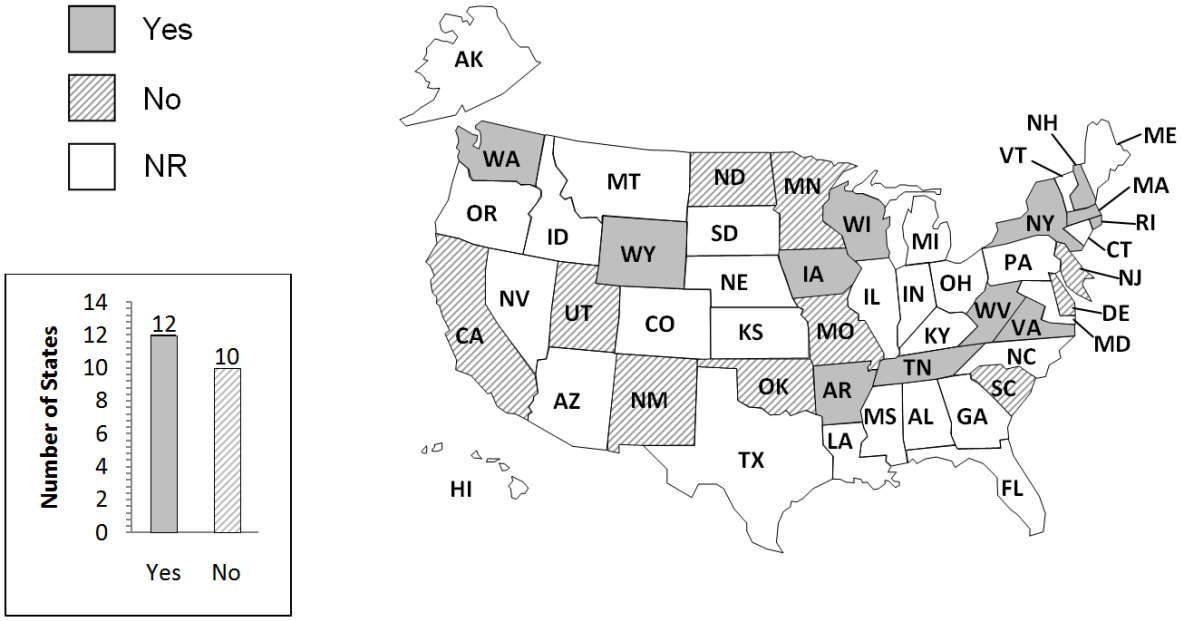

Figure B-46. (Question 28b) - The following set of questions relates to any criteria that may have been used in the initial development of the current regulations used in your state: 2.) Have specific/quantitative economic and feasibility principles been used in the development of regulatory criteria?

Figure B-47. (Question 28c) - The following set of questions relates to any criteria that may have been used in the initial development of the current regulations used in your state: 3.) Has scientifically-based risk assessment been used in the development of regulatory criteria?

Figure B-48. (Question 28d) - The following set of questions relates to any criteria that may have been used in the initial development of the current regulations used in your state: 4.) Have other principles/criteria not included above been used in the development of regulatory criteria?

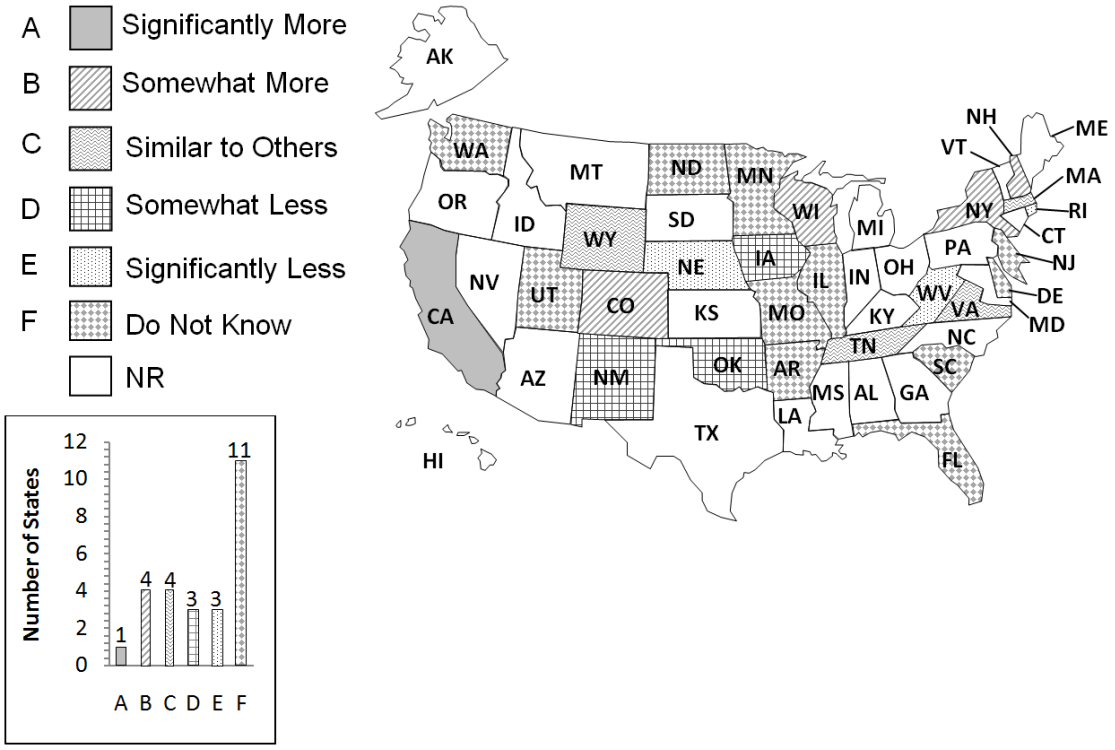

Figure B-49. (Question 29) - Do you have a sense for how your jurisdiction compares to others in regulatory rigor?

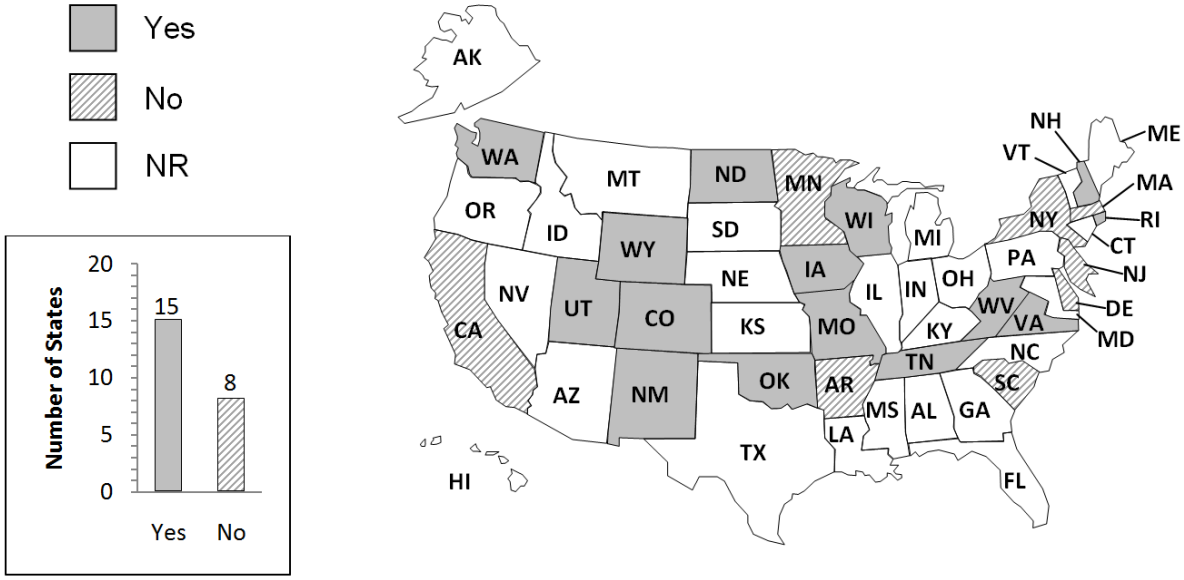

Figure B-50. (Question 30) - Do your regulations have provisions for (or are flexible enough to account for) new technologies (such as anaerobic digestion, hydrolysis, and gasification?

Figure B-51. (Question 31) - Are the recycling operations inspected by your agency?

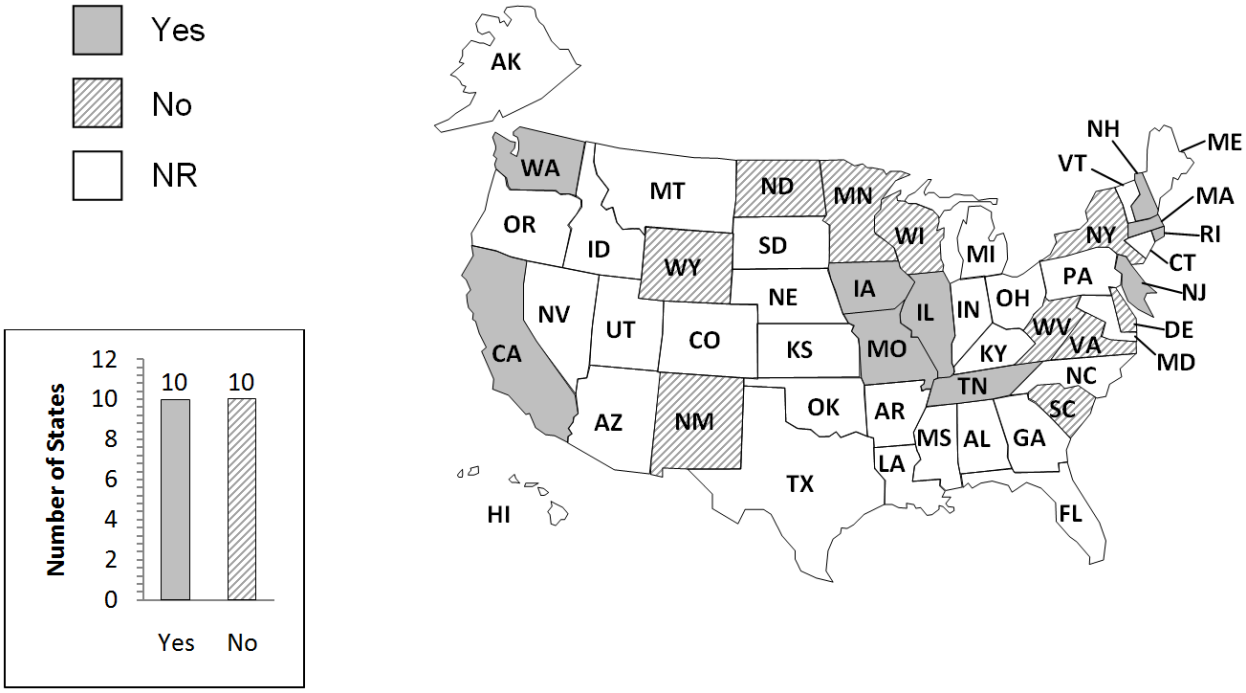

Figure B-52. (Question 32) - If inspections are conducted, do the inspections contain objective components (e.g., data collection, numerical ratings)?

Figure B-53. (Question 33) - If inspections are conducted, do the inspections contain subjective components (e.g., observation of dust and odors)?

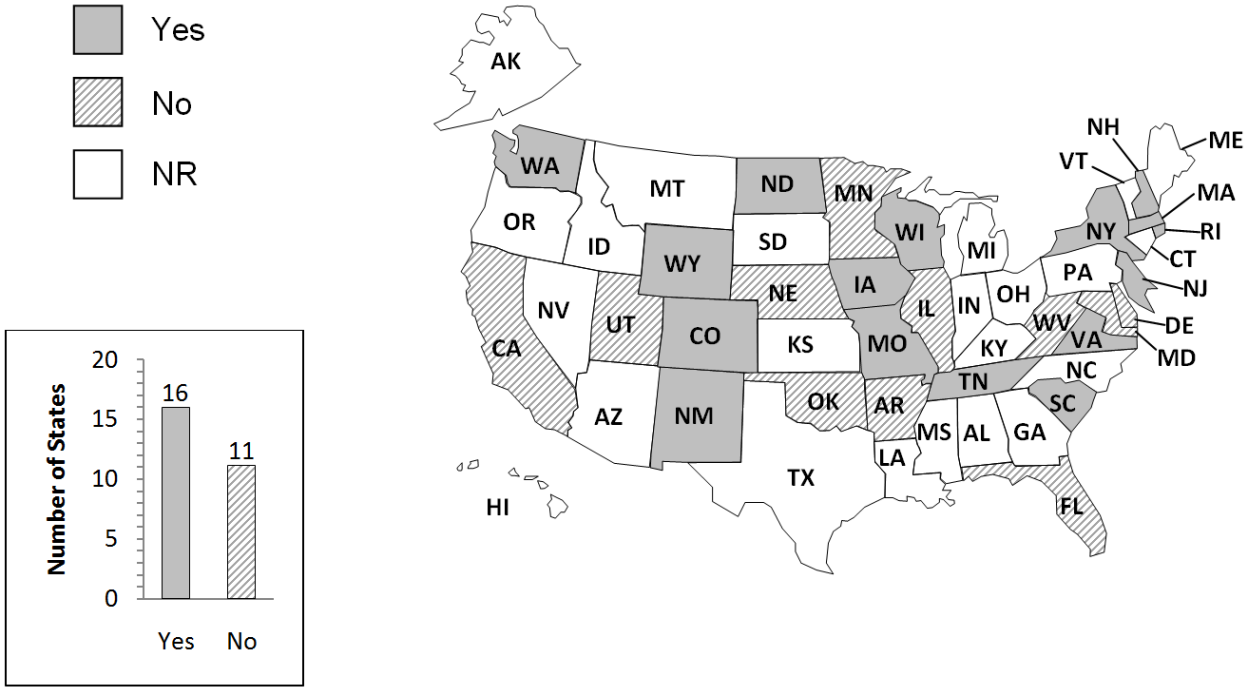

Figure B-54. (Question 35) - Do you assess any type of penalties?

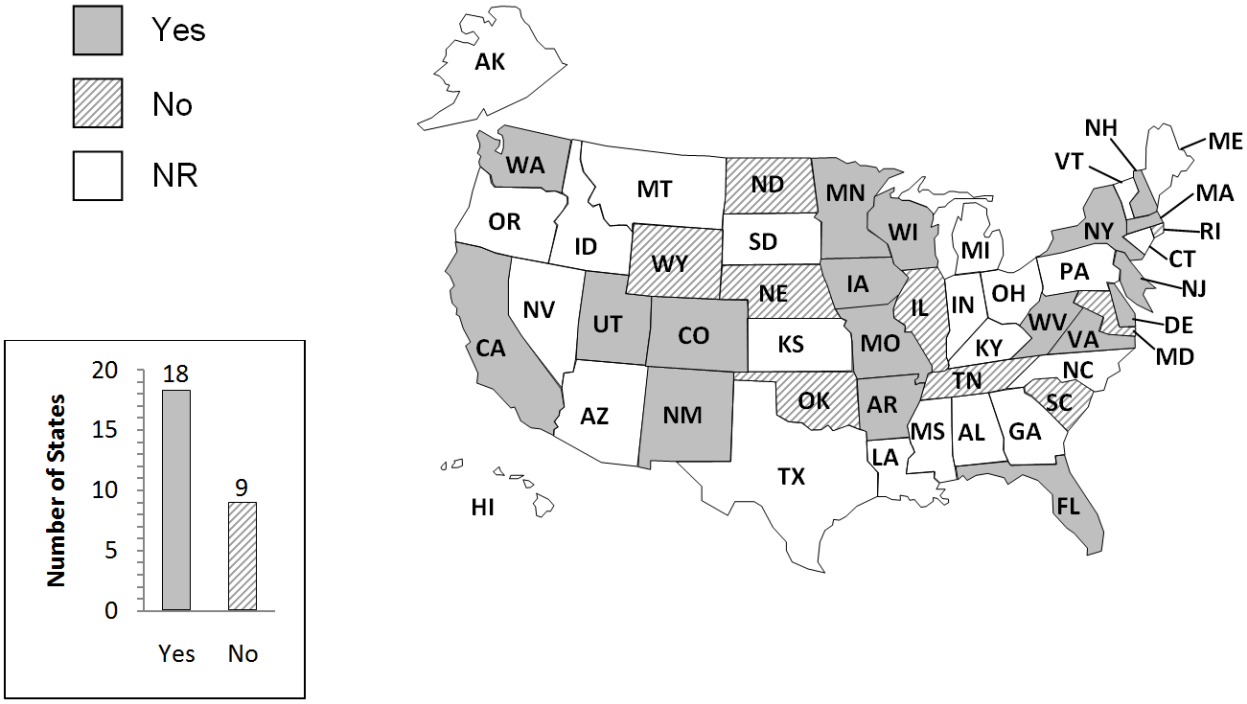

Figure B-55. (Question 36) - Are recycling facilities required to submit reports related to their material flows to meet regulatory requirements?

