

Subcommittee: Solid Waste and Recycling Database Management Systems

(Abstracted from the State Solid Waste Management Plan, amended December 2006; Objective 6 - Planning, Evaluation and Measurement; Appendix B)

Enhance local, regional, and state program measurement, evaluation, and planning practices to drive continual progress towards achieving Connecticut's waste management goals.

Measurement Overview

Effective solid waste management requires comprehensive and accurate solid waste data for:

- Solid waste projections and related planning and program evaluation to help decision makers plan at all levels;
- Assurance of compliance with solid waste statutes, regulations, and permit requirements;
- Measurement of progress towards solid waste management goals and calculation of environmental benefits associated with those goals. Measurement of progress is an essential element of Connecticut's approach to achieving its solid waste management objectives, and especially to achieving its aggressive waste diversion targets. Data and information are needed to measure progress towards local, regional and state objectives; and
- Business decisions regarding location in the state or region of: solid waste or recycling processing facilities, solid waste disposal facilities, solid waste transfer stations, and manufacturing facilities using recycled material as a feedstock.

The CT DEP will revise and enhance the solid waste reporting and measuring system to eliminate duplicative reporting requirements and reduce the reporting burden, while ensuring that the information most needed to plan, implement, and track performance is widely available.

Current Measurement Practices

This section provides a brief synopsis of Connecticut's program reporting system. The State's data reporting requirements are described and assessed in detail in Appendix B.

Prior to 1990, it was difficult to track total solid waste generated in Connecticut because much of Connecticut's solid waste was disposed in municipal landfills, many of which had no scales to measure waste. Starting in the mid-to-late 1980's CT DEP started tracking MSW disposed in Connecticut's resource recovery facilities and in some Connecticut landfills. In the early 1990s, the Department developed a comprehensive solid waste reporting system and computerized data base to track solid waste generation and management in the state. The accuracy of solid waste data, especially for MSW, has increased over the past decade as more solid waste is disposed of through Connecticut permitted solid waste facilities that have scales and that submit solid waste reports to the CT DEP. As a result, the Department is now able to plan much more accurately for the state's solid waste management needs. The CT DEP also participates in regional and national efforts to track MSW imports and exports among the states.

Connecticut state statutes, regulations, and solid waste permits require municipalities, some scrap metal processors, and owners or operators of solid waste disposal facilities, solid waste transfer stations, recycling and composting facilities, and C&D volume reduction facilities to report solid waste and recycling data to the Department. The data is generally submitted on

forms developed by the Department and include information about the type, origin, amount, and destination of waste received and processed.

The Department maintains most of the reported solid waste and recycling data in its computerized database. The data base is designed to track Connecticut solid waste generated, recycled, and disposed, and can aggregate data by town, region, and statewide for different categories of waste and recyclables. Data on MSW and different types of special waste such as ash residue, bulky waste and C&D wastes, are kept discrete.

Although there are issues with regard to the completeness of MSW data captured through the solid waste reporting system, the MSW data does allow for estimates adequate for statewide planning purposes. It needs to be noted that as more of Connecticut's MSW gets disposed out-of-state, tracking that information may become more difficult. Accurate or complete MSW disposal and recycling data for individual municipalities is more elusive. Some solid waste facilities misidentify the origin of waste received at their facilities due to inaccurate information from delivering haulers or to facility reports based on their billing system in lieu of CT DEP reporting requirements. This has made it more difficult to accurately track the flow of waste and recyclables and thus quantify such waste by municipality.

Data regarding resource recovery ash residue disposal are also adequate for planning purposes. However, C&D waste reporting is more incomplete and does not provide a complete picture of C&D waste management in Connecticut.

In addition to the issues mentioned above, there are other problems with the current solid waste reporting system. These include (1) reluctance of some haulers and facilities to divulge the origin or destination of waste allegedly due in part due to concerns regarding confidentiality; (2) checks and balances designed into the original database system result in duplicative reporting by municipalities and solid waste facilities for some disposal and recycling data; (3) some municipalities and solid waste facilities perceive reporting requirements to be unduly burdensome; and (4) the CT DEP does not currently have adequate solid waste data management resources leading to data entry report compilation, and analyses backlogs.

The CT DEP has used the reported solid waste data for some of the following purposes to:

- Track the state and municipal recycling, disposal and generation rates;
- Identify in-state disposal capacity issues;
- Calculate the environmental benefits resulting from the recycling of specific material types;
- Share information with other states looking at MSW import and export issues;
- Identify solid waste management needs;
- Track the success of Connecticut's recycling efforts and help identify recycling marketing issues;
- Track solid waste facility compliance with permit requirements;
- Help decide capacity for new solid waste facility permitting and for permitting expansions at existing solid waste facilities;
- Provide data to recycling processors, brokers, and manufacturers looking for sources of specific recycled materials for feedstock for paper mills and for other manufacturing processes; and

- Use as one of the criteria for naming a municipality to the Connecticut Municipal Recycling Honor Roll which is posted on the CT DEP website.

In the past, the CT DEP annually sent out recycling reports to each municipality. These reports provided the following information: (1) their per-capita MSW recycling and disposal rate; (2) total tonnages of MSW disposed and recycled by each town and for the state as a whole; (3) graphs comparing each town's MSW per-capita recycling rates for different materials to other towns with similar populations; (4) graph showing the town's annual per-capita recycling rate for the past five years; and (5) other pertinent recycling, generation, and disposal data. Municipalities use the data to track and evaluate the success of their recycling programs and to track destinations and amounts of MSW generated in their town and disposed. Although the CT DEP has used that data to recognize towns with exemplary recycling programs, it has never used that data to enforce against or offer assistance to a town not meeting mandated recycling obligations.

