

# **Solid Waste Assessments:**

## ***A Model for Local Government Recycling and Waste Reduction***

### **Overview**

The California Integrated Waste Management Act (AB 939, Sher, Chapter 1095, Statutes of 1989 as amended [IWMA]) requires California jurisdictions to reduce their solid waste disposal by 50 percent.

While many communities were able to achieve the 25 percent mandated reduction in disposal by 1995, many are finding it difficult to reach the mandated 50 percent or surpass that rate.

Even the most casual of overviews of the average community's waste generation sources will reveal that the majority of generated waste comes from the commercial, institutional, and industrial sectors. Therefore, waste reduction planners will need to focus their attention on these sources. A vital first step in this process is conducting waste assessments at the source.

A waste assessment can be defined as the collection and evaluation of accurate information on the types and quantities of waste generated or brought to the site under investigation. This data is critical for any decision-making relating to actions that could be implemented to reduce waste disposal.

### **Program Characteristics**

Waste assessments may vary in content depending upon the definition of waste. While we may be concerned here primarily with solid wastes and their potential for source reduction, reuse, or recycling, other kinds of waste such as water, energy, and air emissions may be very relevant to the assessed source. Additionally, concern for reducing toxic or otherwise hazardous elements will have positive consequences on all of the above. Solid waste assessments then become a vital part of an overall environmental assessment.

### ***Incentives and Disincentives***

The waste assessment must be seen as useful and desirable by the organization considering the assessment. Following is a list of incentives for

businesses taken from the "Waste Audit Reference Manual" of the New York Department of Environmental Conservation:

- Improved company morale—working together fosters a teamwork atmosphere.
- Reduced operating cost—savings in disposal and raw material costs reduce overall operating costs.
- Improved worker safety—reduced toxics improves the environment and decreases personnel protection costs.
- Reduced compliance costs—waste reduction may limit regulatory exposure and eliminate or reduce the need for permits, manifesting, monitoring, etc.
- Increased productivity—more efficient use of raw materials and improved processes.
- Increased environmental protection—reduction in waste and reduced future liability costs.
- Continuous improvement—waste reduction is a part of a total quality management program.
- Enhance consumer acceptance—positive view of "green" products.
- Higher product quality—increased process control may result in improved quality.

The same manual listed some obstacles to waste reduction:

- Capital requirements—project may be deemed too costly to implement.
- Specifications—materials that could be reduced or replaced may be specified in existing contracts.
- Regulatory issues—new or modified permits may be required.
- Product quality—waste reduction projects may have a negative impact on product quality.

- Customer acceptance—perception of product quality may be damaged.
- Available time and technical expertise—staff time and/or expertise may be lacking.
- Inertia—company resistance to change. The “If it ain’t broke, don’t fix it” attitude may prevail.

### ***Categories of Assessment Sources***

Various classes of waste generators may be subjects of waste assessments. Local government planners should be informed about these and be prepared to exercise a form of “triage” to prioritize proactive outreach efforts for maximum results.

These types of generators include:

- Unit industrial sites—in most instances, these will be the largest point source generators of waste in a community. Their waste loads and processes will tend to be unique and not readily replicable within that community. But even modest successes in waste reduction will have significant impact on landfill diversion. Moreover, large companies can be very forceful in securing changes by vendors who service them. These vendor changes can then have a multiplier effect for other businesses as well.

For example: New United Motors (auto assembly) in Fremont, Calif., is moving toward zero one-way packaging from its vendors requiring that products be delivered in reusable, returnable containers.

Baxter Healthcare (health products) in Riverside, Calif., also now requires its vendors to deliver products in reusable plastic crates.

- Independent unit commercial sites—a single department store, an independent supermarket, a commercial office building, and a private hospital are all examples of unit commercial sites. Although these facilities will tend to generate less waste than industrial and manufacturing sites, the completed assessment will probably have relevance for similar units in the community.
- Chain unit commercial sites—supermarkets such as Safeway and Albertson’s, discount chain stores such as Home Depot, Target, Costco, Office Depot, etc., are examples of chain units. While these units lend themselves to site-specific assessments, policies and

processes are often determined at the corporate level with little room for independent action at the local level. With this initial awareness, a local assessment can be a useful vehicle for recommending changes at the corporate level.

- Unit and multiunit institutional sites—government offices, hospitals and clinics, libraries, museums, schools (or school districts), colleges, and universities are all examples of institutional sites. Public agencies at all levels (that is, federal, State, county, and city) commonly have some presence in most communities.

