

Assessment of State Recycling Regulations in the United States

Nazli Yesiller¹, James L. Hanson², and Samuel A. Vigil³

ABSTRACT: This investigation was conducted to identify the current status of state recycling regulations in U.S. using an extensive survey. Questions were included regarding: baseline waste generation and recycling trends; recycling regulatory trends; quantitative thresholds; integration of science, engineering, and economic principles; material properties; and legislative status of regulations. The majority of the surveyed states had regulations for recycling activities, which were less strict than solid waste regulations, and required permits for operation of recycling facilities. A low percentage of the states regulated generators, transporters, and handlers and a high percentage regulated recyclers. In general, transfer stations and recycling centers were not regulated as solid waste facilities whereas MRFs were regulated as solid waste facilities. Exemptions were granted based on type and amount of materials and type of operation as well as for specific activities such as scrap materials, construction and demolition waste, and beneficial reuse. Quantity of incoming materials was measured somewhat more commonly than the quantity of outgoing materials. Weight based measurements were used more frequently than volume measurements. The use of numerical thresholds for residual content and in particular, putrescible content was not common. When used, residual thresholds ranged between 5 and 15% and putrescible threshold was 1%. Duration for on-site storage of materials typically was regulated and varied over a wide range (from 60 days to 3 years). Best management practices and best engineering principles/judgment were adopted in the development of regulatory schema and comprehensive science and engineering principles or risk analysis typically were not used. Variable frequencies and practices were used for inspections and also for enforcement. Annual reports typically were required for recycling operations. The majority of the surveyed states indicated that they were considering or in the process of changing regulations for recycling activities. A general lack of oversight was identified as a common problem.

INTRODUCTION

Recycling is a significant component of waste reduction and waste diversion activities. Regulatory oversight typically is used for entities and operations involved in recycling activities as recyclables commonly are part of the waste stream and recycling activities are considered waste operations. The entities involved in recycling include generators, transporters, handlers, and recyclers. The types of recycling operations typically include material recovery facilities (MRFs), transfer stations, recycling centers, and buy-back and drop-off centers. This investigation was conducted to determine the level and details of regulatory oversight of recycling activities in the U.S. to support a staff driven review and potential modification of recycling regulatory schema in California.

¹Director, Global Waste Research Institute, California Polytechnic State University, 1 Grand Ave, San Luis Obispo, CA 93407 USA, nyesille@calpoly.edu.

²Professor, Civil and Environmental Engineering Department, California Polytechnic State University, 1 Grand Ave, San Luis Obispo, CA 93407 USA, jahanson@calpoly.edu.

³Professor, Civil and Environmental Engineering Department, California Polytechnic State University, 1 Grand Ave, San Luis Obispo, CA 93407 USA, svigil@calpoly.edu.

SURVEY

An extensive survey was administered to all 50 states to identify significant aspects of recycling regulations. The web-based survey was developed using Survey Crafter Professional 4.0 software and included 44 questions. Photographs were added to enhance the appearance of the surveys and keep the interest of the respondents for high rates of complete returns. The entire survey is presented in Hanson et al. (2010). The survey included questions related to:

- baseline waste generation and recycling trends;
- recycling regulatory trends;
- quantitative thresholds in regulations;
- integration of science, engineering, and economics principles in regulations;
- incoming and outgoing material properties;
- enforcement of regulations and reporting requirements;
- efficiency and level of satisfaction with regulations; and
- legislative status of regulations.

SURVEY RESULTS AND ANALYSIS

A total of 28 states completed the recycling survey, which provided a representative cross section of the U.S. with respect to total population, population density, agricultural status, and economy (Fig. 1). The complete set of survey results is presented in Hanson et al. (2010). The reported rates of solid waste recycling varied between 9 and 45% in the surveyed states. Cash refund programs for bottles and cans were present in six states. A total of 20 states indicated presence of regulatory or economic incentives for promoting recycling, which included: target recycling rates; compulsory recycling by various entities (e.g., municipalities, businesses, etc.); advance recycling fees for various commodities (e.g., tires, appliances, motor oil, etc.); incentives (e.g., tax credits, tax exemptions) for purchase and installation of recycling equipment; recycling market development zones and loans; grant programs (e.g., for development of recycling infrastructure, for economic development); and technical assistance, outreach, and education programs.