Barriers to Enhanced Measurement

Some of the barriers to enhancing local, regional and state program measurement include:

- A lack of funding and staff resources for data collection, program measurement and evaluation;
- Scale software at solid waste facilities that is designed for billing purposes but not amended to also comply with DEP reporting requirements;
- Recycling and solid waste reporting is not a priority for municipalities;
- The difficulty of documenting recycling flows due to the many players involved and sensitivity over reporting potentially proprietary, business sensitive information to government agencies and/or solid waste facilities; and
- Difficulty in getting data on solid waste not captured by the current reporting system i.e., waste disposed or recycled without passing through a Connecticut permitted solid waste facility.

Opportunities and Priorities for Measurement

Connecticut must improve its solid waste reporting system in order to:

- Establish a means to obtain solid waste data through reporting requirements that are less burdensome and less duplicative for reporting entities but still provide information needed for solid waste management planning and evaluation, assessment of environmental and economic benefits of recycling and source reduction, and private investment in recycling, composting, or reuse businesses.
- Establish municipal and regional disposal reduction goals that are less burdensome to accurately track and which will require more relevant reporting and measurement.

Strategies for Measurement

Strategy 6-2. Minimize the reporting burden for municipalities and others by only requiring the collection of data necessary to support the goals of the Plan and provide the information needed for on-going solid waste management planning and evaluation.

The CT DEP will focus on getting more accurate solid waste disposal data statewide and for each municipality. The CT DEP will work with the Agency's Solid Waste Management Advisory Committee and other stakeholders to evaluate the existing solid waste data

management system, make recommendations for improvements and implement these recommendations. Listed below are some considerations and approaches that may be undertaken.

- Amend the annual municipal and quarterly solid waste facility reporting requirements to:
(a) eliminate duplicative reporting by municipalities in their annual municipal recycling reports; eliminate requirement for solid waste and recycling facilities to report duplicative information to both the CT DEP and to municipalities; (b) require more meaningful municipal reporting of efforts to reduce waste generation and disposal through its recycling programs and services, and identification of needs; and (c) require haulers to report to the CT DEP on waste or recyclables not delivered to a reporting solid waste facility.
- To help assess the effectiveness of recycling, composting, and source reduction efforts, waste disposal characterization assessments should be conducted as necessary to evaluate municipal efforts and success in promoting and enforcing local recycling requirements.
- Under this strategy, the CT DEP will still require annual recycling reports from municipalities, but the information required will eliminate the duplicative and often burdensome reporting currently required of municipalities.
- The CT DEP will explore options for obtaining data or estimates of unreported recyclables, including bottle bill containers, lead acid batteries recycled through the deposit law, waste oil quantities recycled by automotive repair shops, scrap metal, recyclables backhauled to out-of-state retail distribution centers, and other commercial recyclables.

These proposed changes to Connecticut's current reporting system and goals (from a percent recycled goal to a goal of reducing the MSW per-capita waste disposal rate and reducing the tons of C&D waste requiring disposal) will strike a more efficient balance between the need for data and information, and the cost and burden associated with obtaining, compiling, and reporting it. This statewide goal system will effectively drive efforts to simultaneously minimize the amount of waste requiring disposal, help determine disposal capacity expansion needs, and provide a framework for increasing source reduction, reuse, recycling and composting.

Appendix B – Data Summary, Validation and Assessment (Abstracted)

Data Validation - Data Collection

Data pertaining to MSW are gathered by the CT DEP in a variety of ways. Table B-5 summarizes these methods. Reports are submitted to the CT DEP's Bureau of Materials Management and Compliance Assurance (BMM&CA), Bureau of Water Protection and Land Reuse (BWPLR), and the Office of Planning and Program Development (OPPD).

DATA SUMMARY, VALIDATION, AND ASSESSMENT

**Table B-5
MSW Data Reports Submitted to CT DEP**

Form Name	Submitter	Frequency	Main Data Contained
Annual Municipal Recycling Report Form (submitted to joint program OPPD/BMM&CA)	Municipalities	Annual (due August 31)	<ul style="list-style-type: none"> ■ Residential tons of recyclables recycled from residential facilities, names of receiving facilities ■ Quantities recycled from non-residential sources, and receiving facility names ■ Specific efforts to promote home composting and grasscycling (yes/no questions) ■ Education/enforcement activities and events ■ Recycling violations reported to municipality by RRFs/solid waste (SW) facilities ■ Pay as You Throw (PAYT) program ■ Registered haulers, and their contact info ■ Disposal sites (for MSW, bulky, and special wastes) and amounts disposed
RRF Operational Report (submitted to joint program OPPD/BMM&CA)	CT RRF Facilities	Quarterly (or monthly depending on permit)	<ul style="list-style-type: none"> ■ Tons CT waste received ■ Tons out-of-state waste received ■ Tons and destination of ash produced ■ Tons and destination of bypass waste sent out ■ Tons regulated wood fuel received ■ Tons coal burned (Mid-CT RRF) ■ Tons lime used ■ KWH produced (gross and net) ■ Tons metal recovered (before and after combustion) ■ Tons other material recovered before combustion ■ Tons separated non-ash residue disposed elsewhere ■ Pounds steam produced ■ Destination of all materials exiting facility ■ Authorized special waste tons received