Local government planners sometimes neglect even those units of which they are a part. Often, a common barrier to change is the absence of cost savings in the unit budget, thereby eliminating a major incentive to heads of units.

Conversely, with high level administrative and political support, change may be possible throughout the system. Facilities of higher levels of government may have their own directives to perform assessments. Local government awareness of—and access to—these assessments can be useful planning instruments.

For example: Region 8 of the U.S. Environmental Protection Agency published on the EPA Web site the results of a solid waste assessment carried out in 1998 ([www.epa.gov/unix0008/p2action/swaudit.html](http://www.epa.gov/unix0008/p2action/swaudit.html)). This report and others like it can be most useful to local planners as a potentially replicable document.

- Mixed-use multiple unit sites—the most common examples of these are shopping malls, business corridors, and business parks. Their concentration in a given geographic area makes them good candidates for cooperative or coordinated efforts yielding economies of scale.

However, these may be offset by diversity of waste, logistical limitations, and diverse business interests and goals. Some of these areas are characterized by a single management company that may facilitate or

inhibit project development depending on the willingness of the management to take action.

For example: the City of Oakland, Calif., using the services of a temporary intern on staff, carried out a study of recycling and waste reduction in a downtown office corridor from 8th Street west to Grand Avenue, and from Martin Luther King Jr. Way south to Lakeshore Avenue and Oak Street. A targeted sample of 64 commercial office buildings was used.

The surveys produced valuable base data. Successful recycling programs were identified, and relationships were established with building managers. Other links were developed with the building owners and managers association as well as with custodial staffs. Demand for technical services and follow-up work were stimulated.

- Construction, renovation, and demolition projects—this category is fundamentally different from the others in a number of ways:
  - Generation of waste in large quantities in a concentrated period.
  - Given the limited project life, waste reduction efforts must be mounted at a specific time or the opportunity is lost forever.
  - Making changes may be severely hampered by time and money constraints.
  - Demolition and renovation projects, if the facilities are old enough, may be heavily contaminated with such items as asbestos and lead-based paints.
  - Construction projects must be impacted early in the planning stages or contracts may already bar useful waste reduction activities.

### ***The Assessment Team***

A successful assessment must be thorough, timely, and competent. Even if an assessment does not result in significant waste reduction, a competent assessment will identify the reasons and point the way to what must occur for reduction to take place. Proper staffing of an assessment team is critical to its success. With local government waste reduction planners spearheading outreach to stimulate waste generators to engage in assessments, it will be useful to have technical

experts available to assist as necessary. Ideally, a team should consist of:

- A site representative with clear management support and status with co-workers.
- A technical expert, as appropriate, in the business or institution being assessed.
- Outside experts for the various elements under assessment; for example, solid waste, energy, water, etc.
- Outside expert for reuse and recycling materials and material marketing.
- Ad hoc support staff as needed from unit subdivisions, facility management, custodial services, finance and records, etc. These should include both supervisory and line personnel.

On its Web site at [www.ciwmb.ca.gov/Bizwaste/](http://www.ciwmb.ca.gov/Bizwaste/) the CIWMB provides tips for businesses on developing skills to conduct waste assessments. Team members should be skilled at questioning, listening, observing (probing), writing, taking pictures, organizing material, analyzing, and presenting.

### ***Conducting the Waste Assessment***

Conducting an assessment is a process that can be broken down into six distinct phases.

1. **Review of records.** During initial discussions it is important to determine what solid waste records are kept available for review. This includes purchasing data for mass balance inputs and waste disposal information. Types of materials, labor, costs, and disposal costs should be included. The records should be reviewed and documented before any tour of the facility or facilities.
2. **Tour of facility.** The purpose of the tour is to document current practices and to note and describe relevant facility layout. Particular emphasis is placed on materials flow, equipment access, storage, and receiving and loading capability. The Florida Department of Environmental Protection offers six tour report sections:
  - a) Basic information including name, address, number of employees, shifts, and a brief physical description of the facility.

- b) Names and contact numbers for all personnel who will be involved in the assessment process.
- c) Identification and description of processes or operations that produce a waste stream.
- d) Mass balances.
- e) Simple flow diagrams.
- f) Supporting documentation.
- g) [Author's addition] Material handling equipment list.