Figure B-56. (Question 37) - Do you feel that operational efficiency at recycling facilities is affected by regulations?

Figure B-57. (Question 38) - Are you satisfied with the current model of regulation?

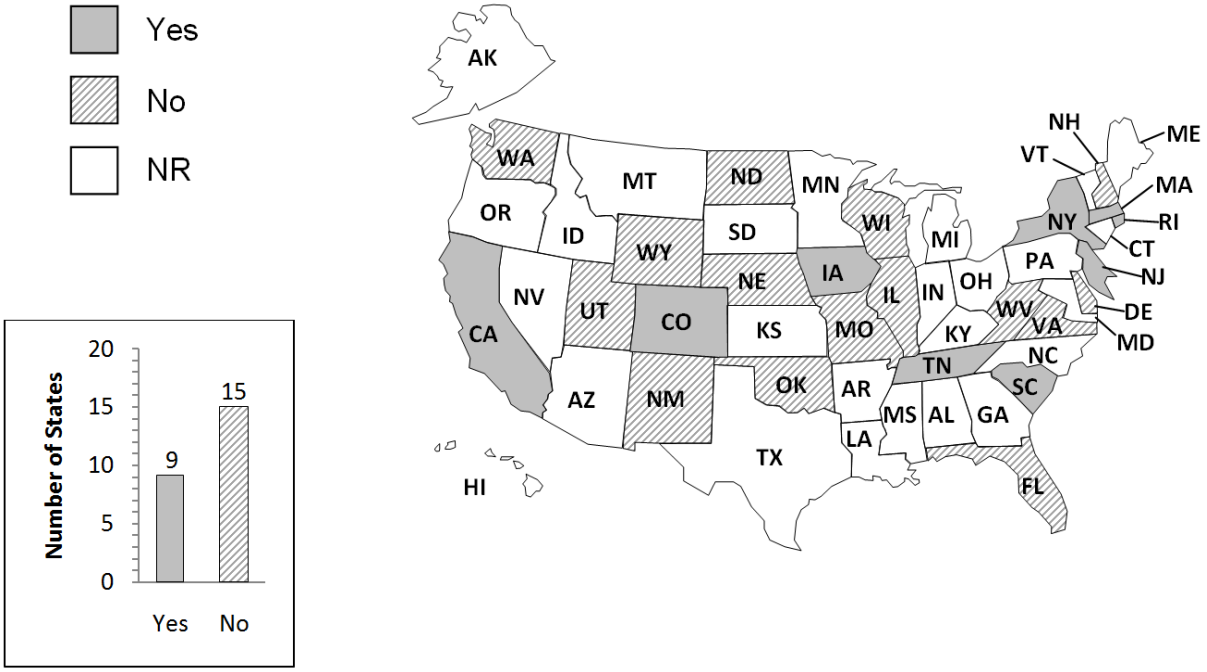

Figure B-58. (Question 40) - Is your state considering or in the process of changing regulations for recycling activities?

Table B-1. Comments from Recycling Survey

State	Comments from Recycling Survey
Alaska	There are no recycling regulations in Alaska.
Arkansas	Permits are not required for recycling centers, however permits are required for material recovery facilities and transfer stations.
California	Recycling facilities are inspected only if there's a question if they should be a solid waste facility. Enforcements are done mostly by Local Enforcement Agency. Area of Concern or violation
Colorado	We are currently revising our recycling regulations to a framework approach to regulate not only MSW recycling but Beneficial Use of Industrial Materials. Currently only sites that process material are regulated (MRFs and recycling facilities, Beneficial Use projects). Our new regulations will regulate drop-off sites, MRFs, End users (recycling facilities), Industrial Recycling (aggregates, C&D operations), and Beneficial Use projects. Recycling Facilities MRFs must recycle 75% over a three-year rolling average, which is calculated by incoming material compared to material sent off site as a product or further recycling. We are revising our recycling regulations because there are many gaps in our current regulations such as who qualifies as a recycler.
Delaware	DNREC is the regulatory body for the State of Delaware, they determine MSW regulations. There are no regulations on recycling activities. All recycling activities are market driven. DSWA is the leading recycler of household material. Recycling facilities are subject to sight inspections daily. Delaware businesses that are involved with recycling are required to submit recycled material types and volumes on an annual basis. No problems with regulations exist.
Florida	Florida has 30% recycling goal for counties.
Illinois	There are no regulations for recycling. Recycling facilities might be inspected if a citizen complaint is received about blowing liter or poor housekeeping. We tried to regulate recycling unsuccessfully several years ago. People thought we would put recycling out of business, so we didn't regulate them. Still the economic climate this year has put some out of business.
Iowa	Economic incentives include: property tax exemption for recycling properties and waste diversion goal progress, tonnage fees are based upon this calculation (higher diversion results in lower fees). We have governing rules that apply to everyone, but local areas can develop more strict enforcement: bans, etc.

State	Comments from Recycling Survey
Iowa (con't.)	Violators are issued a Notice of Violation. This could lead to an Administrative Order, which could eventually result in a monetary fine/penalty. There are minimal regulations and enforcement on recycling facilities and this makes it hard to obtain reliable data. The state does not have any enforcement capability for reporting.
Maryland	Newsprint distributed in the state is to have a recycling rate of 40% by weight over a 3-year rolling average. This started in 2005 and will be continued in all subsequent years.
Massachusetts	Most facilities are most likely inspected in response to complaints. Violators are issued notices of non-compliance and are then followed with penalties. The regulations are being changed to better clarify how the regulatory requirements apply to evolving technology options such as anaerobic digestion.
Minnesota	For tax purposes, the state has a 85/15 rule. As long as residual is less than 15%, the residuals are exempt from the solid waste management tax. We have not done any enforcement for violators as of yet. We don't have much oversight. The permit-by-rule would work better if we were assured that all sites are registering. Recycling sites have essentially been ignored for several years in Minnesota. We are in the process of trying to find all of them again.
Missouri	For source-separated recyclables, no permit is required. Facilities that separate recyclables from other solid wastes do require permits, as do transfer stations. Inspections are only done for recycling faculties that require a permit. Violations are normally civil or administrative, there are few criminal cases. Problems with the regulations exist seldomly.
Nebraska	Only MRFs require a permit
New Hampshire	Inspections are done in compliance with permitting every other year Violators are issued letters of deficiency and fines for significant violations. The state would like to see self-inspection.
New Jersey	Violations for Class B, C and D facilities may be either for failure to comply with the recycling regulations or permit violations. Traditional recyclables including glass, paper, plastics, etc. (Class A recyclables) are exempt from permitting requirements and generally regulated on the local level.
New Mexico	If an inspector deems the quantities to be a nuisance or unsafe, then a notice of violation would be issued. Other than that, there are no time limits for storage.

State	Comments from Recycling Survey
New Mexico (con't.)	Recycling facilities are personally visited not more than once per year, or based on complaint. Violators are issued a notice of violation. For extreme, repeat violations we use administrative compliance order with fines and penalties. We do not experience problems with regulations.
New York	Inspection time varies for the facility type, transfer stations every 1-2 years, and non-putrescible facilities less often. Landfills and combustors get the most inspections. Violators are issued a notice of violation...30 days to correct. If not corrected, enforcement actions include fines, order of consent to improve operations and permit revocation if necessary. We resolve problems every day. The state is moving to a permit by rule approach. We regulate facilities that receive materials. However, separation of recyclables is a generator and hauler function, but our regulations do not cover those parts of the supply chain. This is the greatest weakness. Regulations have been in place since mid-1990s
North Dakota	For a recycling facility to be regulated as a waste handler, the determining factor is if the facility is operated so poorly that it poses a significant risk to public or environmental health. Inspections are on a drop-in basis or as complaints are logged. Violators are issued warning letters or notices of violation. It would be better if the recycling facilities reported numbers (volumes of products collected and sold) to us so we had a better understanding of who is recycling and what is being recycled in the state.
Oklahoma	There are no regulations for recycling and no problems are evident
Rhode Island	The state has regulations requiring all municipalities and businesses to recycle. Unfortunately, enforcement of these regulations is an issue. Regulations state that loads of solid waste containing more than 20% recycling should not be landfilled. Again, enforcement is an issue. The frequency of measurement depends on whether it is the regulatory agency doing a spot check or the operator of the facility who may monitor daily or weekly. Regulations are being drafted that would require recycling centers to register with DEM. Recycling facilities should be subject to regulatory supervision and enforcement.

State	Comments from Recycling Survey
South Carolina	South Carolina does not require permits for MRFs or other processing facilities. If issues are discovered based on a complaint, DHEC has the authority to pursue civil or criminal enforcement actions. If South Carolina had recycling regulations, the state may see improved reporting and a more accurate picture of recycling activities by local governments as well as businesses and industry. In addition, regulations may enhance the state's ability to influence how local governments manage waste (e.g., add a specific commodity to their recycling program). South Carolina has recommended to the governor and legislature that the S.C. Solid Waste Policy and Management Act of 1991 be updated.
Tennessee	Only recycling operations that hold Solid Waste permits are inspected. This is done yearly. Convenience Centers are also inspected yearly. A field office representative inspects the facility using a checklist style method, and notes any areas out of compliance with the facility's permit. Non-permitted facilities might also be inspected in the case of a public complaint. Violations are met with written warnings and monetary fines depending upon their severity. No specific problems, we have the same common problems most states have with community economics, accounting for of solid waste, and market stability. We are currently in a rule making process to change the recycling goals for the state.
Utah	No penalties are issued for recycling facilities.
Virginia	Permits are not required for a "clean" MRF where the incoming recyclable material is sorted and then all of it shipped out with no waste stream.
Washington	There are some inefficiencies with local health departments being responsible for permitting and enforcement because some are understaffed or mismanaged and fall down on their enforcement duties. Also, the model of self-reporting on facility reports has problems of some of the reports being inaccurate, and difficult to enforce upon.
West Virginia	The only regulation that does not apply across the board in the requirement that cities with populations over 10,000 must provide curbside collection for recyclable materials. There are no reporting requirements for non-regulated recycling facilities. Facilities are inspected on a random basis by the WV Department of Environmental Protection. Violators can be issued fines or facility closure. Lack of reporting requirements is an impediment to coordinating the system.

State	Comments from Recycling Survey
Wisconsin	Recycling facilities must demonstrate "flow-through" of at least 75% of inventory in a year. We were inspecting MRFs each year, but with reduction in staff are having to cut back on inspection frequency. With advent of mega-regional processing facilities, we should have authority to require submittal of a plan of operation and have more oversight authority over the small "mom and pop" MRF operations.
Wyoming	Violations are done on a graduated system. This includes: letters of violation, formal notices of violation, compliance orders, and fines. There are no problems with current regulations.

Appendix C - Composting Survey and Analysis

Survey on Composting Regulation Framework--2009

Introduction

A study is being conducted by California Polytechnic State University (San Luis Obispo) on behalf of the California Integrated Waste Management Board (CIWMB) to evaluate regulatory framework for recycled and composted materials.

A wide variety of jurisdictions (50 states plus several foreign countries) are being surveyed to obtain information on the effectiveness of regulatory models and methods for recycling and composting facilities.

For perspective, California currently uses the Three-Part Test to determine whether a material handling operation (recycling facility) is regulated as a solid waste facility. Public Resources Code section 40200(b)(2) provides that the Board does not have jurisdiction over facilities whose primary function is to process wastes that have already been separated for reuse and are not intended for disposal. The transfer/processing facilities and operations regulations set forth a three-part test, which was established to help determine if a business qualifies for the exclusion from the Board's jurisdiction. The Three-Part Test provides a measurable method to allow for statewide consistency regarding regulatory

exclusions. When an activity meets the Three-Part Test to qualify as a recycling center, it is not subject to the Board's regulations. If it fails any part of the Three-Part Test, the activity is considered a solid waste operation or facility subject to the Board's jurisdiction. The components of the Three-Part Test include:

1) An activity shall only receive material that has been separated for reuse prior to receipt (section 17402.5 (d)(1)). "Source Separated" means materials, including commingled recyclables, that have been separated or kept separate from the solid waste stream, at the point of generation, for the purpose of additional sorting or processing those materials for recycling or reuse in order to return them to the economic mainstream in the form of raw material for new, reused, or reconstituted products which meet the quality standards necessary to be used in the marketplace.
2) Determination that the residual amount of solid waste in the material is less than 10 percent of the amount of separated for reuse material received by weight (section 17402.5(d)(2)). The allowance for 10 percent residual is recognition of the fact that it is not uncommon for materials that are legitimately separated for reuse to still include minimal levels of contamination.
3) Determination that the amount of putrescible wastes in the separated for reuse material is less than 1 percent of the amount of separated for reuse material received by weight and the putrescible wastes in the separated for reuse material shall not cause a nuisance, as determined by the EA (section 17402.5 (d)(3)). The restriction of 1 percent putrescible wastes is recognition of the fact that putrescible wastes can pose a significant risk to public health, safety, and the environment and, therefore, any site receiving putrescible wastes should be regulated. The regulation allows up to 1 percent putrescible wastes rather than taking a zero tolerance stance because it is not uncommon for materials that are legitimately separated for reuse to still include minimal levels of putrescible wastes.

Chipping and grinding operations and compost operations handling only green material have a low level of regulatory oversight by CalRecycle as compared to composting operations handling other solid waste. Operations handling contaminated green material fall under greater regulatory oversight. To determine if green material is contaminated, a

threshold was established that the material received contain no greater than 1 percent of physical contaminants by weight to meet green material processing requirements. Material streams from curbside, multi-family dwellings, and urban green material collection can result in contamination levels that exceed the 1 percent contamination threshold. A re-examination is warranted of the green material contamination that is based on an assessment of public health and environmental impacts from facilities primarily handling recyclables. This would provide information that could be used to recalibrate the regulatory threshold or provide alternative methods for classifying and regulating operations relative to the potential impact to public health and the environment.

The research team is seeking to assemble information on recycling efforts in your jurisdiction and particularly, the methods and models used to determine whether compost operations (and similar chipping and grinding or other operations) are considered solid waste streams for regulatory purposes. The regulatory methods being evaluated include those that preserve public health and the environment including reducing nuisances, vectors, and odors.

The intent is that this survey will take approximately 15-25 minutes to complete. The research team and the State of California appreciate your contributions to this effort.