DATA SUMMARY, VALIDATION, AND ASSESSMENT

**Table B-5
MSW Data Reports Submitted to CT DEP**

Form Name	Submitter	Frequency	Main Data Contained
RRF SW Detailed Tonnage Report (joint program OPPD/ BMM&CA)	CT RRF Facilities	Quarterly (April 30, July 31, Oct 31, Jan 31)	<ul style="list-style-type: none"> ■ CT contract tons delivered by source (e.g., town or regional multi-town facility of origin) ■ CT spot tons delivered by source (e.g., town or regional multi-town facility of origin) ■ Out-of-state tons delivered by source (e.g. state or regional multi-town facility of origin) ■ Type of waste (MSW, bulky, authorized special waste, processed demolition wood) ■ All data is monthly
Landfill Solid Waste Tonnage Report (joint program OPPD/ BMM&CA)	CT Landfills	Quarterly (April 30, July 31, Oct 31, Jan 31)	<ul style="list-style-type: none"> ■ Tons of waste received, by type (MSW, bulky, special, or ash), by town (for CT waste), by state (for out-of-state waste) or by regional multi-town solid waste facility of origin; ■ Type of special waste ■ All data by month
CT Solid Waste Transfer Station Report (joint program OPPD/ BMM&CA)	CT Solid Waste Transfer Stations	Quarterly (April 10, July 10, Oct 10, Jan 10)	<ul style="list-style-type: none"> ■ Type of waste (MSW, bulky, special, recyclables), received by town (if from CT) or by state (if from out-of-state) of origin ■ Tons of waste (MSW, bulky, special, or recyclables) transferred to disposal or recycling or other type of facility, and name of facility receiving waste ■ All data by month
VRF – C&D Waste/SW Facilities (joint program OPPD/ BMM&CA)	VRF Facilities	Quarterly (April 10, July 10, Oct 10, Jan 10)	<ul style="list-style-type: none"> ■ C&D tons delivered by waste type (e.g., scrap metal, non-treated lumber, clean wood, clean fill, C&D wastes, demolition wastes, mixed wastes, etc.) by state or regional multi-town facility of origin ■ Tons MSW recyclables received and processed by type (if permitted to process MSW recyclables) by town or regional multi-town facility of origin ■ Tons and end destination (disposal or recycling) of materials by type (e.g., clean wood, treated wood, scrap metal, etc.)

DATA SUMMARY, VALIDATION, AND ASSESSMENT

**Table B-5
MSW Data Reports Submitted to CT DEP**

Form Name	Submitter	Frequency	Main Data Contained
Recycling Transfer Station Form (joint program OPPD/ BMM&CA)	Recycling Transfer Stations	Quarterly April 10, July 10, Oct 10, Jan 10	<ul style="list-style-type: none"> ■ Tons recyclables received by material type (can be commingled containers/mixed paper) by residential/non-residential, and mixed (residential and non-res.) by town or multi-town solid waste facility of origin. ■ Tons transferred to processing facilities/end markets by material type ■ Tons MSW, bulky waste, special waste, received by town or facility of origin, by month. (if permitted to also transfer solid waste) ■ Tons solid waste transferred and name/location of disposal or other facility receiving waste (if permitted to also transfer solid waste) ■ All data is monthly
Recycling/SW Facility Reporting Form (joint program OPPD/ BMM&CA)	All IPC's and Recycling Facilities	Quarterly (April 30, July 31, Oct 31, Jan 31)	<ul style="list-style-type: none"> ■ Total tons of recyclables received, by material (or commingled containers and mixed paper), from each municipality or multi-town regional SW facility ■ Tons of residue disposed, and disposal site ■ End markets and tons of each commodity recycled
Recycling/SW Facilities Receiving Only Leaves/Yard Waste and Clean Wood (joint program OPPD/ BMM&CA)	All facilities that process yard waste or clean wood only	Quarterly (April 30, July 31, Oct 31, Jan 31)	<ul style="list-style-type: none"> ■ Tons of leaves, grass, brush, mixed yard waste and clean wood (including stumps and land clearing) received, by town or multi-town regional facility of origin (by month) ■ Destination of material shipped by month, by category of end product
Scrap Metal Processor Report (joint program OPPD/ BMM&CA)	Scrap metal dealers	Annually (Calendar Year due by March 31)	<ul style="list-style-type: none"> ■ Tons of scrap metal received, by month, by municipality or State agency (or other political subdivision) of origin (does not request scrap metal quantities by non-municipal generators).
HHW/ CESQG Report (OPPD)	HHW facilities, paint and stain facilities, and one-day event sponsors	Semi-Annual (permanent HHW) Annual – One-day events Quarterly – Paint and stain	<ul style="list-style-type: none"> ■ Participation numbers by town; ■ CESQG's, name and type/quantity of waste delivered ■ Destination manifests, containing waste categories, unit of measure, amounts, destination, and final disposition of material (e.g., Incineration, TSDF, treatment, etc.)

**Table B-5
MSW Data Reports Submitted to CT DEP**

Form Name	Submitter	Frequency	Main Data Contained
Sewage Sludge Reporting – Monthly Operating Report (submitted to BWPLR)	Waste Water Treatment Plant	Monthly to annual, depending on size of facility.	<ul style="list-style-type: none"> ■ Amount of sludge generated and where sludge is disposed

In addition, the CT DEP OPPD receives annual newsprint user reports from newspaper publishers and printers reporting the amount of newsprint used and the amount of recycled fiber contained in that newsprint and annual directory publisher reports reporting amount of recycled directory paper used and the tonnage and percent of directories retrieved for recycling. These reports are not part of the recycling database, but are managed by the CT DEP.

State agency reports are also submitted annually to the CT DEP OPPD (FY data due on October 1st), indicating types and quantities, if known of material recycled during the previous fiscal year. This is to ensure that State agencies are still complying with recycling mandates. These data are thought to be relatively accurate from buildings where State agencies manage the building directly or hire a contractor to manage the building. CT DEP reports that offices that are in leased office space are less likely to be in compliance with recycling regulations.

If solid waste goes directly from a generator to a non-reporting destination (i.e. out-of-state facility, end-user, etc.), the CT DEP does not receive this data unless a municipality solicits this information and includes it in their annual municipal recycling report. Most municipalities do not collect this data.

CGS Section 22a-208(e) requires that if a municipality or hauler delivers specific recyclables to a recycling facility which is not located in Connecticut, that municipality or collector must notify the CT DEP of the name and address of the owner or operator of such facility and is required to ensure, by contract, that the out-of-state facility has notice of and complies with the reporting requirements to the CT DEP. The CT DEP indicates that this reporting is not taking place.