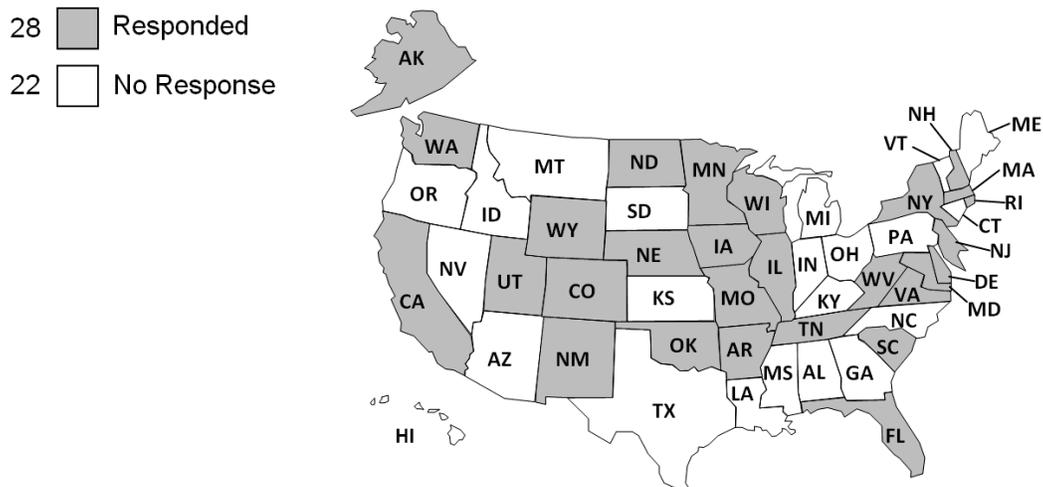


Fig. 1. Surveyed states.

The amount of materials at recycling facilities was quantified using weight measurements more commonly than volume measurements for regulatory oversight. Weight measurements were made directly or volumes were converted to weights using assumed unit weight values. Regulations did not always specify a requirement for direct measurements and survey respondents indicated problems with conversions using assumed values. Measurement of quantity of incoming materials was somewhat more common than measurement of the quantity of outgoing (total or recyclable) materials for regulatory compliance. Individual components (i.e., paper, plastic, metal, glass) of incoming and outgoing material streams were quantified using weight measurements at approximately 30% of the surveyed states. Use of volume measurements for the individual components was not common. The use of numerical thresholds for residual content (31% of the states) and in particular, putrescible content (12% of the states) was not common in the surveyed states. Qualitative descriptions commonly are included in regulations related to prevention of nuisance, odors, and vectors. When measured, both residual and putrescible content typically were quantified as a quotient of the total amount of materials processed at a facility on a weight basis and not as an absolute quantity. Residual content typically was determined using outgoing material quantities. The thresholds for residual content varied between 5 and 15% for regulatory oversight. A threshold of 1% was reported for putrescible content. Determination of the amount of contaminants in the incoming wastes also was reported in the survey results. Material flows averages were used twice as more commonly as discrete spot measurements for determination of material quantities for regulatory compliance. The frequency of material flows measurements generally were between weekly and annual and discrete spot measurements between continual and less than monthly. Recycling facilities were specifically required to measure material quantities for regulatory purposes or quantities were obtained from business transactions and reported to the relevant regulatory agencies. The quality of outgoing materials is not regulated with the exception of one state, which required that “materials must be stored and managed to maintain good marketable quality”.

The majority of the surveyed states indicated that they had regulations related to on-site storage of materials at recycling facilities. The reported durations varied between 60 days to 3 years for recyclable materials. In addition, qualitative descriptions such as “preventing speculative accumulation”, “materials must be actively managed”, and “materials cannot be stored if they are creating a public nuisance or presenting a significant risk to public or environmental health” were used. Further analysis of regulations of selected states indicated the presence of duration limits for storage of residual or putrescible materials, which ranged from processing requirements on the day of receipt to 7 days.

The majority of the surveyed states indicated that they had regulations related to beneficial reuse of waste materials. Some states identified specific waste materials (e.g., waste tires, unadulterated newspaper and newsprint, reclaimed glass, etc.) and specific end uses (e.g., landfill alternative daily cover, animal bedding, construction fill, etc) with several states indicating that exemptions were available for beneficial reuse applications and regulatory compliance was determined on a case-by-case basis.

The survey included a set of questions related to initial development of the state recycling regulations. A total of 67% of the states that responded indicated that specific/quantitative science and engineering principles had been used in the development of regulatory criteria; 55%

indicated that specific/quantitative economic and feasibility principles had been used in the development of regulatory criteria; 45% indicated that scientifically-based risk assessment had been used in the development of regulatory criteria; and 40% indicated use of other principles/criteria in the development of regulatory criteria. Further analysis of the state regulations and personal correspondence with state representatives indicated that best management and best engineering principles/judgment were adopted in the development of regulatory schema and comprehensive science and engineering principles or risk analysis typically were not used in the development of regulations, even though a positive answer may have been included in the survey results. Effects of recycling activities on public health and the environment commonly have not been investigated in systematic scientific studies.