1.	What state do you represent?
	[- Select One -]

2.	Answer the following:	
	Name of agency and governmental association (e.g., State of XYZ Department of Environment)	_____ _____ _____ _____ _____
	Contact Person	_____ _____ _____ _____ _____
	E-mail address (e-mail to be used to share final report, e-mail addresses will be kept confidential and not shared with anyone)	_____ _____ _____ _____ _____

3.	Total amount of green waste (for purposes of this survey, green waste is defined as yard trimmings, leaves, twigs, and grass clippings) generated and composted per year in your state?	
	Total weight of green waste generated (in tons)	_____
	Weight of green waste generated that is composted (in tons)	_____
	Percent (by weight) of green waste composted	_____

4.	Does your state maintain a specific definition for green waste?	
	○	No
	○	Yes

If yes, please provide that definition:	_____ _____ _____ _____ _____ _____ _____ _____

5.	Does your state maintain a specific definition of food waste?	
	○	No
	○	Yes

If yes, please provide that definition:	_____ _____ _____

	_____ _____ _____ _____ _____ _____ _____

6.	Are there numerical thresholds that are used to distinguish various types of compostable wastes in your state (e.g., green wastes, food wastes, biosolids)?	
	○	No
	○	Yes

If yes, please provide the threshold(s):	_____ _____ _____ _____ _____ _____ _____

	_____ _____ _____

7.	Is green waste composting regulated at the state level in your state?	
	○	No
	○	Yes

8.	Are permits required for operating composting operations in your state?	
	○	No
	○	Yes

If yes, are there conditions where permits are not required? Please list them here:	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

9.	Is there a single set of regulations for the entire state?	
	○	No
	○	Yes

If no, please comment on the variation in application of regulations (e.g., urban vs. rural areas, county-based regulations, socio-economic delineations, etc.).	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

10.	Does the regulation of green waste composting differ from regulation of municipal solid waste in your state?	
	○	No
	○	Yes

11.	Does the regulation of green waste composting differ from regulation of food waste composting?	
	○	No
	○	Yes

12.	Does the regulation of green waste composting differ from the regulation of biosolids composting in your state?	
	○	No
	○	Yes

13.	Are there standards addressing the composition or quality of waste that may be composted (e.g., contaminants such as plastic, glass, and food waste may affect the feasibility of composting green waste)?	
	○	No
	○	Yes

14.	Are green waste composting facilities regulated as solid waste facilities?	
	○	No
	○	Yes

15.	What level of permitting is applied to green waste composting facilities?	
	○	Equal to landfills
	○	Less stringent than landfills
	○	Not regulated as waste

16.	What criteria (if any) are used to determine if a green waste composting facility is regulated as a solid waste facility (please describe)?	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

17.	What compost properties are quantified at green waste composting facilities for regulatory oversight? (please check all that apply):				
		Weight	Volume	Other Property (please list)	Comments:
	Total materials incoming to facility	☐	☐	☐	_____ _____ _____
	Total materials outgoing from facility	☐	☐	☐	_____ _____ _____
	Outgoing compost	☐	☐	☐	_____ _____ _____
	Outgoing recyclables (if any)	☐	☐	☐	_____ _____ _____
	Total incoming other materials (please list)	☐	☐	☐	_____ _____ _____

17.	What compost properties are quantified at green waste composting facilities for regulatory oversight? (please check all that apply):				
		Weight	Volume	Other Property (please list)	Comments:
	Total outgoing other materials (please list)	☐	☐	☐	_____ _____ _____
	Other material types/forms (please list)	☐	☐	☐	_____ _____ _____
	None	☐	☐	☐	_____ _____ _____

18.	Is residual content (or contaminant content) quantified for regulatory purposes?
	○ No
	○ Yes

If yes, please describe the mechanism:	_____

19.	Is putrescible content quantified for regulatory purposes?	
	○	No
	○	Yes

If yes, please describe the mechanism:	_____

20.	How are material quantities determined?	

21.	What is the method used for sampling weights and measures at the facilities in your jurisdiction to assure compliance with regulations?	
	○	Discrete spot measurements
	○	Material flows averages

If discrete spot measurements are used, what is the frequency of such measurements?		
	○	Continual (i.e., every load)
	○	Multiple times per day
	○	Daily
	○	Less frequent than daily, but more frequent than weekly

If discrete spot measurements are used, what is the frequency of such measurements?		
	○	Weekly
	○	Less frequent than weekly, but more frequent than monthly
	○	Monthly
	○	Other

If other, please list:	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

If material flows averages are used, what is the period of duration considered for average material flow for measurements used for assuring compliance period		
	○	Continual (i.e., every load)
	○	Multiple times per day
	○	Daily
	○	Less frequent than daily, but more frequent than weekly
	○	Weekly
	○	Less frequent than weekly, but more frequent than monthly
	○	Monthly
	○	Other

If other, please list:	_____ _____ _____ _____ _____ _____ _____ _____ _____

22.	Are any properties of outgoing compost measured and reported besides the quantity (weight or volume) of these materials?	
	○	No
	○	Yes

If yes please explain. (we are particularly interested in finding out about any regulatory requirements for quality of outgoing compost).	_____ _____ _____ _____ _____

	_____ _____ _____ _____ _____ _____ _____

23.	Are there standards for the quality of compost intended for different applications?	
	○	No
	○	Yes

24.	Does your state have regulations related to the duration that materials can be stockpiled or stored on site at a recycling facility?	
	○	No
	○	Yes

If yes, please describe.	_____ _____ _____

	_____ _____ _____ _____ _____ _____ _____

25.	What types of green waste composting facilities are located in your state? (please check all that apply):	
	☐	Windrow Composting
	☐	Aerated Static Pile Composting
	☐	Aerobic In-Vessel Composting
	☐	Others
	☐	None

If others, please list:	_____ _____ _____ _____

	_____ _____ _____ _____ _____ _____

26.	Approximately how many green waste composting facilities are located in your state?	_____

27.	The following set of questions relates to any criteria that may have been used in the initial development of the current regulations used in your state:			
		No	Yes	If yes, please comment:
	1.) Have specific/quantitative science and engineering principles been used in the development of regulatory criteria?	○	○	_____ _____ _____ _____ _____ _____

27.	The following set of questions relates to any criteria that may have been used in the initial development of the current regulations used in your state:			
		No	Yes	If yes, please comment:
	2.) Have specific/quantitative economic and feasibility principles been used in the development of regulatory criteria?	○	○	_____ _____ _____ _____ _____ _____
	3.) Have other principles/criteria not included above been used in the development of regulatory criteria?	○	○	_____ _____ _____ _____ _____ _____

28.	Do you have a sense for how your jurisdiction compares to others in regulatory rigor?	
	○	Significantly more stringent than other jurisdictions
	○	Somewhat more stringent than other jurisdictions
	○	Similar to other jurisdictions
	○	Somewhat less stringent than other jurisdictions
	○	Significantly less stringent than other jurisdictions
	○	Do not know

29.	Are your green waste composting facilities inspected by your agency?	
	○	No
	○	Yes

If yes, how often and what format of inspection?	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

30.	Are green waste composting facilities required to submit reports related to their compost production to meet regulatory requirements?	
	○	No
	○	Yes

If yes, please provide details:	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

31.	Do you feel that operational efficiency at green waste composting facilities is affected by regulations?	
	○	No
	○	Yes

32.	Are there fees associated with permitting or operating under a permit?	
	○	No
	○	Yes

33.	Are you satisfied with the current model of regulation?	
	○	Very satisfied
	○	Satisfied
	○	Neither satisfied nor dissatisfied
	○	Dissatisfied

33.	Are you satisfied with the current model of regulation?	
	○	Very dissatisfied

34.	Do you experience problems with the current model? Please comment:	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

35.	Is your state considering or in the process of changing regulations for composting activities?	
	○	No
	○	Yes

If yes, please describe the	_____

status and direction and/or priorities for new regulations.	_____ _____ _____ _____ _____ _____ _____ _____ _____

36.	Please share any additional thoughts or comments related to your regulatory methods in the space below:	
	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____	

37.	Please provide relevant regulation numbers/titles and corresponding web addresses (if applicable) for further reading for the research team:	
	_____ _____ _____ _____ _____	

37.	Please provide relevant regulation numbers/titles and corresponding web addresses (if applicable) for further reading for the research team:	
	_____ _____ _____ _____ _____	

38.	Please provide any case histories that relate to application of the recycling regulatory framework in your state to the research team. The case histories may relate to a successful or unsuccessful application of the regulations and may involve meetings and hearings related to the application of the regulations. The research team is interested in case histories to better understand and assess your state's regulatory framework. Materials can be provided to the research team as a web address or sending any relevant materials to Dr. Jim Hanson.	
	_____ _____ _____ _____ _____ _____ _____ _____	

39.	Your answers to the survey have been saved. If you have entirely completed the survey (will not be returning to it), please check the “completed” box below and the submit survey button. If you have not entirely completed the survey (and would like to return or have someone else return to add content), please check the “not completed – will return” box. You or someone else can return to the survey and complete the remaining questions. The first survey question and your answer (your state) will bring up your previous answers that have been saved up to that point. It is important that only one person be entering information for a given state at any one instant in time.	
	○	Completed
	○	Not Completed - Will Return

Thank you for your time in completing this survey.

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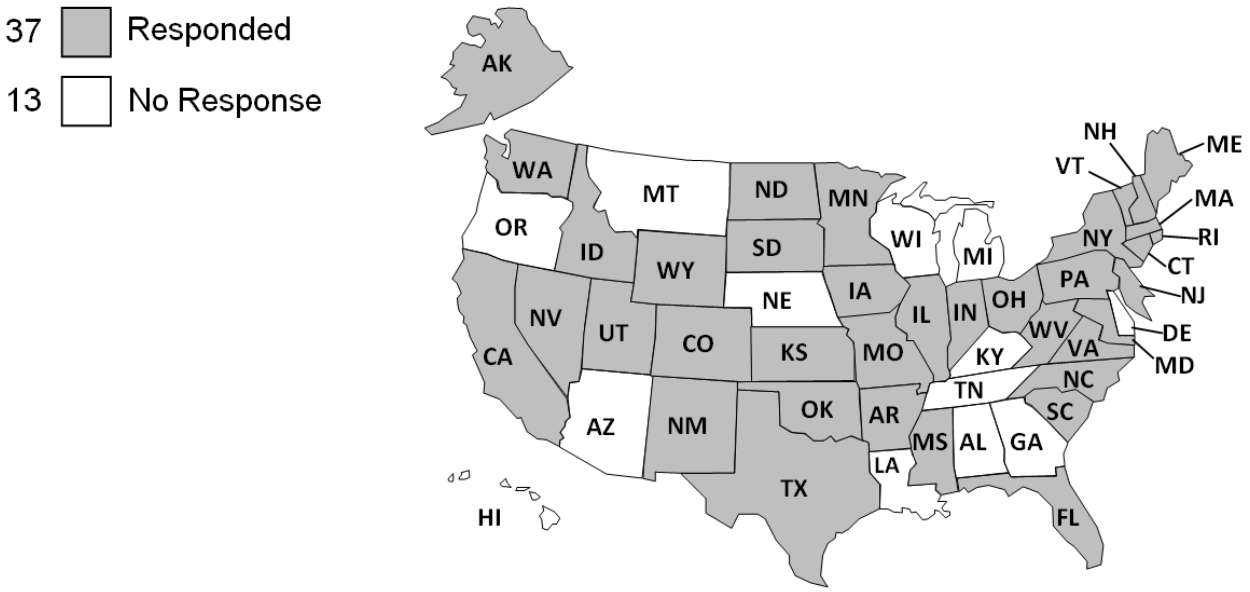


Figure C-1. - Responded to survey

Figure C-2. (Question 4) - Does your state maintain a specific definition for Green Waste?

Figure C-3. (Question 5) - Does your state maintain a specific definition for Food Waste?

Figure C-4. (Question 6) - Are there numerical thresholds that are used to distinguish various types of compostable wastes?

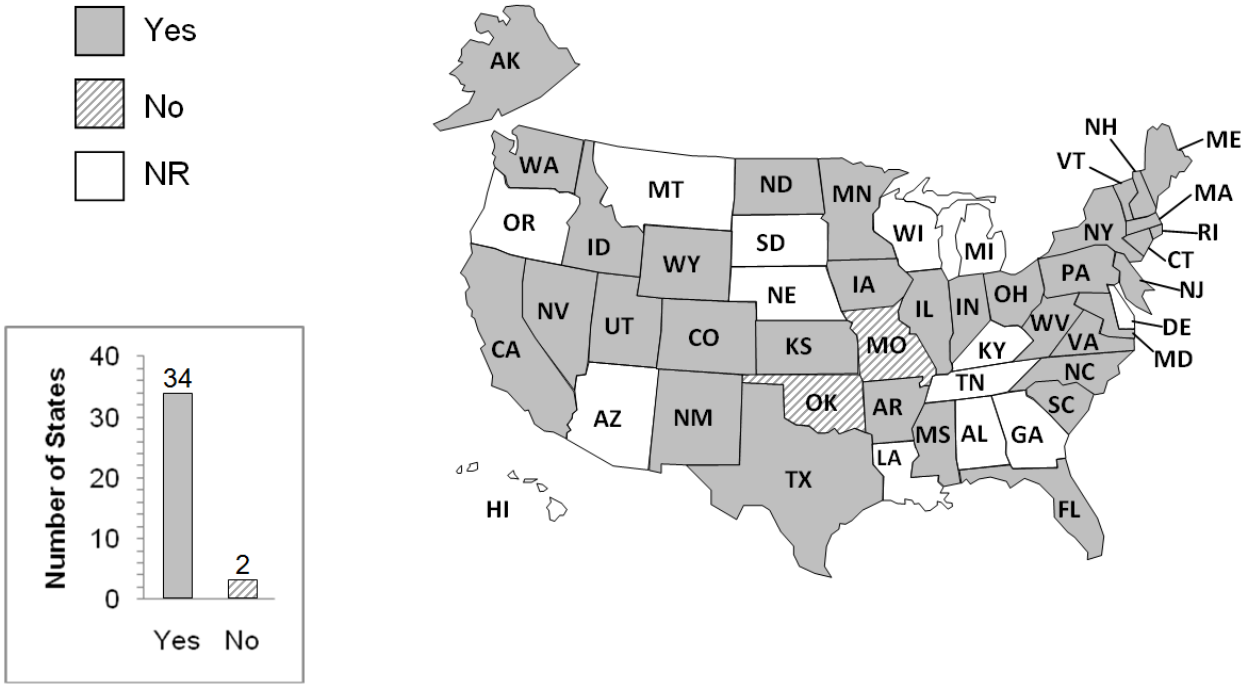


Figure C-5. (Question 7) - Is Green Waste composting regulated at the state level in your state?

Figure C-6. (Question 8) - Are permits required for operating composting operations in your state?

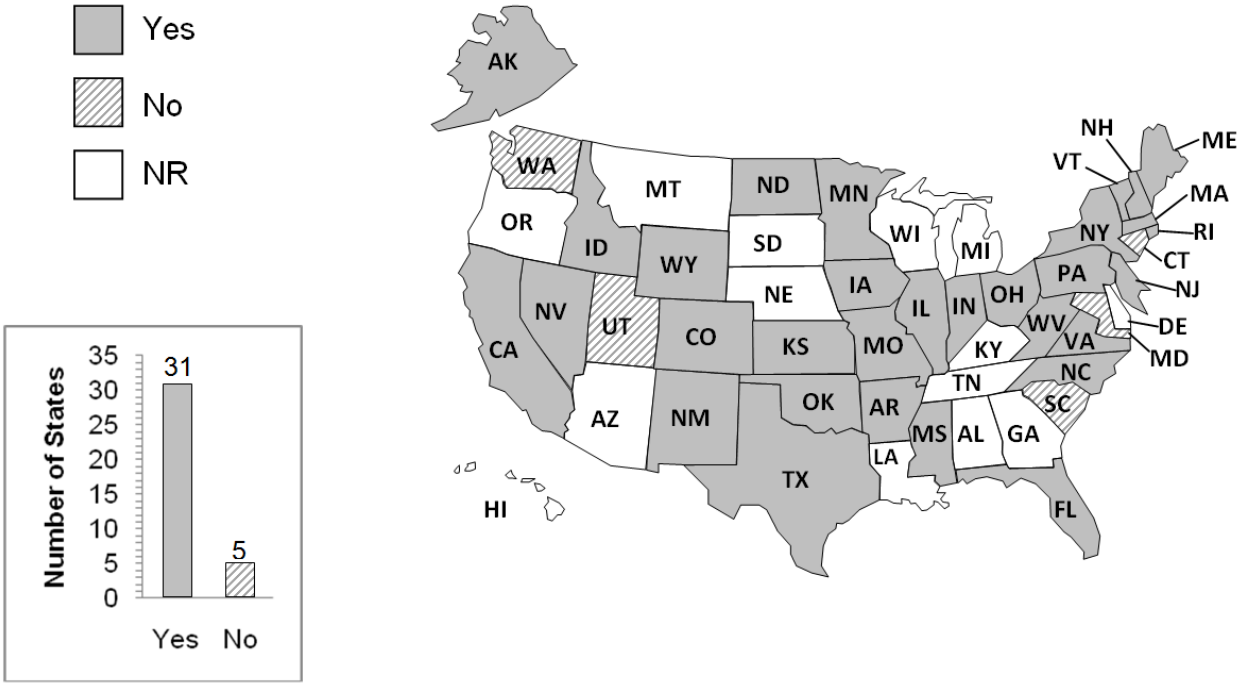


Figure C-7. (Question 9) - Is there a single set of regulations for the entire state?