There is, however, no similar statute for MSW or other solid waste (i.e. C&D waste, special waste, etc.) going to out-of-state facilities. If a municipality has a contract with a hauler taking MSW or other solid waste out-of-state, this will sometimes be indicated on the annual municipal recycling report or quarterly municipal transfer station reports, and the CT DEP will include that data in the calculation of solid waste disposal figures. However, MSW generated by commercial entities may be hauled directly out-of-state without record. In an attempt to capture this data, the CT DEP proposed legislation requiring haulers transporting waste directly out-of-state (without going through a permitted CT solid waste facility) to submit a report to the CT DEP. This legislation was not passed, however.

Figure B-5 shows the type of solid waste or recycling reports the CT DEP receives. This table does not include State Agency annual recycling reports nor does it include the newsprint users and directory publishers reports. Much of this data (except sewage sludge generators,

universal waste, and HHW vendor site reports) is managed by one full-time staff member in the Office of Planning and Program Development and a part-time assistant in the Bureau of Materials Management and Compliance Assurance.

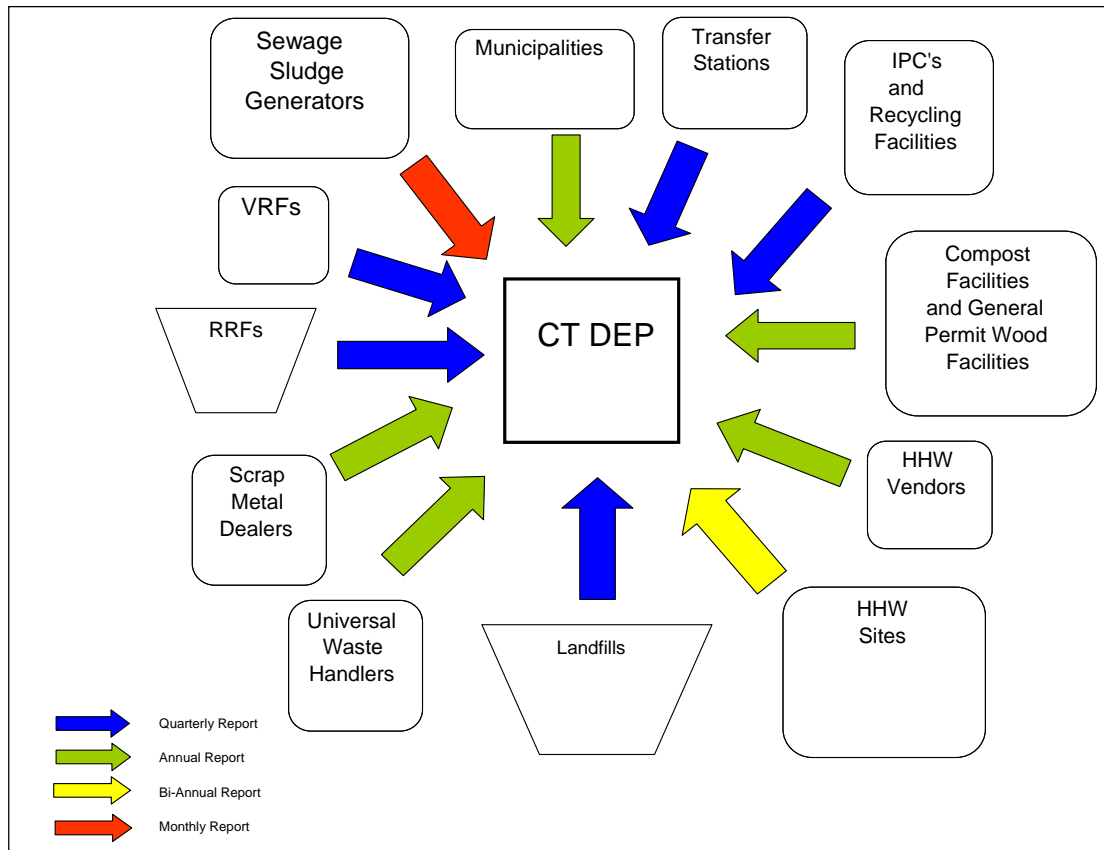
Data Calculations

The CTDEP's program of solid waste data collection and calculation is guided by Connecticut statutes. Connecticut Statutes Chapter 446d, Section 22a-220(f) stipulate that "It shall be the goal to recycle 25 percent of the solid waste generated in each municipality provided it shall be the goal to reduce the weight of such waste by January 1, 2000, by an additional fifteen per cent [sic] by source reduction as determined by reference to the State solid waste management plan established in 1991, or by recycling such additional percentage of waste generated, or both." This effectively puts the combined recycling and source reduction goal at 40 percent.

The CT DEP's methods for developing standard reports are described below. In addition, the CT DEP generates more targeted solid waste or recycling reports in response to requests for information received from other government agencies, from business and industry, and from the general public. The standard calculations have included:

- MSW generated, disposed, recycled; total tons and tons per capita statewide and town-by-town;
- MSW items recycled; tons and tons per capita statewide and town-by-town;
- comparison of MSW recycling rates (percent and per capita) by material type for towns as compared to other towns of similar population size.
- home composting and grasscycling estimates - tons statewide and town-by-town;
- town specific per capita recycling rates compared year-to-year for five year periods;
- percentage of Connecticut MSW disposed at RRFs, disposed at landfills, disposed out-of-state, recycled, home composted/grasscycled;
- MSW imported into Connecticut from other states and disposed in Connecticut;
- C&D waste/ bulky waste disposed in Connecticut; transferred to out-of-state disposal facilities by Connecticut C&D VRFs and Connecticut transfer stations; recovered for reuse or recycling (do not get data on clean fill) by C&D VRFs or municipalities;
- special waste disposed in Connecticut disposal facilities or transferred out-of-state by Connecticut transfer stations, VRFs, RRFs, etc; and
- RRF operation reports include solid waste burned, energy recovered, ash residue tonnage and destination, by-pass waste tonnage and destination; etc.