3. **Organize and evaluate the material collected.** This is a group effort and should be initiated in informal brainstorming to elicit as many ideas from as many sources as possible. In order to structure these sessions to some degree, the Florida document suggests the following considerations:

- Can the process be eliminated?
- Can the process be substituted?
- Can input material be substituted?
- Can the process generate less waste?
- Can the process materials be reused in the process?
- Can the process material be reused in another process?
- Will waste segregation make the material reusable or recyclable?
- Can maintenance and housekeeping be improved?
- Can operational procedures or scheduling be improved?
- Can equipment layout be improved?

All the resulting input should be documented and organized for further evaluation.

- 4. **Feasibility, cost, and environmental benefits.** Examine all options developed in terms of technical and economic feasibility. For those that pass muster, any additional benefits such as safety and environmental factors should be noted.
- 5. **Presentation for decision and implementation.** All feasible options should be

presented to management and documented with recommendations for implementation, including scheduled timelines. The implementation schedule should include responsible personnel, any up-front costs, and a plan for monitoring and evaluation.

- 6. **Protocol for ongoing assessment.** Where appropriate, a protocol should accompany the recommendations. This protocol should include monitoring and evaluation for the introduction of any new processes, equipment, material, and product as it occurs.

### *Legislative or Regulatory Options*

In pursuit of a proactive and result-oriented program of commercial, industrial, and institutional waste reduction assessments, local government programmers should give consideration to ordinances, permit, or contract regulations as vehicles for ensuring that assessments are conducted. These techniques have already been adopted in many different locations. Several examples are noted below.

- City of Los Angeles—for construction and/or demolition contract let by the city, the contractor is obligated to submit a solid waste resources management plan after the contract is approved but before work commences. The plan is to include:
  1. Contractor and project identification information.
  2. Procedures to be used.
  3. Materials to be reused and recycled.
  4. Estimated quantities of materials.
  5. Names and locations of reuse and recycling facilities/sites.
- City of Riverside—a significant local action was taken by the city in modifying its street rehabilitation project bids to include language that “. . . contractors shall primarily use the residue produced from the grinding operations or the crushing of removed asphalt pavement, as long as the material complies with the specifications and that the graduation requirements shall meet those specified in section 200-2. . .” as identified in the Standard Specifications for Public Works Construction Book, 1988 edition.

- City of Atherton—added Chapter 15.52 to the city’s municipal code, entitled, “Recycling and diversion of debris from construction and demolition.” The code now requires that “As a condition precedent to the issuance of any permit for a building or demolition permit that involves the production of solid waste destined to be delivered to a landfill, . . .” a contractor must post a bond of not less than \$5,000 and must subsequently show a plan and document results that at least 50 percent of the material has been diverted from landfill. Penalties are assessed for lesser diversion or total noncompliance.
- City of Berkeley—for all construction and demolition projects generating more than 20 cubic yards of refuse and recyclables, a contractor must file a “construction and demolition plan” indicating the reuse or recycling of at least 50 percent of the total generated or indicate why this cannot be done. The solid waste management division reviews and signs off on the plan before the permit is issued.
- City of Portland, Ore.—requires that, for any building and/or demolition project that exceeds \$25,000 in cost, the contractor must complete a “pre-construction recycling plan form” when applying for a permit, indicating that the following material would be recycled:
  1. Rubble (concrete/asphalt)
  2. Land clearing debris
  3. Corrugated cardboard
  4. Metals
  5. Wood
  6. Other (specify)

A report must be filed at the completion of the job documenting the above. Failing to comply is subject to a penalty of up to \$500.

- Alameda County Waste Management Authority—has prepared a draft model ordinance for use by its member cities that will basically require a 50 percent diversion of construction and/or demolition materials for any project greater than a given threshold. It calls for a security deposit and allows for loss of all or part of the deposit upon failure to

achieve the diversion unless it is determined that a good faith effort was made to comply without success.

## Case Studies

### *StopWa\$te Partnership*

The StopWa\$te Partnership of the Alameda County Waste Management Authority (ACWMA) and Recycling Board are examples of strong ongoing programs that use waste assessments with growing effectiveness and comprehensiveness. The partnership decided to focus on businesses and institutions because they generate approximately two-thirds of disposed waste in Alameda County.

**Background.** The ACWMA is a joint powers agency comprised of the following agencies:

- Alameda County
- Alameda
- Albany
- Berkeley
- Dublin
- Emeryville
- Fremont
- Hayward
- Livermore
- Newark
- Oakland
- Piedmont
- Pleasanton
- San Leandro
- Union City
- Castro Valley Sanitary District
- Ora Loma Sanitary District

The authority operates in conjunction with the Alameda County Source Reduction and Recycling Board that was created through the Measure D ballot initiative passed in 1990. The eleven-member board is comprised of six experts in the waste prevention field appointed by the county board of supervisors and five elected public officials appointed by the ACWMA.