The majority of the states indicated that their regulations had provisions for (or are flexible enough to account for) new technologies. Recycling operations were inspected by majority of the state regulatory agencies. The frequency of inspections ranged from daily (one state, self inspection) to timeframes on the order of quarterly, semi-annually, or annually, to “in response to complaints”. Half of the states that responded indicated that the inspections contained objective components (e.g., data collection, numerical ratings). All of the states with inspections of recycling operations indicated that subjective components (e.g., observation of dust and odors) were used in the inspections. Penalties were assessed by majority of the states in the form of letters, notices, fines, and facility closures. A single state indicated that enforcement had not yet been used and a low number of states included statements indicating presence of criminal cases.

Recycling activities were required to submit reports by the majority of the surveyed states. The reports typically included type and quantity of materials (material received, processed, and/or shipped off site) and were required to be submitted on an annual basis. In a limited number of cases, certifying compliance with certain location/operational standards and information on destination of materials sold/distributed off-site, with a detail of how many tons to each location, including disposal also were required to be presented in the reports.

The majority of states indicated that operational efficiency at recycling facilities was affected by regulations. The number of states that were neutral in terms of satisfaction with the current model of regulation was higher than the number of states that were very satisfied, satisfied, or dissatisfied. Nevertheless, 63% of the states indicated that they were considering or in the process of changing regulations for recycling activities. Specific problems identified and comments provided for recycling in the survey included (presented verbatim):

- We are revising our recycling regulations because there are many gaps in our current regulations such as who qualifies as a recycler.
- 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.
- There are minimal regulations and enforcement on recycling facilities. It's hard to obtain reliable data. No enforcement capability for reporting.
- 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. We are in the process of trying to find all of them again.
- Would like to see self-inspection.

- It would be better if the recycling facilities reported numbers, such as 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.
- Recycling facilities are not regulated and are currently handling hazardous waste. Because of current classification, jurisdiction is questioned.
- If we 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).
- 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.
- Lack of reporting requirements is an impediment to coordinating the system.
- 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.
- 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.
- Recycling facilities should be subject to regulatory supervision and enforcement.

SUMMARY AND CONCLUSIONS

An extensive survey was administered to all 50 states to identify significant aspects of recycling regulations. Questions were included on topics related to: baseline waste generation and recycling trends; recycling regulatory trends; quantitative thresholds; integration of science, engineering, and economic principles; incoming and outgoing material properties; and legislative status of regulations. A total of 28 states completed the recycling survey. The majority of the surveyed states had regulations for recycling activities, had recycling regulations that differed from (less strict) municipal solid waste regulations, and required permits for operation of recycling facilities. A low percentage of the states regulated generators, transporters, and handlers, whereas 54% of the surveyed states indicated regulation of recyclers. Transfer stations and recycling centers typically were not regulated as solid waste facilities, whereas the majority of the states indicated regulating MRFs as solid waste facilities. Exemptions were granted based on type and amount of materials and operation type as well as for specific activities such as scrap materials, construction and demolition waste, and beneficial reuse.

Measurement of quantity of incoming materials was somewhat more common than measurement of the quantity of outgoing materials for regulatory compliance. Weight based measurements were used more frequently than volume measurements, even though conversions were used from volume to weight using assumed unit weight values. The use of numerical thresholds for residual content and in particular, putrescible content was not common. When used, residual thresholds were between 5 and 15% and putrescible threshold was 1%. Duration for on-site storage of materials typically was regulated. However, the durations varied significantly (from 60 days to 3 years). Best management practices and best engineering principles/judgment were

adopted in the development of regulatory schema and comprehensive science and engineering principles or risk analysis typically were not used in the development of regulations in a systematic manner. Variable frequencies and practices were used for inspections and also for enforcement. Annual reports typically were required for recycling operations. The majority of the surveyed states indicated that they were considering or in the process of changing regulations for recycling activities. A general lack of oversight was identified as a common problem.

In general, regulatory framework is present for recycling activities across the U.S. to varying degrees. Enforcement is affected by implementation, oversight, and economic constraints and is not always consistent with the original intent or requirements of the regulations. A significant number of states are in the process of changing regulations in response to increasing trends in recycling, advancements in recycling technology, and economic conditions for proper management of recycling activities.

ACKNOWLEDGEMENTS

This study was funded by California Department of Resources Recycling and Recovery (CalRecycle). The findings and conclusions provided in this paper are those of the authors and do not necessarily reflect the views of CalRecycle. The assistance of Mr. Watson Gin and Mr. Mark De Bie is greatly appreciated. The cooperation of state regulators who participated in the survey is acknowledged. Mr. Craig Jones and Mr. Nicholas Broussard assisted with the investigation.

REFERENCES

Hanson, J. L., Yesiller, N., and Vigil, S. A., (2010), *Study on Other States' Regulatory Oversight of Waste and Material Handling Activities Relative to Recycling Centers, Transfer Stations, and Green Material Contamination*, Final Report, DRRR-2010-003, CalRecycle, Sacramento, California.