Figure B-5
Type of CT Solid Waste Facilities and Municipalities Reporting to the CT DEP



Waste streams that are not considered MSW are not tracked as closely, because of gaps in data reporting requirements. It has been the practice of the CT DEP solid waste and recycling data management program to use Connecticut Department of Public Health population estimates to develop per capita estimates for MSW generated, disposed and recycled. Calculations of per capita MSW projections use the U.S. census population projections for Connecticut. Table B-6 summarizes the statewide figures for FY2005 estimated from actual FY2003 and FY2004 data and uses U.S. census population projections for Connecticut for July 1, 2004. The CT DEP has been collecting MSW recycling and disposal data since FY1992. FY2005 has been used in this section because it is the baseline year for assumptions made in the Solid Waste Management Plan.

For FY2005, the CT DEP-reported data yields an MSW recycling rate of 24.2 percent. Adding estimates for home composting and grasscycling and supplemental recycling, the rate of diversion from disposal is 30 percent.

**Table B-6
MSW Estimates for FY 2005 Based on FY2003 and FY2004 Reports Submitted to the CT DEP and Additional Sources**

	Tons per Year (numbers are rounded)	Tons Per Capita per Year ⁽¹⁾	Pounds Per Capita per Year	Pounds Per Capita per Day
MSW Disposed	2,671,000	0.766	1,533	4.20
CT DEP MSW Recycled (based on CT solid waste facility and municipal recycling reports)	844,000	0.242	484	1.33
MSW Home Composted/Grasscycled ⁽²⁾	51,000	0.015	30	0.08
Supplemental Recycling ⁽³⁾	238,000	0.068	137	0.37
Total MSW Generation ⁽⁴⁾	3,805,000	1.09	2,183	6.0
Total MSW Recycling ⁽⁵⁾	1,133,000	0.325	650	1.8

(1) Connecticut Population Estimate July 1, 2004: From U.S. Census Bureau Projections 3,485,593

(2) Estimated based on FY2003 municipal efforts to promote home composting and grasscycling

(3) Estimated - Includes Bottle Bill materials and some commercial recycling; Source: CRRRA 2000 report *Impact of Source Reduction and Recycling in Connecticut*

(4) To project future residential and commercial generation, R.W. Beck developed a regression analysis based on Connecticut's population, to project residential generation, and the Gross State Product, to project commercial/industrial MSW generation. The output of this regression analysis is, therefore, expected to account for changes in waste generation due to fluctuations in population as well as changes in economic growth. Connecticut population projection was based on the U.S. Bureau of the Census's "Population Projections: States 1995-2025". The 1998 estimate of non-reported recyclables and the FY2003 estimate of tonnage home composted and grasscycled were projected to FY2005 at the rate of 1.6% annually - and that tonnage was added the generated tonnage to get the total projected tonnage generated for FY2005.

(5) Includes CT DEP Recycling, Source Reduction, and Supplemental Recycling

Data Sources: FY2003 and FY2004 reported data from CT DEP; additional recycling estimates from Franklin and Associates; Estimates for FY2005 by R.W. Beck

Data Verification

MSW Disposal

Before reports are run, the CT DEP looks for data outliers to screen potential data problems, such as extreme increases or decreases in waste disposed. In addition, the CT DEP looks for potential double-counting of materials, and cases of reports that do not agree with each other, as well as other checks and balances. Examples include:

- Verifying that amount reported sent by individual transfer station to disposal facilities is equal to the amount the disposal facilities reported receiving from those transfer stations;
- Verifying that the tonnage reported in the RRF quarterly reports equals the amount reported in their operational report for totals, Connecticut and out-of-state;
- Checking the last page of the municipal recycling reports for the disposal tonnages to capture material that may be going out-of-state but not reported on transfer station reports;
- Comparing town disposal tonnages to their tonnages last year and to their averages over the past five years;

- Calling out-of-state disposal facilities known to be, or that have historically been, accepting MSW generated in Connecticut; this is based on the Office of Congressional Research Service annual report of “*Interstate Shipment of Municipal Solid Waste*” and the Northeast Waste Management Officials’ Association (NEWMOA) annual study of import and export of MSW between NEMOA member states;
- Checking Connecticut border towns to find out who hauls in their towns and call to find additional exported waste;
- Calculating the amount of material disposed in the Mid-Connecticut system (Hartford landfill, Mid-CT RRF) from Connecticut towns. This includes accounting for:
 - bypass waste, process residue, non-processibles, and
 - metals recovered pre-combustion, and
 - material recovered as pre-combustion metal but not actually recycled (i.e., some residue comes back to the RRF as result of processing the pre-combustion metal).

The CT DEP calculates a per capita MSW disposal rate for the state overall, as well as for each municipality. This calculation is accurate to the extent that MSW data collected is complete. This calculation does not address C&D waste.

In addition to Connecticut MSW disposed at Connecticut RRF’s and landfills and Connecticut MSW transferred out-of-state by Connecticut transfer stations and by-passed to out-of-state facilities from Connecticut resource recovery facilities, the calculated state overall MSW disposal rate also takes into account MSW disposed out-of-state by Connecticut recycling facilities and VRF’s. The CT DEP tries to eliminate as much double counting as possible.

If per capita disposal rates are significantly inconsistent with the previous year’s calculations, either at the state or municipal level, the numbers receive additional scrutiny.