The recycling board is funded by a surcharge on tonnage disposed at the Altamont and Vasco Road landfills, which were expected to generate \$7.9 million during FY 1999–2000. Half of annual revenues are passed through to the member cities for their waste reduction programs.

The ACWMA is funded by a \$1.50-per-ton surcharge at Alameda County landfills and mitigation fees of \$4.52 and \$4.53 per ton for waste imported from the City and County of San Francisco and other locations outside of Alameda County. Together with other miscellaneous income, revenues of \$7.5 million were anticipated for FY 1999–2000.

This is an indication that excellent resource use and conservation programs can be implemented and maintained by excellent staffing where there is an adequate support base.

### ***Award Recognition***

The excellence of this agency has been recognized many times. Of special note, the agency was the recipient of the Stopwaste Materials Efficiency Award issued by the California Resource Recovery Association in 1997 for the “most comprehensive public education and recycling program” in California. In 1998, the Recycling Board was awarded the Grand Prize Award of Excellence from the California Association of Local Economic Development.

### ***The StopWa\$te Partnership***

Formally, the comprehensive environmental assessment program is a part of the agency’s business and public agency services. It has been described as a free non-regulatory technical assistance initiative. According to the StopWas\$te budget mission statement, the partnership “Provides comprehensive environmental performance assessment and improvement services focusing on source reduction, recycling, energy and water conservation, wastewater discharge reduction, and efficient use of materials. Services are generally targeted to companies and institutions in Alameda County with over 75 employees.”

In order to provide this technical assistance, agency staff has teamed with such organizations as PG&E, East Bay Municipal Utilities District, Science Applications International Corporation

(SAIC), and the Economic Development Alliance for Business.

Team skills include years of experience with operations in many types of businesses, as well as expertise in environmental issues of solid waste, energy, air, and water quality.

### ***Costs and Benefits***

Total costs for the StopWa\$te Partnership in FY 1998–99 was \$648,800 and FY 1999–2000 is budgeted at \$702,308, an increase of 8 percent.

- FY 1998–99 accomplishments:
  - Added 15 new clients to the partnership.
  - Developed framework for Web-based technology transfer component.
  - Instituted measurement and tracking protocols.
  - Diverted an estimated 12,000 tons of material.
  - Developed first eight case studies for Web distribution.
  - Conducted needs assessment for a wood chips exchange.
- FY 1999–2000 objectives:
  - Divert an additional 10,000 tons of solid waste from landfill disposal.
  - Operationalize a Web-based subscription service for clients, to include: best practices database, local case studies, benchmarking data, and self-assessment tools.
  - Market the StopWa\$te Materials Efficiency Awards on an ongoing basis and receive minimum of five source reduction proposals.

At the end of the budget item report, the following set of assumptions was included to indicate the reality that any agency’s plans must rely, to some extent, on the participation of others:

- Target businesses and institutions will participate in the program.
- Target businesses and institutions will implement cost-effective recommendations.

- Team members such as PG&E, EBMUD, SAIC, and LLNL (Lawrence Livermore National Laboratory) will continue to participate in the program.
- Existing markets for recovered materials allow for the estimated diversion to occur.
- New technology can be incorporated into our existing infrastructure.

### ***Passaic County, New Jersey***

**Background.** In April of 1987, the State of New Jersey passed the New Jersey Mandatory Source Separation and Recycling Act. The act required each district or county and municipality to develop a comprehensive plan for reduction of solid waste to meet a reduction goal of 25 percent.

These plans call for all New Jersey businesses and institutions to establish recycling programs. Subsequent to the implementation of this act, Passaic County increased its commitment to waste reduction in 1991 calling for a 60 percent reduction by 1995. This increase in waste reduction was in fact achieved by 1993.

The county aggressively encourages businesses to develop comprehensive waste management programs citing potential economic benefits, including:

- Cost avoidance.
- Cost savings.
- Sale revenues.

Citing “skyrocketing solid waste disposal costs,” the county indicates that its landfill disposal tipping fee is at \$109 per ton. The county encourages businesses to consider the following materials for recycling:

- Newspaper.
- Corrugated cardboard.
- High-grade office paper.
- Mixed paper (magazines, junk mail and unsoiled scrap).
- Glass food and beverage containers.
- Tin and bi-metal cans.
- Ferrous and non-ferrous scrap.
- Plastic (containers and film).