Figure C-8. (Question 10) - Does the regulation of green waste composting differ from regulation of municipal solid waste in your state?

Figure C-9. (Question 11) - Does the regulation of green waste composting differ from regulation of food waste composting?

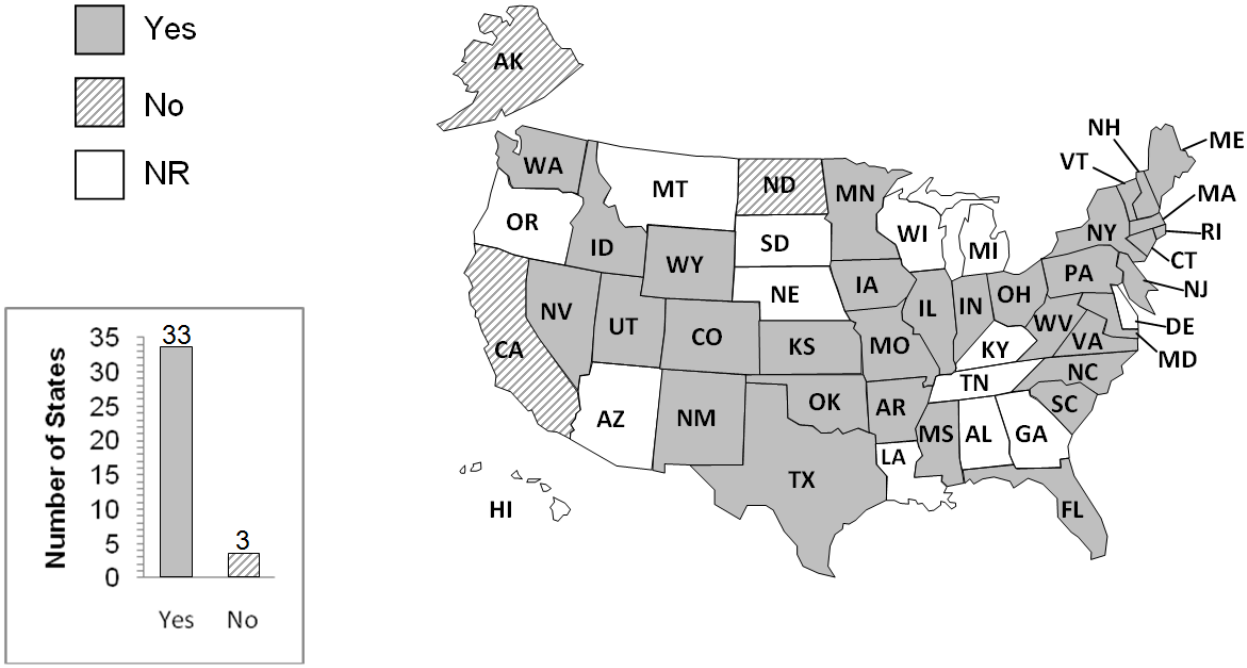


Figure C-10. (Question 12) - Does the regulation of green waste composting differ from the regulation of biosolids composting in your state?

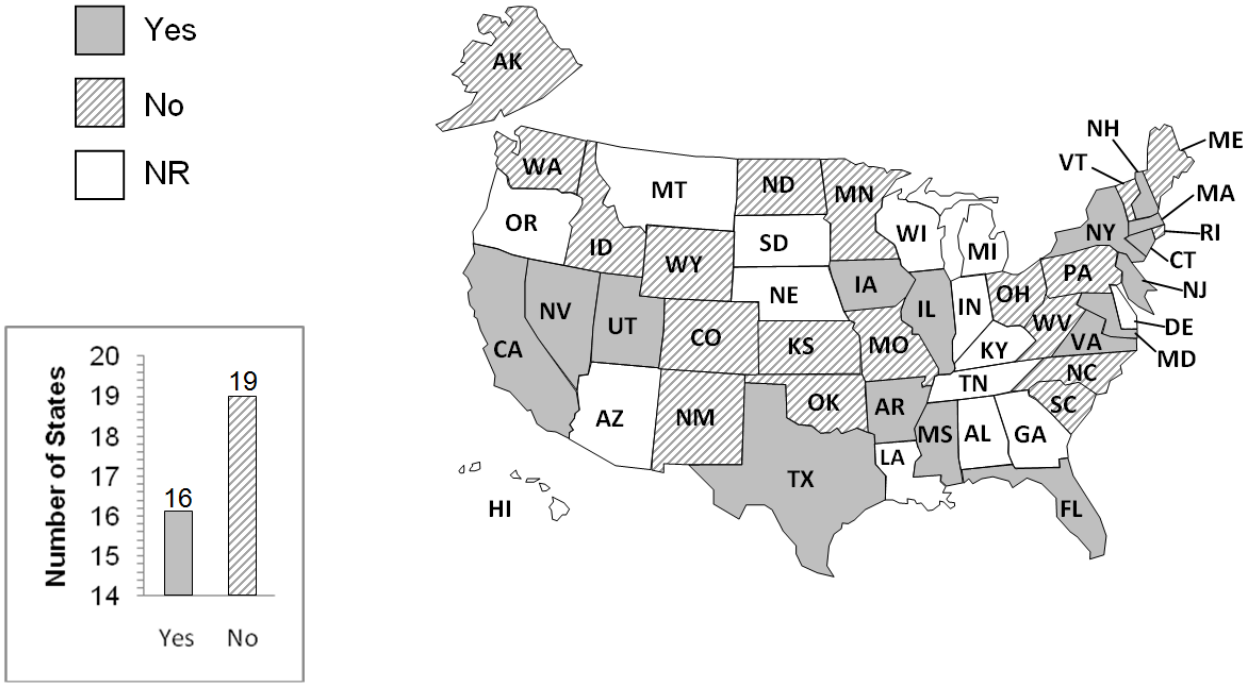


Figure C-11. (Question 13) - Are there standards addressing the composition or quality of waste that may be composted?

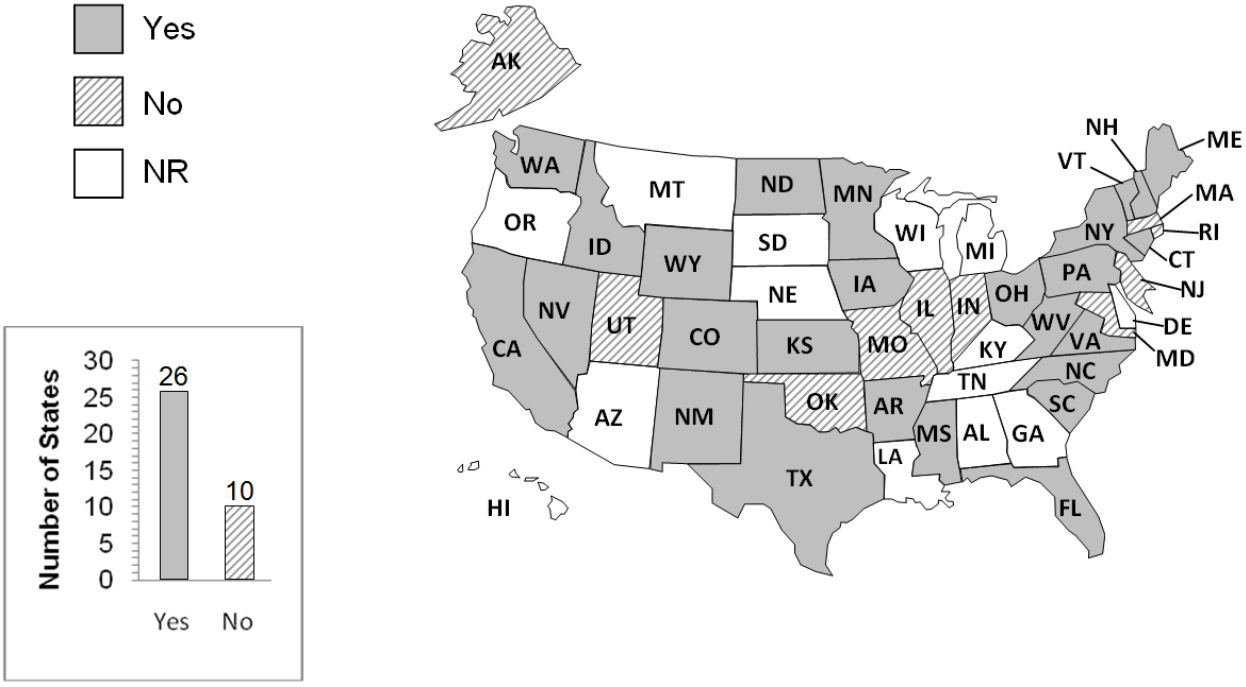


Figure C-12. (Question 14) - Are green waste composting facilities regulated as solid waste facilities?

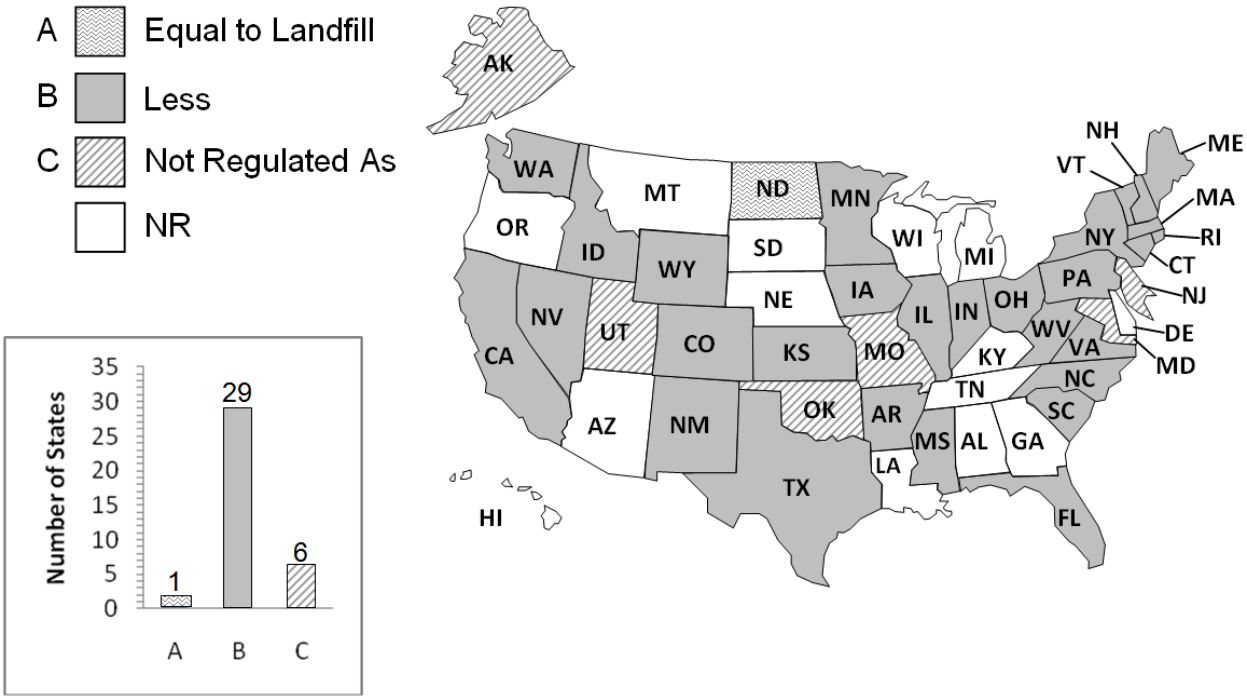


Figure C-13. (Question 15) - What level of permitting is applied to green waste composting facilities?

Figure C-14. (Question 18) - Is residual content (or contaminant content) quantified for regulatory purposes?

Figure C-15. (Question 19) - Is putrescible content quantified for regulatory purposes?

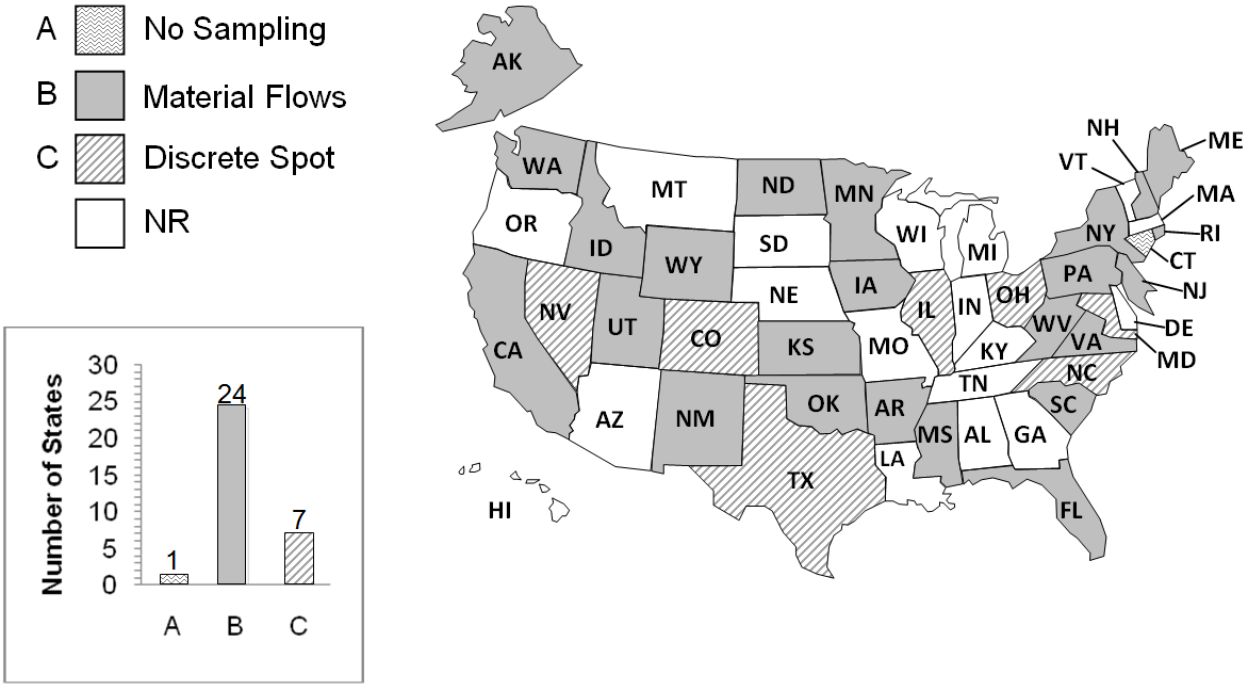


Figure C-16. (Question 21) - What is the method used for sampling weights and measures at the facilities in your jurisdiction to assure compliance with regulations?

Figure C-17. (Question 22) - Are any properties of outgoing compost measured and reported besides the quantity (weight or volume) of these materials?

Figure C-18. (Question 23) - Are there standards for the quality of compost intended for different applications?

Figure C-19. (Question 24) - Does your state have regulations related to the duration that materials can be stockpiled or stored on-site at a recycling facility?