MSW Recycling

Historically the recycling rate in Connecticut has been calculated only for MSW; the CT DEP has not attempted to calculate a percent recycled for special or bulky waste since complete data for the amount of bulky and special waste generated is not reported. When calculating the MSW recycling rate, the CT DEP does not include metal recovered post-combustion from RRF ash because ash is not part of the MSW stream. Based on FY2004 data submitted to the CT DEP, 9.5 percent of MSW RRF ash residue was recovered as scrap metal (i.e., post-combustion scrap metal recycled). This does not include the amount of ash residue generated at the MidCT RRF or the metal recovered from the MidCT MSW before it was burned at MidCT RRF.

Checks and balances that the CT DEP conducts in calculating the recycling rate include:

- Analyzing tonnages that may be double counted because they went from one Connecticut recycling facility to another and the receiving facility reported material as coming from a town instead of another recycling facility or from a transfer station; i.e., multi-town recycling transfer stations and VRF tons marketed, as well as recycling facility tons marketed;
- Ensuring that residue tons reported are due to processing of MSW recyclables, not due to processing C&D materials at a VRF. Residue due to processing MSW recyclables are subtracted, as appropriate, when calculating state recycling rates;
- Checking towns with very high (>35) percent or very low (<15) percent recycling rates;

- Checking town rates that are twenty percent higher or lower than the town rates in previous years;
- Comparing current municipal recycling reports with the reports from the previous year to identify any obvious changes to material types or tonnage and calling towns where significant differences occur; and
- Comparing amounts of recyclables towns reported sending to processing facilities with the amounts those facilities report receiving from those towns.

In calculating recycling rates, the CT DEP:

- Calculates **statewide** recycling rates based on tons of MSW reported recycled on the annual municipal recycling reports and on tons of bottles, cans, and paper reported marketed by Connecticut recycling facilities (Before FY2002 all recycling data was obtained from the annual municipal reports). From FY2002 on, municipal data was used for obtaining recycling data for other materials (other than bottles, cans, and paper) and for bottles, cans, and paper reported sent to non-reporting destinations (i.e. out-of-state recycling facilities, directly to end markets such as paper mills, etc.);
- Calculated **town-by-town** recycling rates based on tons of MSW reported recycled on the annual municipal recycling reports;
- Calculates **statewide and town-by-town** disposal tonnages based on the MSW reported received, buried, burned, or transferred by CT landfills, resource recovery facilities and transfer stations. Corrections are estimated for municipalities for which MSW disposal numbers appear inaccurate, either under-reported or over-reported.

MSW generation is calculated in the following manner:

Tons Generated = Tons Disposed + Tons Recycled (including organics composted)

In the past, the CT DEP did not count home composting and grasscycling as part of the generation rate since, in some circles (i.e. U.S. EPA), this waste is considered source reduction because it never reached the waste stream.

MSW recycling rate is calculated in the following manner:

Percent Recycled = (Tons Recycled+ Tons Composted) /Tons Generated

In addition, the CT DEP calculates additional bulky waste recycling tonnages based on information contained in the annual municipal recycling reports. For this Plan, the CT DEP also attempted to calculate C&D waste disposal and recycling tonnages, to the extent they are available, from C&D VRFs and Connecticut DOT reports. However, this information does not represent complete data on C&D waste recycling /reuse and disposal and it is therefore difficult to calculate the correct denominator (tons of C&D generated) for the reasons described above.

Principles of Data Management Systems

The following assessment of the CT DEP's management of solid waste data is based on general principles of effective and accurate data management. These principles are presented below and then discussed in relation to the current CT DEP data management program. A good solid waste data management system will incorporate the following seven guiding characteristics or principles. A robust data management system should provide data which is:

- complete,

- accurate,
- consistent with the institutions vision and goals,
- systematic,
- accessible and usable,
- cost-effective for data supplier and data users, and
- secure.

Each of these principles is examined below.

Complete

The CT DEP's current data collection system does not appear to provide complete data. Examples of data which is not collected include:

- Materials collected and recycled under the Bottle Bill;
- Lead acid storage batteries collected and recycled through Connecticut's deposit system;
- Commercial recyclables processed out-of-state or at non-permitted Connecticut solid waste facilities, such as:
 - Materials recovered and handled by a broker and/or sent directly to an end market without first passing through a permitted Connecticut solid waste facility;
 - Waste oil not recovered through municipal transfer stations or recycling facilities; and
 - Materials, such as OCC, which are back-hauled from retail chains and warehouse-type stores to out-of-state regional distribution centers or warehouses for baling and recycling.
- Data pertaining to ash generation and disposal from the six sludge incineration facilities;
- Commercially generated scrap metal which is recycled;
- Solid waste which is direct hauled out-of-state for disposal; and
- Materials from facilities which are required to report are incompletely or inaccurately reported.

In addition, the CT DEP's data management systems have limitations (e.g., the PAMS, a CT DEP system for tracking permits, only allows up to five types of recyclables to be entered; PAMS system doesn't interact with the solid waste database which tracks solid waste tonnages processed through solid waste facilities).

Recommendations for Gathering more Complete Data

First, the CT DEP should make a careful assessment of what data is important, even critical, to its mission of tracking solid waste management in the state. Not all data needs to be collected and analyzed.

Following are some suggestions for capturing certain types of data, if the CT DEP deems this data important to its mission.

- For Bottle Bill Materials: Obtain statewide sales data for beverages, estimate tons of containers sold in-state, apply a known return rate such as Massachusetts' 69 percent, and use this ratio to average weights to obtain an estimate of various bottle bill materials.

- OCC Backhauls: Survey some warehouse-type stores regarding their OCC management practices and obtain information pertaining to any other recyclables they recover that are not currently reported. Figures could be extrapolated to other stores based on sales figures or number of employees.
- Estimate lead acid storage battery recycling tonnages based on national figures.