- Tires.
- Automotive batteries.
- Used motor oil.
- C&D debris (for example, concrete, asphalt, brick, block, wood pallets, and used lumber).
- Yard waste (leaves, brush, and grass).
- Food waste (restaurant and tavern).

The county recommends that each business perform—or have performed for it—an evaluation (waste assessment) as a first step. The assessment should have the following elements:

- Appoint one person as a recycling coordinator.
- Determine how waste is presently collected, noting collection costs and how they are factored.
- Determine the equipment used to handle solid waste.
- Calculate the amount of solid waste and recyclables generated.
- Evaluate any existing recycling activities.
- Review any existing local ordinances for compliance.
- Make use of equipment and program options made available by recycling associations; county, State, and federal recycling offices; and private recycling companies.
- Check for and evaluate potential participation in existing municipal collection, drop-off, and/or commercial buyback center options.
- Consider partnering with neighboring businesses, especially if located in a mall, office complex, or industrial park.
- Set up a tracking and monitoring system prior to implementation.
- Consider both source reduction and buying recycled-content products as part of the assessment.

### **Local Government Challenges and Opportunities**

Local governments need to develop procedures to incorporate the waste reduction assessment into a part of a normal way of doing business in their

community. These procedures should apply to both construction and demolition projects as well as to regular ongoing business activity.

Local agencies should avail themselves of technical assistance and waste assessment services presently offered by outside agencies such as the CIWMB.

Efforts should be made to partner with other local governments in formal (joint power authorities) or informal groups to achieve economies of scale and shared burden of cost for staffing and carrying out waste reduction assessments.

Efforts should be made to partner with private and nonprofit entities, especially businesses and business associations, to integrate waste assessments into regular business practices.

Databases developed locally and databases of other agencies and locations should be integrated to be of practical use to businesses and institutions in the local community.

### **Tips for Replication**

- Access the CIWMB Web site to familiarize your community with technical services available. Use this as a jumping-off point for exploring other sites for available educational materials and training manuals for carrying out waste reduction assessments.
- Form alliances with relevant agencies concerned with energy, water quality, air quality, and hazardous material mitigation to develop a more comprehensive environmental assessment service that may be more attractive to local businesses and institutions. San Francisco State University, San Diego State University, and the University of Nevada-Reno offer free energy, waste reduction, and productivity assessments under a grant from the U.S. Department of Energy. Contact the Industry Assessment Center at any of the three institutions for more information.

### **References**

#### ***CIWMB Publications***

Many CIWMB publications are available on the Board's Web site at:

[www.ciwmb.ca.gov/Publications/](http://www.ciwmb.ca.gov/Publications/).

To order hard copy publications, call 1-800-CA-Waste (California only) or (916) 341-6306, or write:

California Integrated Waste Management Board  
Public Affairs Office,  
Publications Clearinghouse (MS-6)  
1001 I Street  
P.O. Box 4025 (mailing address)  
Sacramento, CA 95812-4025

"Establishing a Waste Reduction Program at Work," CIWMB Publication #442-95-070.

"Reduce, Reuse, Recycle—It's Good Business: A Guide for California Businesses," CIWMB Publication #500-94-004.

#### ***Other Publications***

"Rethink Your Bottom Line—It Pays to Reduce," Alameda County.

"Waste Prevention Pays Off—Companies Cut Waste in the Workplace," U.S. EPA 530-K-92-005.

"Office Paper Recycling Guide," National Office Paper Recycling Project.

#### ***Web sites***

[www.ciwmb.ca.gov](http://www.ciwmb.ca.gov)

[www.stopwaste.org](http://www.stopwaste.org)

[www.epa.gov/epaoswer/non-hw/reduce/wstewise/index.htm](http://www.epa.gov/epaoswer/non-hw/reduce/wstewise/index.htm)

<http://es.epa.gov/new/business/sbdc/sbdc.htm>

[www.boma.org](http://www.boma.org)

[www.recycledproducts.org](http://www.recycledproducts.org)

[www.epa.gov/epr](http://www.epa.gov/epr)

[www.choose2reuse.org](http://www.choose2reuse.org)

[www.recycleday.com/](http://www.recycleday.com/)

[www.earthday.net](http://www.earthday.net)

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