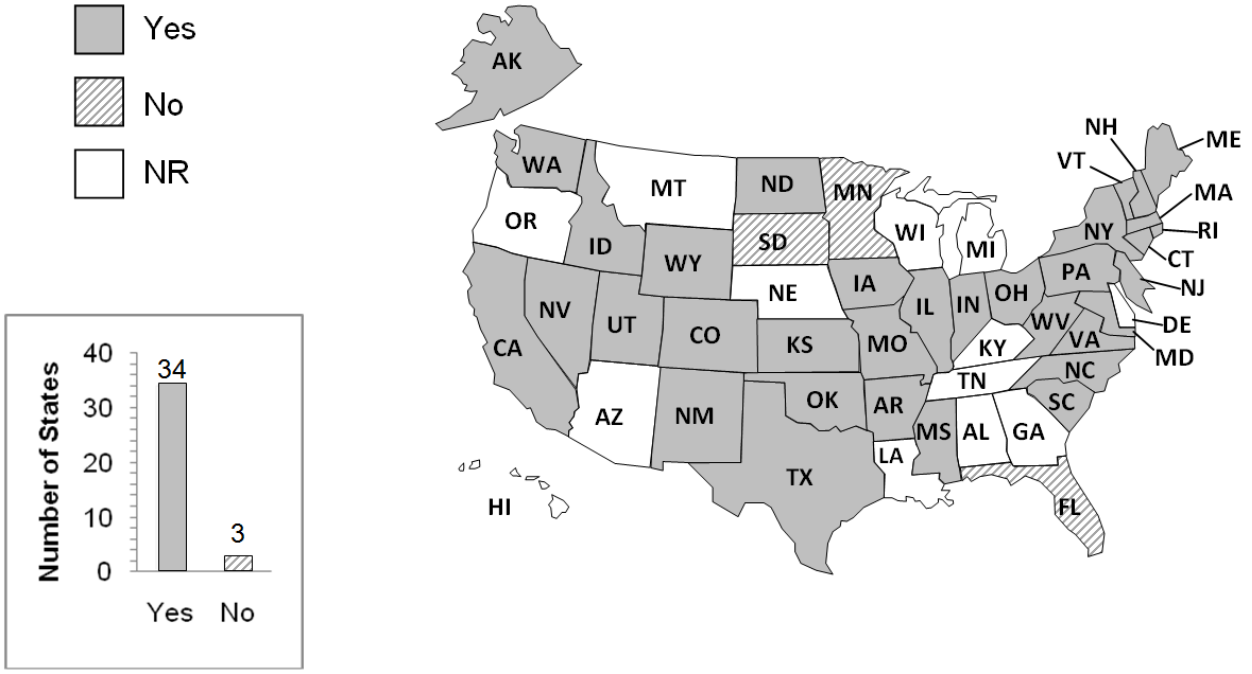


Figure C-20. (Question 25a) - Are windrow green waste composting facilities located in your state?

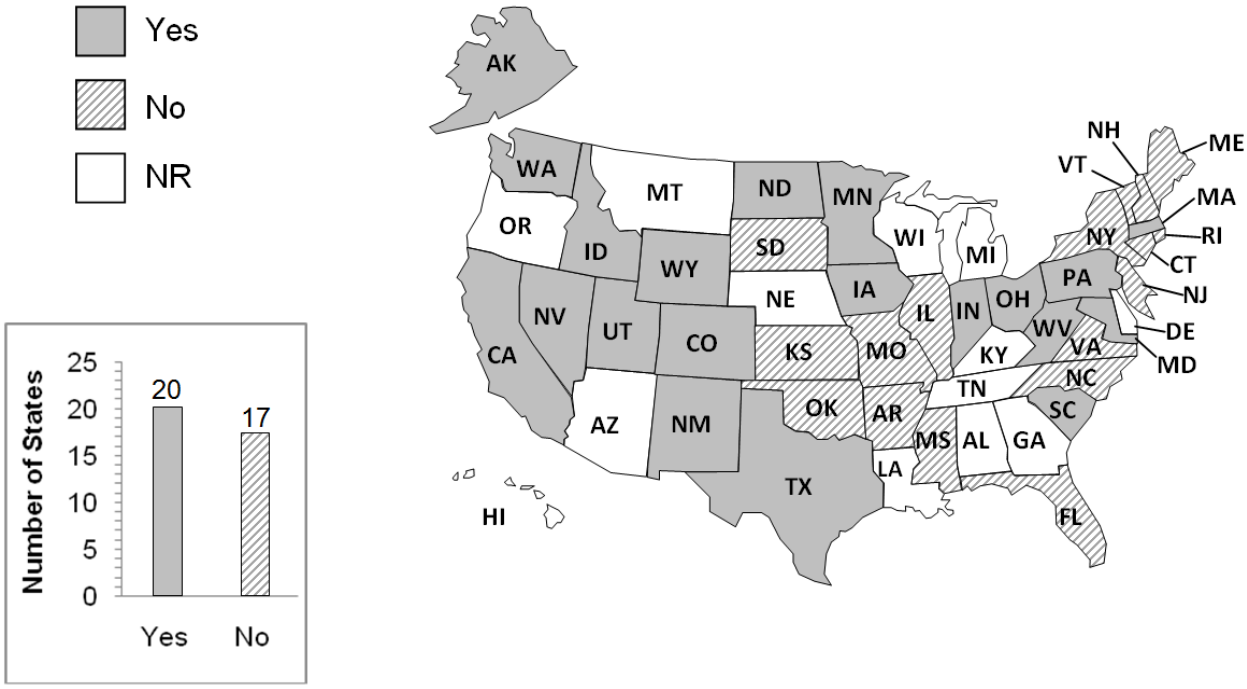


Figure C-21. (Question 25b) - Are aerated static pile green waste composting facilities located in your state?

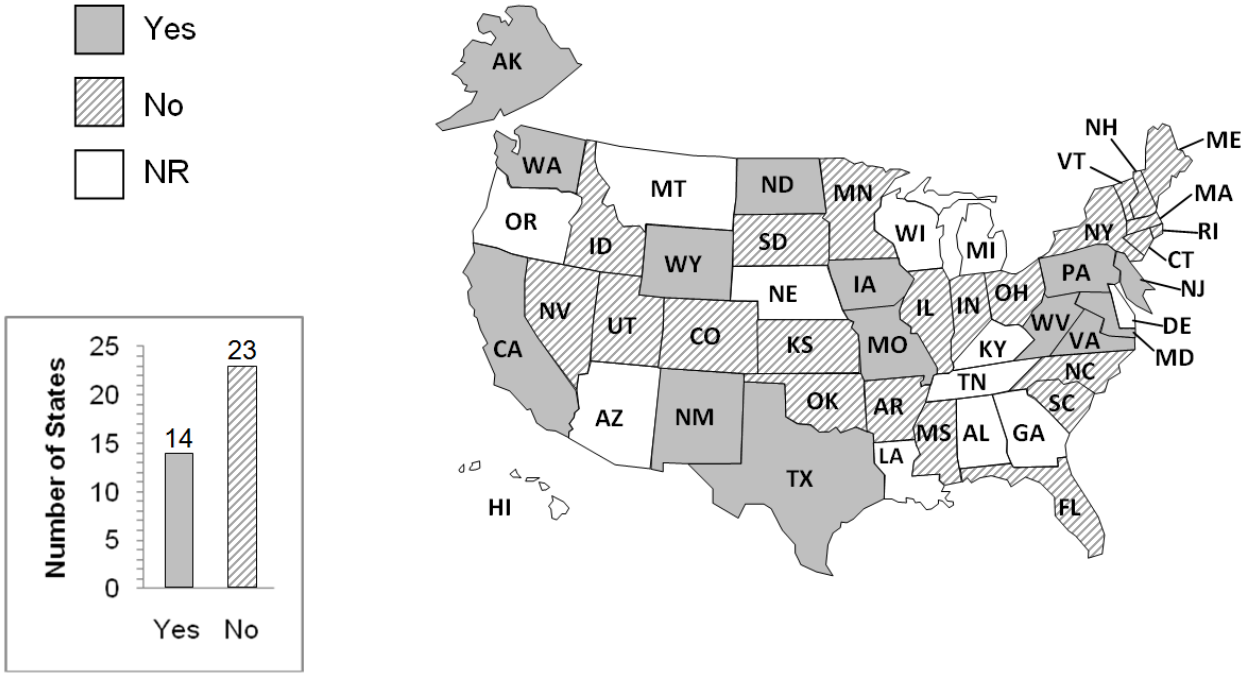


Figure C-22. (Question 25c) - Are aerobic in-vessel green waste composting facilities located in your state?

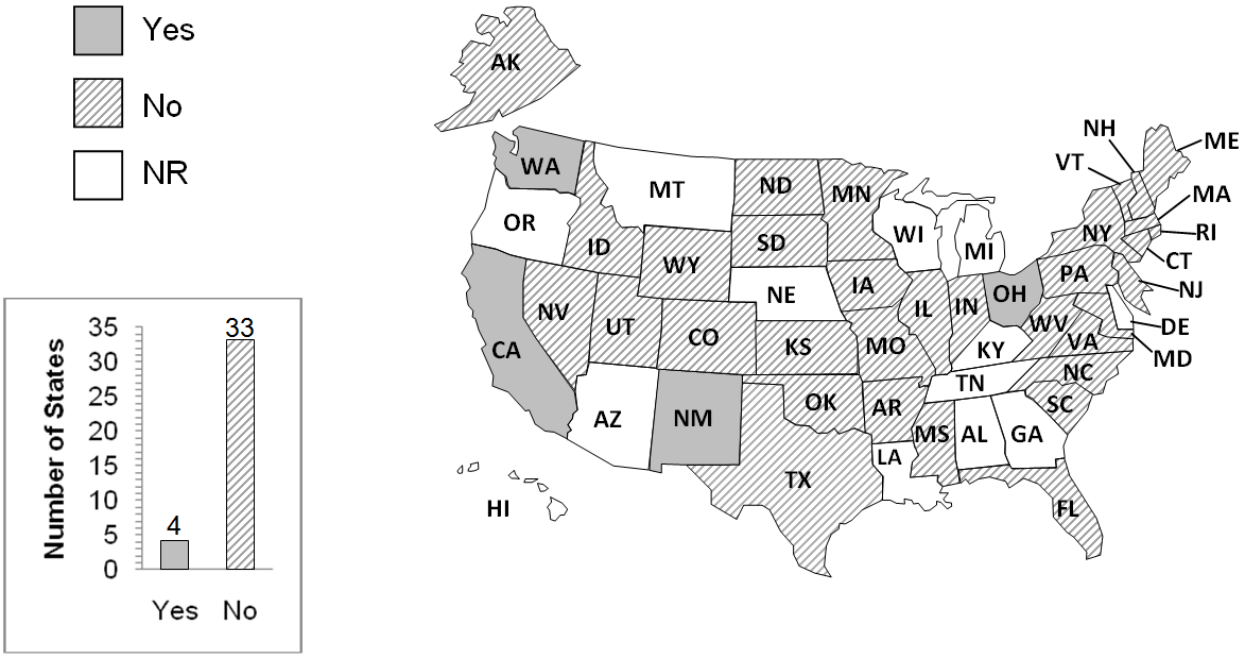


Figure C-23. (Question 25d) - Are other methods of green waste composting located in your state?

Figure C-24. (Question 26) - Approximate number of green waste composting facilities in your state?

Figure C-25. (Question 27a) - Were specific/quantitative science and engineering principles used in the development of regulatory criteria?

Figure C-26. (Question 27b) - Were specific/quantitative economic and feasibility principles used in the development of regulatory criteria.

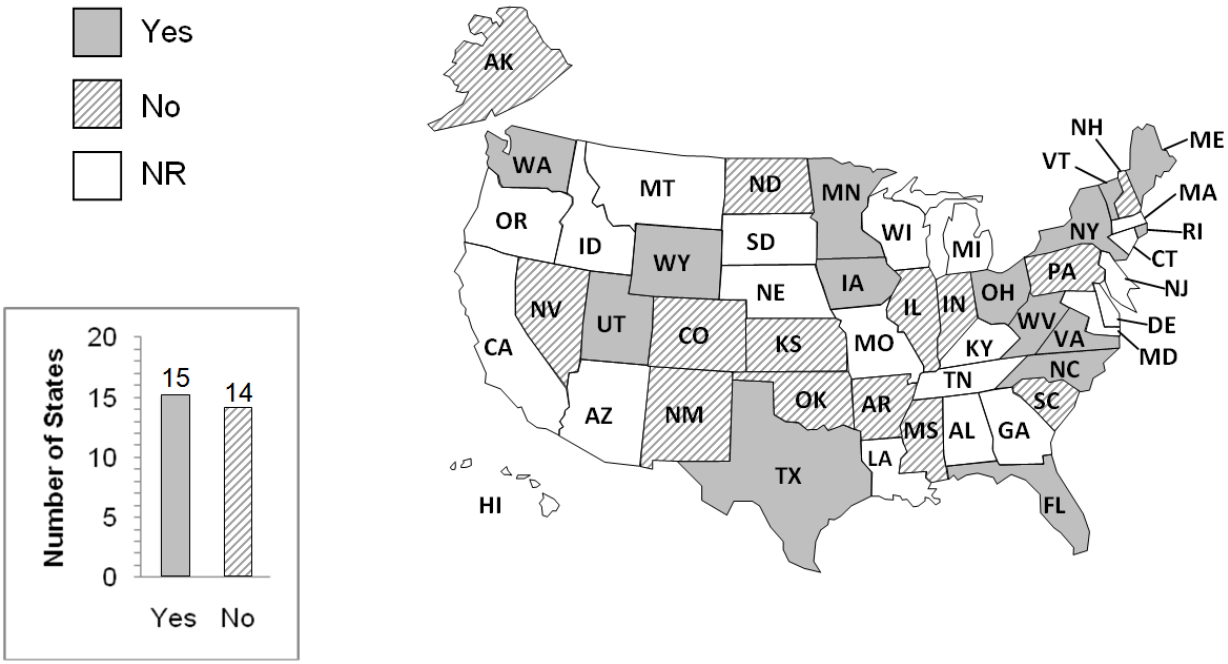


Figure C-27. (Question 27c) - Have other principles/criteria not included above been used in the development of regulatory criteria?

Figure C-28. (Question 28) - Do you have a sense for how your jurisdiction compares to others in regulatory rigor?

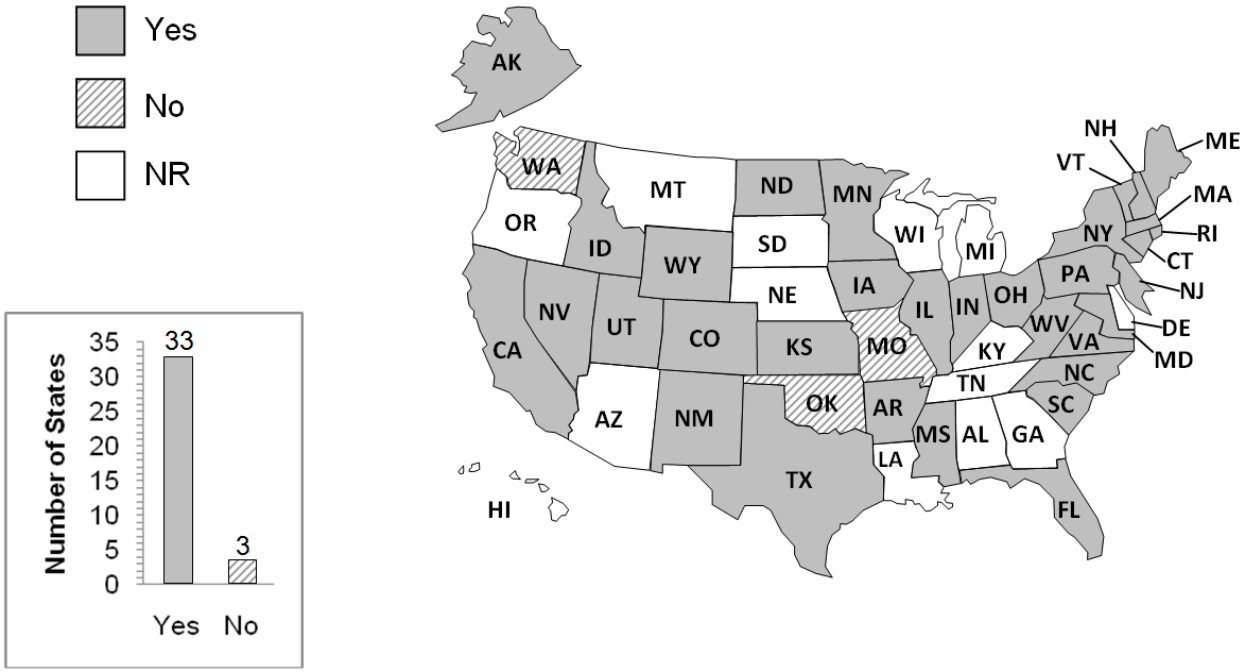


Figure C-29. (Question 29) - Are your green waste composting facilities inspected by your agency?