In addition to or in lieu of the above suggestions, consider the following actions:

- De-emphasize the importance of capturing *all* recycling data, and instead focus on per capita disposal rates. The CT DEP might track municipal recycling, in order to monitor relative progress and assess program effectiveness, but not “chase” exact recycling percentages. Instead, the CT DEP could focus on total tons of disposed MSW, and disposed MSW per capita, as these figures are generally more easily obtained and tracked. Several states (e.g., North Carolina and California) have decided in recent years to track per capita MSW disposed and develop disposed waste reduction goals, rather than recycling goals, as they believe that some specific recycling figures will never be known.
- Conduct a waste characterization study to better understand the composition and size of the disposed MSW and C&D/bulky waste streams. Such a study might also help to identify materials that could be added to existing recycling programs, as well as identify recycling programs that might benefit from supplemental education and outreach, or incentives.
- Increase the CT DEP staff responsible for data management.
- Educate and remind permittees of their responsibilities for submitting solid waste management data to the CT DEP and increase enforcement of reporting requirements.
- Streamline reporting forms to make them more user-friendly.
- Work with other Connecticut agencies and CT DEP bureaus to ensure that all information they receive pertinent to solid waste management is shared.
- Ensure that there are sufficient data elements in the PAMS database for all requested data. For example, if a facility processes 11 types of materials, ensure that there are at least 11 fields available.
- Consider making it mandatory for haulers to report all waste direct-hauled from the point of generation for disposal or recycling out-of-state or to a non-reporting destination in Connecticut without first passing through a Connecticut permitted solid waste facility. Although haulers are already required to report specific recyclables hauled directly out-of-state to the CT DEP pursuant to CGS 22a-208e(c), this reporting is not happening.

Accurate

The more accurate data is, the more useful it is. The CT DEP staff spends a considerable amount of time cross-checking data to ensure that there is no double counting, and to avoid other potential errors. However, inaccuracies in the data still arise for various reasons. Sometimes data are inaccurate because respondents do not have their material weighed or are asked to provide data they are not collecting. This results in estimates of varying degrees of accuracy. For example, the CT DEP asks for yard waste tonnages, but it is often collected in terms of cubic yards. Using conversion factors introduces some level of inaccuracy but is not a major cause for concern. A conversion factor is built into the solid waste database to convert yard waste cubic yards to tonnage; in addition, there are 19 other conversion factors built into the database for other items as well.

Another cause of inaccuracy includes confusion about the legal definition of bulky waste in Connecticut which is not consistent with the definition used by many municipalities and other states. This causes facilities to provide inaccurate data, and leads to entire loads being reclassified to another waste type upon entry into another state. Also, because construction and demolition debris are currently managed together, for the most part, along with bulky (i.e. “oversized”) MSW, the CT DEP does not have specific data pertaining to the tons of C&D waste, or oversized MSW, or clean wood. Still another cause of inaccuracy is the failure of some facilities and some haulers to provide accurate information regarding the city or town of origin of solid waste or recyclables delivered to Connecticut MSW solid waste disposal, transfer, or recycling facilities.

In a very few cases, a facility owner or operator or a hauler may believe that the data requested from the CT DEP is proprietary and may not wish to divulge where materials are being sent or the origin of the waste received at the facility, regardless of reporting requirements.

Recommendations for Gathering More Accurate Data

Following are opportunities to address data inaccuracy:

- Continue to cross-check data where necessary.
- Provide some additional, more comprehensive, easy-to-understand conversion factors for certain waste streams. For example, use standard container sizes used for the waste stream, and provide a factor for various levels of compaction/moisture, etc.
- Develop clear definitions and consistent terminology for waste types, such as for C&D waste, oversized MSW, and land clearing debris that are more consistent with municipal and surrounding states’ definitions, and are in line with management strategies for those waste streams.
- Develop and publicize policies for protecting proprietary information.

Consistent with the CT DEP’s Solid Waste Management Vision and Goals

The CT DEP’s Solid Waste Management Plan targets reducing the waste stream by 58 percent. However, as described above, there are many “holes” in the data required to calculate progress toward the stated target. As the CT DEP develops and/or revises its solid waste management goals, it should revisit the data it is seeking and the means of collecting that data. Tying data directly to the goals and objectives of the Solid Waste Management Plan makes them more logical to those providing the data.

Recommendations for Gathering More Accurate Data that is More Consistent with the CT DEP Vision and Goals

- Ensure that the key data required to measure progress towards identified goals and objectives are gathered in a manner consistent with the data system principles stated above.
- Ensure that key data required for strategic planning and implementation are gathered and available as needed.
- Relax data reporting in cases where the data do not directly relate to the State’s vision and goals. Simply adding new data requirements or data-gathering activities will unnecessarily consume resources.

Systematic

A data management system should be systematic. This means that the data should be collected and stored in an orderly and logical fashion. The CT DEP's current database systems have evolved in a patchwork fashion over many years, resulting in an overall disjointed system. Anomalies of the current system include:

- The PAMS system (which tracks information related to permitting) does not interface with the solid waste/recycling database, so the staff entering solid waste/recycling data does not have up-to-date data pertaining to the active permitted facilities they should expect to hear from.
- In the PAMS system, general permit facilities' recyclables and individual permit facilities' recyclables are not assigned the same abbreviations for materials that can be disposed or processed at these facilities.
- Terminology is confusing. Some facilities categorized as recycling facilities are actually transfer stations; recycling facilities, IPC's, C&D VRFs, all have volume reduction facility permits.