Figure C-30. (Question 30) - Are green waste composting facilities required to submit reports related to their compost production to meet regulatory requirements?

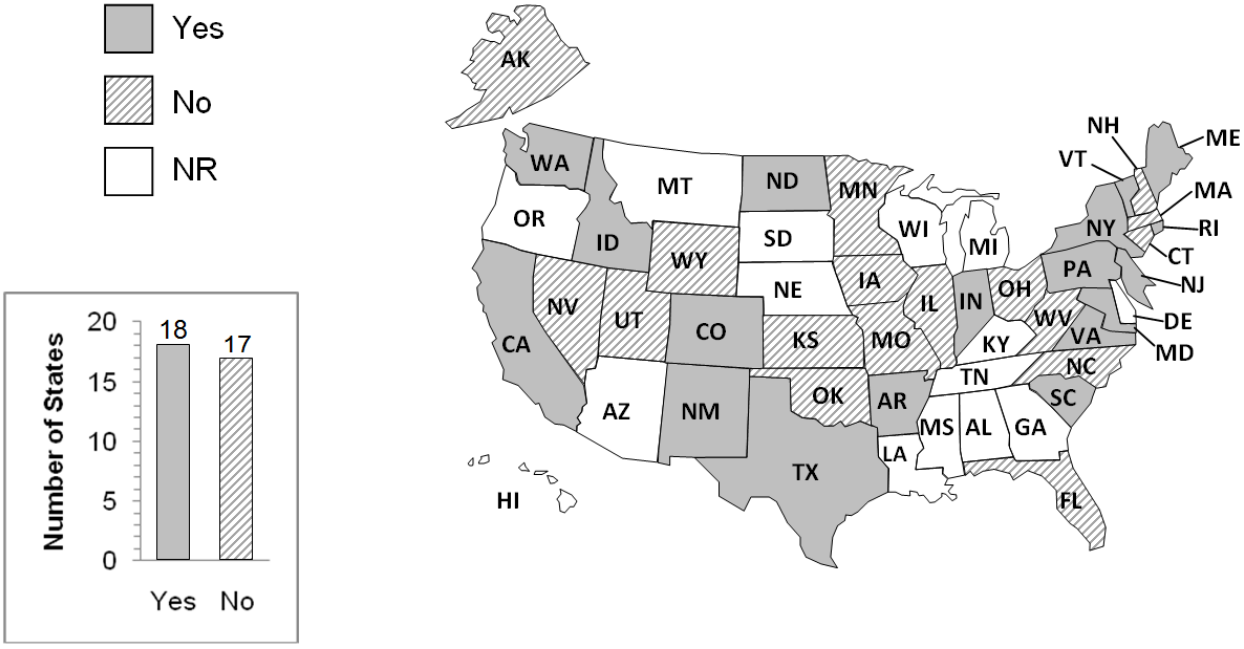


Figure C-31. (Question 31) - Do you feel that operational efficiency at green waste composting facilities is affected by regulations?

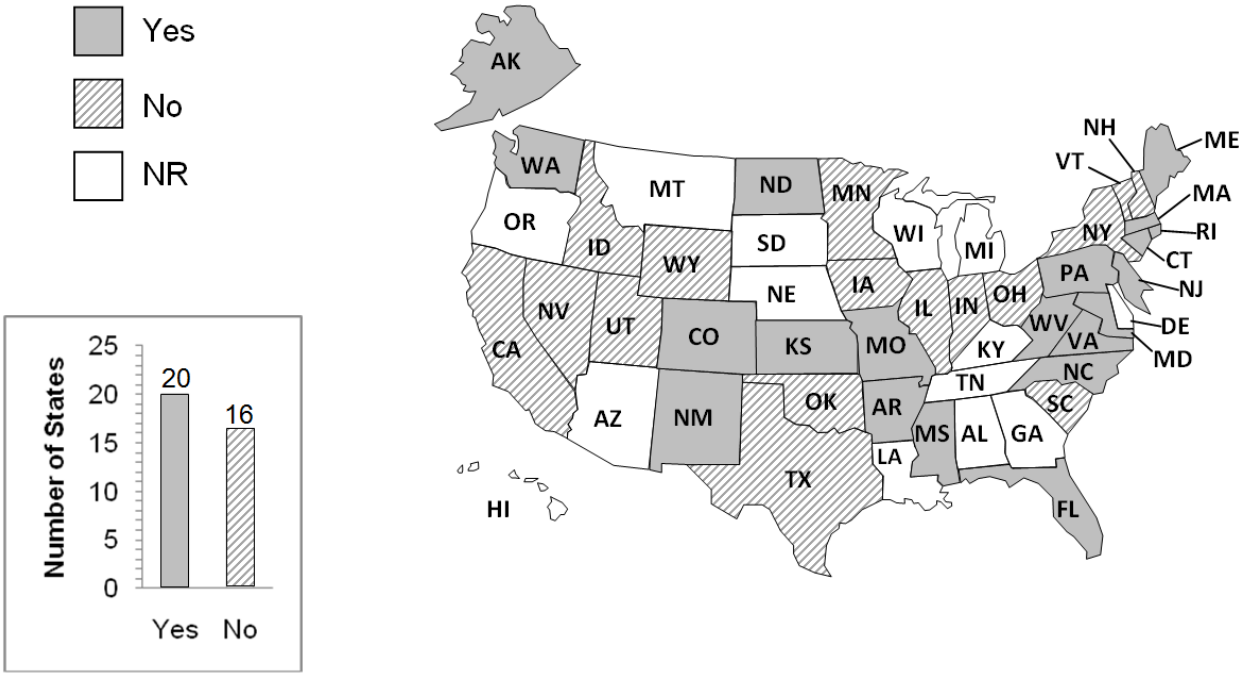


Figure C-32. (Question 32) - Are there fees associated with permitting or operating under a permit?

Figure C-33. (Question 33) - Are you satisfied with the current model of regulation?

Figure C-34. (Question 35) - Is your state considering or in the process of changing regulations for composting activities?

Table C-1. Comments from Composting Survey

State	Comments from Composting Survey
Arkansas	Recent legislation allows landfills to utilize yard waste in the harvesting of methane gas.
California	Priorities for changing regulations: In-vessel, contamination levels, on-site and seasonal composting
Florida	If mixed with biosolids, it is regulated under the Department's domestic wastewater residuals program. Otherwise it is a solid waste facility (exempted, registered or permitted). Department staff does not sample weights and measures ourselves. Note that we do not have breakdowns in the "products" removed for use. Therefore, we do not know what fraction of the total was compost. The registration program was developed with the assistance of a technical advisory group (TAG) that included a balance of regulators and regulated, as well as private and governmental. The biggest disagreement during the TAG meetings was what to call the regulating instrument (i.e., registration versus general permit) because of the perceived stigma of an operation requiring a permit of any type. There is no established level of service for inspecting registered facilities (no YT only facilities are operating under a full permit) other then responding to any complaints. The state is divided into 6 districts, a few of which try to inspect these facilities at least once per year before registration (annual) renewal. Registered facilities are exempt from testing If the registered facilities are not routinely inspected, there developed a large disposal problem in a few situations. Also, if enforcement is not taken, it is easier for sham recyclers (disposal under the guise of recycling) to continue operating. For the most part, the registration provisions have encouraged more recycling activities. We are proposing to expand the registration program to include composting more putrescible materials (e.g., source-separated food waste collected from institutional and commercial operations, but not from residential programs)
Illinois	No specific regulation per se, however if a stockpile sits idle for one year, Illinois EPA treats it as an open dump/abandoned pile and acts accordingly Due to increase interest in food and paper waste composting, Illinois has a bill (not yet law) that would exempt certain composting facilities from local siting requirements (which are different from local zoning ordinances), making it easier for food/paper composters to get a permit if they meet location standards (for windrow activities) or plan on using in-vessel composting. The majority of composting in Illinois is landscape waste, because Illinois has a ban on landscape waste going to landfills. Composting usually occurs in windrows because of land availability; usually the size of a composting site is not an issue. Recently I have noted more interest in composting food (restaurant, grocery store produce) waste (mainly in the Chicago metro area). I expect to see more permit applications for food waste and in-vessel composting in the near future.
New	Exemption: no more than 3,000 cubic yards green waste per year. Registration: no more than

State	Comments from Composting Survey
York	10,000 cubic yards green waste per year. Permit: greater than 10,000 cubic yards green waste per year. Engineering judgment and Department experience used
Texas	All regulations must have a technical basis, based on state of the practice. All regulations include a fiscal impact assessment for large and small businesses as well as local governments. Regulations are also based on legislative directives. Pre-announced inspections for permitted and registered facilities every one or two years, unannounced inspections with a week or so if a complaint is received. Current Problems: Current regulations consider ground material to have been recycled, even if not put to a beneficial use within a reasonable timeframe. However, once abandoned the material is considered a solid waste again. Mulching operations should be required to send all material off-site after one year. Composting operations should have a similar requirement with an allowance for a longer time period if part of the composting process.

Appendix D - Trip Summary Reports

Trip Report for Three-Part Test Investigation

Facility Name
NorCal Tunnel Road Facility

Facility Location
Tunnel Rd, San Francisco, CA

Date of Visit
8/18/2009

Visitors
Jim Hanson, Nazli Yesiller, and Watson Gin (CalRecycle staff)

Contacts
Drew Lehman, Director, Environment and Planning
e-mail: dlehman@recology.com
tel: (415) 875-1173

Mike Crosetti, Site Manager
e-mail: mcrosetti@sfrd.com
tel: (415) 850-5647

Capacity and Statistics
The combined facilities (Tunnel Road and Pier 96) handle all San Francisco recycling. The throughput at the Tunnel Road facility is approximately 2300 tons/day.

Summary of Operation
The City of San Francisco leads the nation in diversion rates. Currently, the city maintains 72 percent diversion from landfills. Financial incentive is in place for incrementally increasing this number each year. A global goal is in place for zero waste to landfill by 2020. Recently, the city has mandated an increase in food recycling (i.e., composting). The outgoing sorted compost from the facility is sent to Jepson Prairie Organics in Dixon, California. The compost is OMRI certified for organic farming. Most of the customers for the compost are the wineries of Napa Valley. A biochemist tests the outgoing compost for quality control. The equipment at the site is generally commercially available. The overall process of sorting, mixing, and odor control is proprietary. The facility employs 250 persons. The sorting process was a mixture of hand and automated. They maintain 100 percent visual sorting.

General Observations
The operation was large, quite clean, and well-organized. The facility has a strong relationship with the community including sponsorship of a resident artist. Collections of artwork made from the recycled materials are housed in a gallery as well as a sculpture garden on the premises. The operation maintains a fleet of vehicles for curbside collection. The quality of incoming materials was noticeably clean compared to other facilities. This facility operates with a residual rate of approximately 15-20 percent. Throughput and residual quantities are calculated daily. The company maintains a 0 percent violation policy.

Permit Status
Permitted

Operator's Perspective on Regulatory Framework
The operators are fine with regulations, as long as they are enforced.
The LEA does a fine job.
The regulations do not hinder operations.
The duration needed for approval from the State (i.e., CalRecycle) for approval on a permit to modify operations was too lengthy (on the order of six months, whereas six weeks would be reasonable).
The operator needs to change operations continually to keep up progress with diversion (increasing by approximately 1.5 percent each year).
The regulations prevent rapid evolution of processes and experimental testing of new processes.
Expedited reviews would be helpful as speed is the key.

Photographs

Incoming curbside recyclables

Green waste handling

Municipal solid waste transfer pit

Designated bunkers under separation lines

Trip Report for Three-Part Test Investigation

Facility Name
Pier 96 Recycle Central (2)

Facility Location
Pier 96, San Francisco, CA

Date of Visit
8/18/2009

Visitors
Jim Hanson, Nazli Yesiller, Watson Gin

Contacts
Drew Lehman, Director, Environment and Planning
e-mail: dlehman@recology.com
tel: (415) 875-1173

Capacity and Statistics
The facility handles 700 tons per day, which is mostly curbside (400-450 tpd). The facility is permitted for up to 1350 tpd.

Summary of Operation
The facility is in operation for 24 hours per day (16 hours of active processing and eight hours of cleanup and maintenance). The facility produces 21 different product streams. The facility has 180 employees and uses a neighborhood hiring program. The hiring program is associated with the lease with the Port of San Francisco.

General Observations
Apartments generally produce a low rate of recycling. This facility operates with a residual rate of approximately 16-18 percent. The company maintains a 0 percent violation policy.

Permit Status
Permitted

Operator's Perspective on Regulatory Framework
The operation handles what regulations they have. CalRecycle must inspect for a revised permit.
The numerous regulatory agencies in California (CalRecycle, LEA, Water Board, Air Districts, Air Resources Board, DTSC, and county) complicate operations. By comparison, Minnesota, New York, and Virginia all have a single regulatory agency.
Unregulated competitors are problematic.
Small illegal operations should be stopped, not regulated, but stopped.
A minimum threshold (such as 250 tons/year) could be established.

Photographs

Incoming curbside recyclables

Green waste handling

Summary Trip Report for Three-Part Test Investigation

Facility Name
Bestway Recycling

Facility Location
2268 East Firestone Blvd, Los Angeles, CA 90002

Date of Visit
1/28/2009

Visitors
Jim Hanson, Nazli Yesiller, Gerardo Villalobos (LEA)

Contact
David Kim, Site Manager/Business Owner
e-mail: dong@bestway.org
tel: (323) 588-8157

Capacity and Statistics
600-700 tons/day is typical. Approximately 200 tons/day buy-back, the remainder is curbside. They operate with approximately 15 percent residue. The glass sorter used was purchased from Amsterdam and is the only one of its kind in the U.S.

Summary of Operation
Outdoor facility. Roof covers part of operations, but open structures throughout. Receive materials in roll-off trucks from transfer station.

General Observations
The facility included a combination of hand-sorting and mechanical sorting. Some shredded materials were being received. Amount of stored sorted materials was significant. Heavy dust was present at the facility. Misters were not yet installed on new sorting equipment and this may have contributed to some of the dust.

Permit Status
Temporary permit since August 2008

Operator's Perspective on Regulatory Framework
High quality of outgoing product needed to have buyers of product.
Marketability of product is highly variable (e.g., $0.01 to $0.10 per pound based on timing) which leads to desire for storing product until good market exists. Generally, no market exists for product in the U.S.
California has benefit of proximity to China for relatively inexpensive shipping.
Facility is buying material (they pay for all incoming), and therefore considers itself a material handler, not a waste operator.

No clearinghouse exists in California for technology and no research and development program. The responsibility for development of machines, trial and error, lies with the operators and is not sponsored by the State.

Some concern exists that the State may be charging the regulatory service fee (for residual material) twice for a given ton of material.

Project demonstration site in Los Angeles would be helpful to educate schoolchildren about recycling.

State should define clearly municipal solid waste vs. recycling or regulate and make funds available for equipment upgrades.

State should help by finding local market for material.

Municipal curbside operations need to be held to standards (e.g., if a bag of diapers is delivered to recycling operation, who is accountable?)

Photographs

Inflow pile

Shredded materials (inflow)

Stored, sorted materials

Stored, sorted materials

Trip Report for Three-Part Test Investigation

Facility Name
California Waste Solutions

Facility Location
1005 Timothy Dr., San Jose, CA 95133

Date of Visit
5/29/2009

Visitors
Jim Hanson, Nazli Yesiller

Contact
Glenn Ledet, Site Manager
e-mail: glennledet@calwaste.com
tel: (408) 292-0830

Capacity and Statistics
500 tons/day capacity. Only curbside recyclables are accepted. The facility is permitted as a solid waste transfer station. The facility has a recycling rate of approximately 82 percent. The tonnage of incoming and outgoing materials is monitored. The amount of putrescibles is not measured at the site. The manager estimated that the amount of putrescibles was approximately 3-4 percent. The facility employs 40 workers.

Summary of Operation
The recycling operations at the facility are completely enclosed indoor operations. The received materials are separated and sorted using a two-time process. The recycled end products include paper, plastics, glass, metals, bulky items, appliances, and textiles. The manager indicated that the quality of materials they produce is essentially driven by recycling markets and associated prices. The available ISRI standards are typically not utilized. The recycled materials go to both domestic and international markets. Materials stored overnight are placed under cover.

General Observations
The site represented a mid-size operation (can be considered large for an entirely enclosed facility). The facility included a combination of mechanized and automated operations and hand sorting. Moderate dust and litter were present at the site. Moderate odor was present inside the facility. Vectors were not apparent. The facility is located in a highly developed area with similar nearby operations, other industries, and residences. The facility contained a designated area for conducting education and outreach activities.

Permit Status
Permitted

Operator's Perspective on Regulatory Framework

The operator is supportive of permitting. Permitting legitimizes operations.

The operator indicated that the regulatory status is determined by the quality of incoming materials over which they do not have control. California Waste Solutions operates a similar facility located in Oakland, which is not regulated as the residual amount in the incoming wastes is approximately 5 percent. The manager pointed out the difference in the recycling habits of San Jose vs. Oakland residents as the source for the difference in the residual amounts.

The manager indicated that the permitted status of the facility results in lower capacity and slower operations (500 tons/day) in comparison to the high capacity operations (6000-7000 tons/day) at the non-permitted Oakland facility.

The Oakland facility, although not permitted, still reports every month.

The site capacity is limited by regulations and therefore, the facility cannot accept more clean materials that could reduce the overall residual amount at the facility.

Scavengers significantly affect the quality of incoming recyclables. Buy-back centers legitimize scavengers and need to be better monitored. The operator suggested collecting names, drivers' license, and Social Security number for any buy-back transaction.

The police are too busy to deal with scavengers and another level of enforcement is required.

The public health and safety can be improved by regulating buy-back centers more rigorously.

One-bin recycling increases recycling rates, while small trash bins promote placement of trash in the larger recycling bins. In San Jose drivers and auditors make spot checks of bins, however, sufficient disincentives are not available for changing recycling/disposal habits.

The manager indicated a higher need for enforcement of regulations with monetary fines.

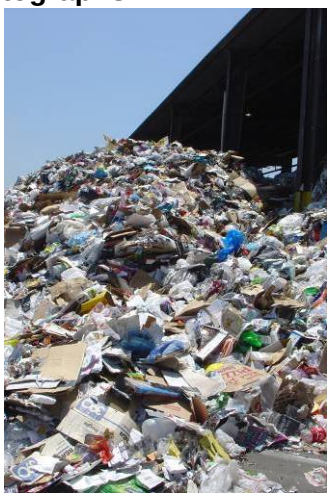
The operator indicated that outgoing product regulations would be problematic for the industry.

It is the legitimate companies that keep the industry together and running a legitimate company (e.g., union labor) is expensive.

Smaller garbage containers are problematic as overflow ends up in the recycling stream.

The operator felt strongly that public awareness of recycling needs to be improved.

Photographs



Incoming materials

Incoming materials on sort line

Indoor storage of sorted materials

Outdoor storage of sorted materials

Trip Report for Three-Part Test Investigation

Facility Name
North Bay Corporation Redwood Empire Disposal

Facility Location
3417 Standish Ave, Santa Rosa, CA 95402

Date of Visit
5/29/2009

Visitors
Jim Hanson, Nazli Yesiller

Contact
Casey Williams, Community Outreach Manager
e-mail: casey@unicycler.com
tel: (707) 586-5542

Capacity and Statistics
The facility contains two sites across the street from one another. One is a buy-back and commercial processing and the other is curbside residential processing. The facility employs 20 persons.

Summary of Operation
The site uses a combination of hand-sorting and automated equipment. The material flow is off approximately 9 percent compared to the previous year. The material stream is made up of approximately 55 percent cardboard, 15 percent mixed paper, and 30 percent plastic and film.

General Observations
The end products are sold approximately 50 percent domestic and 50 percent overseas.

Permit Status
Permitted

Operator's Perspective on Regulatory Framework
The operators support a public awareness program for recycling.
Being regulated is worth the cost as it allows the business to operate with a larger degree of freedom.
Chinese Customs monitors the quality of product. The operator indicated that the Chinese Customs applies a three-strikes rule for quality of products.
The outgoing products are generally of a lesser quality than ISRI standards.

Photographs

Incoming commercial material stream

Sorted recycled materials in bays

Summary Trip Report for Three-Part Test Investigation

Facility Name
Cedar Avenue Recycling & Transfer Station (C.A.R.T.S.)

Facility Location
3457 S. Cedar Ave, Fresno, CA 93725

Date of Visit
7/21/2009

Visitors
Jim Hanson, Nicholas Broussard

Contact
Ray Medley, Site Manager
e-mail: raym@cartsinc.net
tel: (559) 233-1158

Capacity and Statistics
The material stream includes approximately 60 percent municipal solid waste, 30 percent construction and demolition debris, and 10 percent curbside comingled recyclables. A lot of recycled product results from the construction and demolition wastes. The site contains a closed landfill (38 acres, 28-acre waste placement footprint), an inert rock recycling operation (18 acres, of which six acres are used for the operation), and transfer station (15 acres). The facility handles 1500-1800 tons/day. The facility employs 100 persons.

Summary of Operation
Generally, this is an outdoor facility. Roof covers part of operations, but partially open structures throughout. Receive materials in roll-off trucks from various customers. The spotter at the incoming scale speaks with the driver to determine composition of load. Then the load is delivered appropriately to designated processing area. For mixed loads or questionable loads, materials are dumped at a central staging area on the pavement to evaluate the feasibility of sorting for recovered materials. Commodity analyses on 100-300 ton samples are periodically conducted to evaluate material flow trends for given customers. The rock crushing operation results in specification rock, non-specification rock, and occasionally involves some grinding of asphalt.

General Observations
The facility included a combination of hand-sorting and mechanical sorting. Significant amount of construction/demolition materials being handled by facility for recovering recyclables. Heavy dust was present at the facility. Misters were installed on portions of the covered parts of the operation (in part for temperature control). Paper and fiber products are generally sent to China. The price indicates the rigor with which to dig into

waste materials for recyclables. The market value worldwide is approximately 50 percent of what it was one year ago.

Permit Status
Full permit.

Operator's Perspective on Regulatory Framework
Overall, the operator has no problems with the regulations and accepts them as being the rules for operation.
Inspections are conducted monthly by LEA, every 18 months by the State for the landfill, and every 5 years by the State for the transfer station.
The operator would prefer if the regulations would remain under a single regulatory agency.
The operator has concern with three specific materials in relation to regulations:

1) Tires – can only haul up to nine tires unless it is an amnesty day. This leads to inefficient operations for customers with relatively small tire loads (but more than nine) who need to make multiple trips to the facility for dropping off tires. Also, a limit is in place for a maximum storage of 500 tires.
2) Pressure treated wood – considered a chemical waste/level 1 waste and requires delivery to Kettleman City. This regulatory is completely inconsistent with allowing use of such ties in retaining structures for residential and commercial landscaping.
3) Alternative Daily Cover for landfills – the regulations are quite inconsistent for what is permitted to be used for ADC. At some sites, construction and demolition fines (smaller than 4-inch particles) is allowed, whereas this is not allowed at other sites.

Unprocessed materials have a 48-hour maximum storage duration. No time limit exists for processed materials.

Photographs

Staging area

Gypsum wall board

General operations and dust

Thin film separation and storage

Trip Report for Three-Part Test Investigation

Facility Name
Sunset Waste Paper, Inc.

Facility Location
2721 South Elm Ave, Fresno, CA 93706

Date of Visit
7/21/2009

Visitors
Jim Hanson, Nicholas Broussard

Contact
John Mohoff, Manager
e-mail: jmohoff@sunsetwastesystems.com
tel: (559) 499-1595

Capacity and Statistics
The facility is on a 20-acre site. The site has two separate tipping floors—a transfer floor (for municipal solid waste) has a daily intake of approximately 250-300 tons/day, and a green waste floor has a daily intake of approximately 50 tons/day. The recycling operation handles approximately one half of Fresno's recycled materials. The facility has manual sort lines and is permitted up to 2000 ton/day. The facility handles approximately 150 tons of plastic per month (including mixed, hard, and rigid) as well as approximately 100 tons of curbside film (i.e., grocery bags) per month.

Summary of Operation
The operations at the facilities are primarily indoor operations with the exception of outgoing material storage areas. The combined facility employs 125 workers, 45 of whom are residents of the community. The material recovery facility is in operation effectively 24 hours a day through two 8- to 10-hour shifts, depending on intake rates. The site contains four Fastpass scales.

General Observations
The general area has industrial and business developments nearby, without immediately adjacent residential neighborhoods. The facility was quite clean and well organized. Sorting operations were not under way at the time of the facility tour.

Permit Status
Permitted

Operator's Perspective on Regulatory Framework
The operator is generally supportive of permitting.
The operator indicated that high level permitting is needed to prevent undesirable garbage handlers.
The operator indicated that little illegal competition exists for the Fresno market.

For the material on the site, the regulatory concern is generally local in comparison to state level.

The economy of a digester is not feasible in the Fresno market. Instead, contained windrows are used.

Based on large-scale composition studies for different customers, the operator estimates that the residual content is approximately 20 percent. The 10 percent limit associated with the Three-Part Test is effective at keeping out undesirable garbage handlers.

The operator felt strongly that outflow should be market-driven.

Photographs

Fiberboard storage

Separation of plastics

Textile separation trial

Green waste operations

Trip Report for Three-Part Test Investigation

Facility Name
Zanker Road Landfill (ZRL) and Zanker Materials Processing Facility (ZMPF)

Facility Location
705 Los Esteros Road and 675 Los Esteros Road, San Jose, CA 95134

Date of Visit
5/28/2009

Visitors
Jim Hanson, Nazli Yesiller

Contact
Michael Gross, Site Manager
e-mail: michael@z-best.com
tel: (408) 263-2384

Capacity and Statistics
1000 tons/day at each facility for a total of 2000 tons/day currently, a total of 2600 tons/day is typical at the combined facilities under fully operational conditions. Materials received include construction and demolition waste, concrete, asphalt, wood, yard waste, mixed debris, tires, appliances, and e-wastes. Materials are brought by contractors, operators of various industry and infrastructure activities, and private individuals. Yard waste is the only curbside material received. Each facility has an approximate area of 70 acres and is situated over an old (pre-Subtitle D unlined) landfill. ZRL is built over a municipal solid waste landfill and ZMPF is built over an industrial landfill (Owens Corning Fiberglass Landfill). ZRL has been operational since 1985 and ZMPF has been operational since 1999. The annual recycling rates (for May 2008 through April 2009) at ZRL and ZMPF are approximately 90 percent and 69 percent, respectively, for an average recycling rate of 79 percent at the combined facilities (see attached report sheet).

Summary of Operation
The recycling operations at both facilities are outdoor operations with no fully enclosed or indoor areas. ZRL has concrete rubble; wood waste; yard waste; demolition debris; cardboard; gypsum; metal; and bulky item recycling operations. ZMPF has three main material processing areas: demolition recycling area (including a patented demolition plant); mixed debris recycling area; and wood waste recycling area. The combined facilities produce base rock, compost, mulch, soil amendment, agricultural gypsum, and co-gen products that are sold through various venues. The facilities also produce an ADC product and various different commodities including plastics, textiles, and metals. Paper debris is landfilled. The combined facilities employ 176 workers.

General Observations
The combined facilities included a high amount of mechanized and automated operations with hand-sorting to a lesser extent. Medium dust was present at the facilities in the immediate

vicinity of the operations, but was not persistent throughout the facilities due probably to the large area of the facilities and dilution in the atmosphere. Nuisances and vectors were not immediately apparent. No residences are present in the immediate vicinity of the facilities. The general area has very low number of residences (one small community) and has high amount of similar industries (e.g., landfills, recycling operations, waste treatment plant, and power plant).

Permit Status

Permitted

Operator's Perspective on Regulatory Framework

The operator is highly supportive of permitting. Permitted facilities operate well and provide a sense of accountability and trust. The operator strongly supports a single set of state-level regulations that apply to everyone.

The operator has experienced problems with illegal (unpermitted) waste handling businesses in the San Jose region and has spent significant funds on legal expenses related to the situation.

The quality of outgoing materials is determined based on market demands; the quality of outflow from the facilities is not regulated or monitored.

The management at ZRL and ZMPF contribute to the local economy and has good relations with the local community, which is important for minimizing complaints. The operation contributes to the local schools and library.

The operator indicated that better coordination between local and State level regulations and regulators as well as between various State boards (i.e., air, water, and waste) is required.

Photographs

Incoming materials

Wood waste operations

Chipping and grinding operations

Processing operations

Trip Report for Green Material Contamination Investigation

Facility Name
Central Valley Agricultural Grinding, Inc.

Facility Location
5707 Langworth Road, Oakdale, CA 95361

Date of Visit
5/29/2009

Visitors
Jim Hanson, Nazli Yesiller

Contact
Mike Barry, Site Manager
tel: (209) 495-8777

Capacity and Statistics
1500-1800 tons/month total capacity with approximately 30 percent of the total comprising regulated materials (the rest are agricultural operations regulated by the local county). Materials received include brush, grass, leaves, palm, trees, lumber, and other wood. The amount of lumber and wood received is lower than the amounts received during the housing boom. Materials are brought by tree-trimmers, contractors, and operators of various industry and infrastructure activities, as well as private individuals. No curbside materials are received. The facility has a total area of 80 acres, where 40 acres are used for the operations. The facility owns the surrounding 200 acres. The facility has been permitted since 2000. The facility has a high recycling rate. The manager estimated that the amount of residuals were less than 0.5 percent. The tonnage of incoming and outgoing materials is monitored. The facility employs a total of 60 workers; five of the employees are involved with recycling of the regulated materials.

Summary of Operation
The recycling operations at the facility are outdoor operations with no fully enclosed or indoor areas. Approximately 60 percent of the recycled materials produced at the facility consist of mulch and 40 percent consist of animal bedding. The manager indicated that they produce clean, consistent, high-quality materials. Residuals such as creosol-treated wood separated at the facility are disposed of at a landfill. The facility currently uses diesel, which will be converted to electricity in the near future (expected to reduce labor requirements). Materials are stored on site (no cover).

General Observations
The site represented a small operation with relatively low amount of daily material processing. The facility included a high amount of mechanized and automated operations with low manual labor. Dust present at the site was low. The manager indicated that water spraying and a suction system were used for dust and litter control. Water is obtained from an on-site pond and from county ditch water as necessary in summer. Water is also used during dyeing of mulch. The water infrastructure and runoff are regulated by the Water Board. Nuisances and vectors

were not apparent. No residences are present in the immediate vicinity of the facilities. The general area mainly has agricultural operations with a small number of residences.

Permit Status

Permitted (as a chipping and grinding operation)—30 percent of handled materials are regulated (the remainder are agricultural byproducts such as almond shells and pits which are regulated by the county, but not the State).