Recommendations for Making the Data System More Systematic

- Develop one integrated database among all the CT DEP bureaus, or at least ensure they are integrated. The database developer should ensure that all bureaus are involved in the database development and that their needs are recognized. Managing one database would probably also be more cost-effective than managing separate, non-integrated databases.
- Develop consistent nomenclature and definitions for facilities, facility types, waste stream types, and so on, among the CT DEP's bureaus. This will not only simplify the database, but should help the bureaus within the CT DEP work together more effectively.
- Develop and document system protocol. When data is entered, calculations are made, or reports are run, there should be protocol for indicating where in the process the user is, and in what stage of completion the database is.
- Automate cross-checking to a greater extent, if possible. This will remove an element of subjectivity and ensure a greater degree of quality control;
- Periodically review the system. The data management system should be reviewed every two or three years to ensure that it continues to meet the needs of all data providers and data consumers.
- Broaden use of data system. A more robust data system will be increasingly attractive to both the CT DEP employees and the general public.

Accessible, User-Friendly, and Useful

Data should be readily accessible to all those who need to use it. All solid waste data should reside in an integrated system, as described above. Currently, the data in the CT DEP's solid waste division is in two databases: (1) the solid waste database, which is in Access, tracks the tonnages and destinations of solid waste (including recyclables) passing through Connecticut-permitted solid waste facilities and recycling as reported by the municipalities and calculates MSW recycling, disposal, and generation data for the State and for individual municipalities, and (2) the CT DEP's permitting database, called PAMS, which is in Oracle. The focus of the PAMS system is to track permitting. The PAMS system and the solid waste database are not integrated. Furthermore, the permitting and enforcement staff do not have direct access to the solid waste database.

According to the CT DEP's MIS Manager, the Department is working toward developing an integrated system that will eventually be shared by all Agency programs, such that each facility will have a common identification number. The program, called FIS (for facility identifiers), will be supported by Sequel, and will eventually take the place of the Unix-based PAMS, and integrate land, air, and water permits.

Recommendations for Making Data More Accessible, User-Friendly, and Useful

- Provide adequate hardware and software support. Currently some key CT DEP waste permitting, enforcement, and recycling staff cannot directly access the solid waste database because of hardware incompatibility.
- Implement user-friendly interfaces. Both CT DEP staff and those stakeholders entering data online should have user-friendly interfaces that are simple, clear, and not too detailed, but provide the user with the opportunity to click for more information, if needed.
- Develop consistent nomenclature. A user-friendly system will allow all users to employ the same terminology and acronyms.
- Increase staff and resources to develop the system and keep it current.
- Consider broadening availability of some data/information. The CT DEP might post some of the results of their annual analysis online, so that citizens, businesses, municipalities, and solid waste management authorities can track the State's progress toward its solid waste management goals. The CT DEP might also consider posting municipal or regional results. Results should be easily digested (graphic, when possible) and indicate where, relative to the goal, the municipality or region falls. Comparison could also be made against other regions or municipalities with similar characteristics.

Cost-Effective for Data Providers and Users

The current data system(s) do not appear to be efficient for data users because the systems are not integrated, and do not use the same terminology. In addition, the current system is not automated. All data are input manually, and several queries, calculations, and manual cross-checks are necessary to verify data. In some instances, the CT DEP is asking for the exact same information and checking it against different forms, sometimes from the same reporting entity, and sometimes from a different reporting entity. The CT DEP must determine which cross-checking and multiple reporting of the same data is necessary.

Recommendations for Making the Data System More Cost-Effective for Data Providers and Users

- Develop one integrated database.
- Work with facilities and municipalities to understand which data elements are difficult to report. The CT DEP and the reporting entities should seek a mutually agreeable system for reporting and publishing data. For example, recycling and disposal facilities currently must submit the same data in separate reports to both the CT DEP and to the municipalities. It might be possible to develop a single report that would satisfy the needs of both parties.
- Consider having quarterly reports due at staggered times, so that data could be entered on an ongoing basis.
- Develop an online database so that municipalities and solid waste management facilities can enter data online. This should save both those who report data and those that enter

and publish data significant amounts of time. It is likely that such a system would have to be online, linked to the CT DEP's system, so that facilities and municipalities do not have to purchase special software.

- Streamline the data reporting process, such that:
 - To the extent possible, data is gathered from the fewest data providers. In CT, these would include obtaining some data from the recycling facilities, RRFs, and landfills, for example, rather than getting the same data from the municipalities.
 - Identify and, where possible, eliminate, duplicative reporting. Currently, some data is provided twice for cross-checking purposes. In many cases, it may be possible to eliminate this duplication.
 - Consider having recycling facilities and landfill and resource recovery facilities submit their reports to the CT DEP only, and have the CT DEP add the data to the annual reports submitted by the municipalities, eliminating the facilities' reporting to the municipalities.
 - Consider having municipalities submit only data pertaining to materials that are NOT received by in-state IPC's, recycling facilities, and disposal facilities, as that data is already captured.
 - Consider having quarterly reports submitted in different months, such that the CT DEP staff can update databases on a rolling basis. Almost all data is reported on a monthly basis, but is submitted on a quarterly basis. Rotating the months that these reports are due would provide the CT DEP with an opportunity to keep up database entry more effectively.
 - Consider collecting in-depth data on a less frequent basis, perhaps every three to five years, and basic, necessary data on an annual basis. This would streamline efforts for both providers of data, and those in-putting and analyzing data. Alternatively, the CT DEP could focus on one topic each year, asking in-depth information pertaining to a particular goal, and more basic information absolutely necessary to measure the achievement of goals.

Secure

It is important that data be secure so that potentially proprietary information is not compromised. Currently all data in the CT DEP systems is password protected, and there are various levels of password protection for different database-user types. Data is backed up on tape on a nightly basis using a Legato system, and stored off-site at a nearby warehouse on a weekly basis.

Recommendations for Improving the Security of the CT DEP Data System

- Continue to ensure all data is password protected.
- Ensure only authorized users can change certain fields. This is of particular importance if the CT DEP develops an integrated database.
- Continue to backup data daily.
- Continue to store backups off-site at least weekly.
- Develop a protocol to protect proprietary information.