Operator's Perspective on Regulatory Framework

The operator is highly supportive of permitting. Permitted facilities operate responsibly and provide a sense of accountability and trust. The facility did not have any issues with CalRecycle (formerly CIWMB) in the past (no prior non-compliance events, no documented complaints for the facility).

The operator indicated that better coordination between local- and State-level regulations and regulators as well as between various State boards (i.e., air, water, and waste) is required.

Operator believes that a separate category for regulating chipping and grinding operations is needed.

Inspections occur unannounced.

Photographs

Recycled green material stockpiles

Grinding equipment

Tires used to hold tarps in place

Sorted mulch – clean and organized operation

Trip Report for Green Material Contamination Investigation

Facility Name
Community Recycling Lamont Compost Facility (15-AA-0307)

Facility Location
1261 North Wheeler Ridge Road
Lamont, CA

Date of Visit
9/23/2009

Visitors
Sam Vigil (Cal Poly)
Bill O'Ruillan (Kern County LEA)

Contact

David Baldwin	LEA:	Bill O'Ruillan
Community Compost Facility		County of Kern – Environmental Health Services
(661)-303-6207		(661)-862-8731

Capacity and Statistics
Permitted Peak Loading is 3,692 TPD. Annual Loading is 620,294 cubic yards
140 acres in use (190 acres permitted)

Summary of Operation
Site receives green materials from Southern California curbside collection systems. Green materials are ground to -4 inches before transport. Green materials are formed into windrows with no front-end processing at the site. The green materials are formed into 200 windrows, 190 feet long. Four Scarab and one custom compost turning machines are used. Windrows are irrigated by portable sprinklers using reclaimed wastewater from the adjacent city of Lamont wastewater plant. The compost roads between windrows are vacuumed on a weekly basis to reduce wind-borne plastic waste. After composting and curing, the finished compost is screened to remove plastic and other contaminants and ground to -3/8 inch. Approximately 25 tons/day of waste plastic materials are recovered. A plastics recycling system is under construction.

General Observations
The site was well managed. The materials are not screened for contaminants at the front end. Screening and contaminant recovery is performed after composting. The end-product compost is of high quality. No odors were observed.

Permit Status
Full Permit

Operator's Perspective on Regulatory Framework

No comments from operator. The LEA, Bill O'Ruillan, was of the opinion that the 1 percent rule was too lenient. He stated that both the Community Compost Facility and the City of Bakersfield Mt. Vernon Facility both routinely achieved contamination rates of less than 0.1 percent.

Photographs

Aerial view – Community Compost Site

Incoming green materials

Windrow irrigation

Windrow road after vacuuming

Compost loading area

Finished compost (pen for scale)

Trip Report for Green Material Contamination Investigation

Facility Name
GS Brothers, Inc. (19-AA-1066)

Facility Location
20331 South Main St.
Carson, CA

Date of Visit
6/8/2009

Visitors
Sam Vigil

Contact
Chris Everhardt
(310) 480-1255

Capacity and Statistics
Permitted Peak Loading is 100 TPD. Annual Loading is 220,000 TPY.
Facility only receives drop-off loads of green materials, no curbside green materials accepted. Also accepts clean lumber, which is stockpiled for custom grinding. No scale on site, tipping fees are based on volume estimates. Facility is co-located with a commercial wholesale nursery.

Summary of Operation
Drop-off loads are inspected prior to dumping. Handpicking of contaminants is done on some loads. Materials are processed with a horizontal grinder/shredder. Product is sized by changing out the screens in the grinder, no trommel screen is used. Materials sold as mulch to landscape contractors.

General Observations
Site is small scale, at 1.8 acres. Minimal contamination because curbside green waste is not accepted. Output products include wood chips and coarsely ground mulch. The site is located in a commercial warehouse and trucking district with no nearby residences.

Permit Status
Notification

Operator's Perspective on Regulatory Framework
Operator commented that she had "lots of regulations to deal with," including the LEA (Los Angeles County), and local and state air pollution control agencies.

Photographs

Aerial view – GS Brothers, Inc.

Incoming green materials

Incoming wood waste

Chipping and grinding operations

Finished mulch (pen for scale)

Trip Report for Green Material Contamination Investigation

Facility Name
Mt. Vernon Recycling and Composting Facility (15-AA-0311)

Facility Location
2601 South Mt. Vernon Ave.
Bakersfield, CA

Date of Visit
9/23/2009

Visitors
Sam Vigil

Contact

Rubin Ramierez	LEA:	Bill O'Ruillan
City of Bakersfield		County of Kern – Environmental Health Services
(661) 835-8873		(661) 862-8731

Capacity and Statistics
Permitted Peak Loading is 976 TPD. Annual Loading is 84,783 Tons
82 Acres

Summary of Operation
Site receives green materials from the City of Bakersfield curbside collection system. Also receives select loads of green materials from commercial landscapers and the general public. These loads are inspected prior to acceptance. Both curbside and drop-off green materials are process through a trommel screen and semi-automated hand sorting line by six workers. The materials are then ground to -4 inch size by a horizontal grinder. The grinder has been retrofitted with electric motors to reduce air emissions. The materials are then transported to the compost area and formed into 900-foot-long windrows. Compost time is 15 days and 75 days of curing. After curing the finished compost is screened to -4 inch size. Compost is sold to both retail customers and wholesale agricultural customers. Wood waste is also processed and sold as several different grades of mulch for landscaping and as biomass fuel.

General Observations
The site was well-managed with considerable attention to safety and cleanliness. No odors were observed.

Permit Status
Full Permit

Operator's Perspective on Regulatory Framework

No comments from operator

Photographs

Aerial view – Mt. Vernon Compost Site

Incoming green materials

Sorting conveyor and reject materials

Manual sorting operations

Windrows

Finished compost (pen for scale)

Trip Report for Green Material Contamination Investigation

Facility Name
Agromin Green Material Composting Operation (19-AA-1100)

Facility Location
Potrero Canyon Road
Newhall, CA
(Note: Latitude and longitude coordinates in the SWIS Database are incorrect)

Date of Visit
June 9, 2009

Visitors
Sam Vigil
Pete Oda (Los Angeles County LEA)

Contact
Bill Holman (805) 207-7952}

Capacity and Statistics
Peak Loading up to 200 TPD. Annual Loading up to 62,000 tons. Facility receives curbside green materials from Santa Clarita and Burbank Recycling. Facility is located on the Newhall Ranch more than five miles from residences. Access to the site is through a key-coded locked gate.

Summary of Operation
Incoming trucks are weighed and unloaded in a sorting area. Green materials are hand-sorted and contaminants removed and stockpiled for disposal. Green materials are then loaded into a tubgrinder. Green materials are then formed in windrows for composting. Compost is primarily sold to the Newhall Ranch for use in its agricultural operations. Some shredded materials are transported to the Santa Paula Agromin Compost Operation for composting.

General Observations
Site is very well managed. Sorting operation is efficient and produces a clean green materials product for shredding. Isolated location of the site is ideal with no nearby receptors. No odor problems detected during the visit.

Permit Status
Notification

Operator's Perspective on Regulatory Framework
The operator has several comments on the current regulatory structure. He stated that regulations on composting and recycling should be consistent on specifying tons. Apparently some regulations allow volume measurements, which are inaccurate and penalize operators using scales relative to their competitors. He also stated that as a compost operator he has no real control on the quality of curbside green materials (Note: The site does an excellent job of

removing contaminants prior to grinding and composting). He also made the observation that "poorer" and "richer" neighborhoods have more contaminants in green materials than middle-class neighborhoods.

The LEA, Pete Oda of Los Angeles County, commented that the 1 percent contamination rule is difficult to measure. He felt that local code enforcement, with random sampling for residential green materials bins, would be a better method of reducing green waste contamination.

Incoming green materials

Green materials before sorting

Sorting operations

Grinding

Compost windrows

Finished compost (pen for scale)

Trip Report for Green Material Contamination Investigation

Facility Name
Limoneira/Agromin Agricultural Composting

Facility Location
South End Olive/Edwards Ranch Road
Santa Paula, CA

Date of Visit
June 9, 2009

Visitors
Sam Vigil
Ernest Dragan, Ventura County LEA

Contact
Bill Camarillo, Site Manager
E-mail: bill@agromin.com
Phone: (805) 207-5650

Capacity and Statistics
Maximum Permitted Throughput is 200 TPD, currently operating at 150 TPD. Annual capacity is 72,000 TPY. Site area is 20 acres. Processes green materials from curbside collection from Santa Paula, Fillmore, Carpenteria, and unincorporated portions of Ventura County.

Summary of Operation
Curbside green materials are weighed and hand sorted. After sorting green materials are moved across the site and formed into windrow compost piles. The produced compost is then screened to -½ inch (standard product) or -1/8 inch (golf course product).

General Observations
The site is very well managed. The isolated location of the site is ideal with no nearby receptors. No odor problems detected during the visit. The compost produced by the site is used for specialty crops such as strawberries, raspberries, cabbage, lettuce, and spinach. These ground contact crops require compost of the highest quality standards as defined by the U.S. Compost Council. Testing to meet these standards is done by a third-party laboratory.

Permit Status
Notification

Operator's Perspective on Regulatory Framework

The operator commented on several topics:

1. The 12,500 cubic yard limit for on-site green materials. The current regulation does not distinguish between raw materials and finished compost. Market conditions sometimes force

stockpiling of compost. Excess unprocessed green material stockpiles are potentially a nuisance problem, but finished compost is stable.

2. One of the cities serviced by the site, Ventura, is considering an ordinance to allow food waste to be mixed with green materials (approximately 10 percent by volume). Compost produced from this feedstock could not be marketed for leaf crops due to food contamination issues but could be used for landscaping or tree crops. What will the regulatory response be to such proposals?

Photographs

Aerial view – Limoneria/Agromin Site

Incoming green materials

Stockpiled wood waste

Compost windrows

Finished compost (pen for scale)

Appendix E - Summary of European Union Regulations

EU Regulations

EU regulations are included in this section to provide relevant international regulatory practices. The new EU Waste Directive contains regulatory information for both recycling and composting.

The European Union has developed a new waste directive that includes broad provisions for waste processing, including both recycling and composting operations. The new waste Directive 2008/98/EC (this 2008 revision provides updates to the 1975 Original Waste Directive 75/442/EEC) was created for three reasons:

1. Definitions were not sufficiently clear in the original Directive;
2. The strategy on prevention and recycling of waste uses a new approach to waste policy;
3. Simplifies the existing legal framework.

Excerpts from regulations (small size font) and interpretive comments (larger size font) are provided below for the EU Model for Recycling and Composting Regulations.

The following waste hierarchy shall apply as a priority order in waste prevention and management legislation and policy: (a) prevention; (b) preparing for re-use; (c) recycling; (d) other recovery, e.g. energy recovery; and (e) disposal.

Prevention is a key aspect of the EU regulatory framework. A waste generator's first goal is to prevent waste and then to manage the waste in such a way that it is maximized for reuse.

Collection and use of expertise

Scientific/expertise domains concerned

The main areas where scientific expertise was sought were life cycle analysis, waste prevention and recycling, recovery facility standards, definitions of waste, recovery and disposal.

Methodology used

The principal methodologies used were expert meetings and the commissioning of relevant studies. A critical review of existing studies and life cycle analysis on the regeneration and incineration of waste oils was commissioned (see http://europa.eu.int/ comm/environment/waste/studies/oil/waste_oil.htm).

Main organizations/experts consulted

A wide range of experts from research institutes, consultants, and industry were consulted and their opinions taken into account.

Summary of advice received and used

The existence of potentially serious risks with irreversible consequences has not been mentioned.

Limited information was identified in regards to the development process for regulations and how the regulations deal with market dynamics. The research team identified only one statement, which indicated that scientific expertise was used in developing regulations for recycling. Input from a wide range of experts was used in the development of the regulations.

Waste hierarchy

Member States shall take into account the general environmental protection principles of precaution and sustainability, technical feasibility and economic viability, protection of resources as well as the overall environmental, human health, economic and social impacts, in accordance with Articles 1 and 13.

Similar to many of the states in the U.S., handlers must not only deliver a quality product but they must also take care of the environment and health of those impacted by the facility.

By-products

1. A substance or object, resulting from a production process, the primary aim of which is not the production of that item, may be regarded as not being waste referred to in point (1) of Article 3 but as being a by-product only if the following conditions are met:

In contrast to U.S. regulations, any materials produced by a recycling center that cannot be recycled is considered a byproduct.

End-of-waste status

1. Certain specified waste shall cease to be waste within the meaning of point (1) of Article 3 when it has undergone a recovery, including recycling, operation and complies with specific criteria to be developed in accordance with the following conditions:

(a) the substance or object is commonly used for specific purposes;

(b) a market or demand exists for such a substance or object;

Market demand is recognized as a driving force in defining in recycling centers operations what is recyclable and what is considered waste.

Extended producer responsibility

1. In order to strengthen the re-use and the prevention, recycling and other recovery of waste, Member States may take legislative or non-legislative measures to ensure that any natural or legal person who professionally develops, manufactures, processes, treats, sells or imports products (producer of the product) has extended producer responsibility. Such measures may include an acceptance of returned products and of the waste that remains after those products have been used, as well as the subsequent management of the waste and financial responsibility for such activities. These measures may include the obligation to provide publicly available information as to the extent to which the product is re-usable and recyclable.

In order to govern waste prevention, member states can place significant responsibility on producers of products regarding the amount and type of waste that their product generates.

Protection of human health and the environment

Member States shall take the necessary measures to ensure that waste management is carried out without endangering human health, without harming the environment and, in particular: (a) without risk to water, air, soil, plants or animals; (b) without causing a nuisance through noise or odors; and (c) without adversely affecting the countryside or places of special interest.

These regulations are similar to US regulations regarding human health and the environment in both their diction and their qualitative descriptions.

Specific Regulatory Features

EU member countries maintain different grades of compost materials as described in ORBIT/ECN, 2008, Compost Production and Use in the EU, Final Report. The countries have classification for 1 to 4 types of compost, dependent on specific country. The parameters used for classifying the compost include heavy metals, input material (ranging from vegetables, fruit, garden to sewage sludge, mixed municipal solid waste, and source-separated organic wastes), stability (mature compost versus fresh compost), and application types (agricultural, landscaping, landfill coverage, mulch compost).

Germany is unique in that it has specific metal concentration limits based on the type of soil on which the material will be applied.

EU regulations clearly state that prevention is a priority over recycling. While recycling significantly helps in reducing the amount of waste that goes to landfills, prevention is the first step.

Comparison of U.S. and EU Regulations

A report by Brinton (2000) indicated that Europe has more stringent regulations in terms of quality of compost (specifically heavy metal limits), but the U.S. has more stringent standards related to maturity of compost. The report indicated that the California Compost Quality Council is the leading group on developing maturity standards in the world. Brinton (2000) reported that Germany was the country with the most composting per capita. It was in Germany where the first quality standards were applied using the Dewar Self Heating Test.

PAS 100 is a document that describes requirements for compost produced in England and Wales. PAS 100 describes the regulations of quality required on compost depending on the specific use. Table E-1 provides a comparison for the metal requirements in PAS 100 to the metal concentration requirements in California. The limits reported in PAS 100 are significantly less than those in California. The British Standards Institution (the agency that issues PAS 100) outlines testing requirements including ion chromatography with spectrophotometric detection methods.

Table E-1. Comparison of Heavy Metal Limits between UK (PAS 100) and California

Pollutant	PAS 100 (mg/kg)	CA (mg/kg)
Arsenic		41
Cadmium	1.5	39
Chromium	100	1200
Copper	200	1500
Lead	200	300
Mercury	1	17
Nickel	50	420
Zinc	400	2800

EU regulations are similar to the selected states regulations in that qualitative descriptions are provided in the regulations for protecting human health and the environment. The regulations differ in the specificity of how incoming material is handled. There are no regulations on the percentage of residual or the percentage of putrescible waste in incoming recyclable material. Another difference is the inclusion of regulations on producer responsibility. Such measures suggest that a producer should accept the waste that remains after their product has been used.

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