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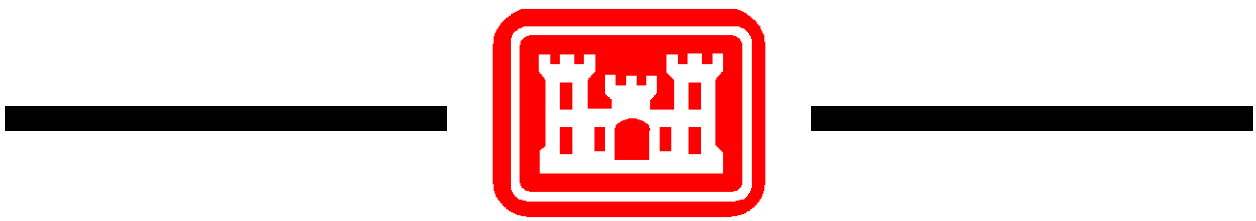
31 DECEMBER 2009

EFFICIENT SOLID WASTE COLLECTION



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EFFICIENT SOLID WASTE COLLECTION

1. Purpose.

a. The purpose of this Public Works Technical Bulletin (PWTB) is to describe current Army solid waste collection and disposal practices. Because private contractors largely provide solid waste services, this PWTB presents alternative (performance-based and resource management) contracting concepts that are designed to save money and promote waste reduction.

b. All PWTBs are available electronically (in Adobe® Acrobat® portable document format [PDF]) through the World Wide Web (WWW) at the National Institute of Building Sciences' Whole Building Design Guide web page, which is accessible through URL:

http://www.wbdg.org/ccb/browse_cat.php?o=31&c=215

2. Applicability. This PWTB applies to all U.S. Army facilities engineering activities within the United States.

3. References.

a. Army Regulation (AR) 200-1, "Environmental Protection and Enhancement," 28 August 2007.

b. AR 420-49, "Utility Services," 28 April 1997.

c. Installation Management Command, IMCOM Strategic Sourcing Municipal Services (MS) Team Commodity Strategy Executive Summary, R. Robinson, IMCOM-West, 17 May 2007 briefing.

d. Duffy, D. P., Maximizing Collection Efficiencies Imperative for the Reduction of Overall Solid Waste Management Costs, *MSW Management*, September/October 2006.

4. Discussion.

a. AR 200-1 provides solid waste management guidance and requires compliance with Federal, state, and local permits and regulations. Additional primary guidance is in AR 420-49, chapter 3. This guidance emphasizes integrated solid waste management, which combines careful planning, minimizing waste generation, reuse, and recycling with compliant disposal practices. Emphasis is on integrated solid waste management, pollution prevention, minimization of solid waste generation and disposal and maximizing recovery, recycling and reuse through pollution prevention actions that ensure that waste accumulation, storage, and transfer facilities are designed and constructed to prevent release to the environment. Additional legal requirements are also mentioned.

b. Every Army installations should have an implemented Integrated Solid Waste Management Plan (ISWMP). This comprehensive planning document should describe the generation, collection, disposal, regulatory compliance, and steps to reduce all types of solid wastes. Common waste categories include: municipal solid waste (MSW), construction and demolition (C&D) debris, hazardous waste, green materials (yard clippings, brush, trees, etc.), medical waste, and other special waste. Army installations are subject to all applicable Federal, Army, state, and local regulations relevant to solid waste collection.

c. This PWTB also presents information on performance-based contracting, a process encouraged by Federal Acquisition Regulations and the Army. This process is contrasted with prescribed approaches often used currently.

d. Resource management, an innovative approach designed to cost-effectively encourage recycling and minimize disposal costs, is also discussed. Disposal and recycling contractors are encouraged by making them partners in these operations and setting the stage by structuring the contract so as to share financially from incentives.

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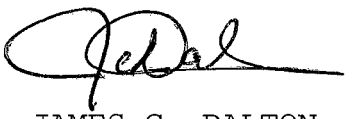

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Appendix A

Efficient Solid Waste Collection at Army Installations

The U.S. Army is a large producer and disposer of waste. In Fiscal Year 2007 (FY07) the Army generated the following volumes of waste:

- 958,809 tons of municipal solid waste (MSW) at Army installations
- 1,851,637 tons of construction and demolition (C&D) waste
- 11,140 tons of yard waste
- 1,287 tons of waste metals.

The Army recycled 354,653 tons of MSW, 1,461,907 tons of C&D waste, and all yard waste. The Army disposed of 604,155 tons of MSW and 389,730 tons of C&D waste.

The Army's costs for refuse/recycle services were $63 million using FY05 data. Army disposal costs are a function of:

- Competition among haulers
- Competition among landfills
- Hauling distance
- Tipping fees and whether they are paid by the ton or the cubic yard
- Local monopoly whether by landfill or hauler and the requirements of the contract.

Current Army Status

An installation's solid waste program has many components. They include refuse, recycling, yard waste, hazardous waste, C&D waste, closed landfill monitoring, and others. All Army installations use contracts for solid waste collection. The collection contracts vary widely. Some bases have multiple or separate contracts for areas such as the cantonment, industrial activities or waste, medical activities and waste, or special waste or activities.

Contracts also differ between geographical areas. For example, Fort Belvoir, VA, is a metropolitan area with many surrounding municipalities while Fort Irwin, CA, is more remote with limited neighbors and hauler choice and landfill access.

The Army's Residential Communities Initiative (RCI) has passed the responsibility for solid waste disposal to the partner so it is not the responsibility of the installation Directorate of Public Works (DPW).

Landfill Business

The Army is nearly out of the landfill business; only a few are left. There are, however, some C&D and inert waste landfills on installations. Some installations also use transfer stations (Figure A-1).

Figure A-1. Transfer station.

Waste transfer stations are facilities where municipal solid waste is unloaded from collection vehicles and reloaded onto larger long-distance transport vehicles for shipment to landfills or other treatment or disposal facilities. No long-term storage of waste occurs at a transfer station; waste is quickly consolidated, loaded, and moved off site, usually in a matter of hours. By combining the loads of several individual waste collection trucks into a single shipment, installations can save money on the labor and operating costs of transporting the waste to a distant disposal site. They can also reduce the total number of vehicular trips traveling to and from the disposal site. Although waste transfer stations help reduce the impacts of trucks traveling to and from the disposal site, they can cause an increase in traffic in the immediate areas where they are located. If not properly sited, designed, and operated, waste transfer stations can cause problems for nearby residents. An ideal location for a transfer station would have the following characteristics:

- It would be remote from residential development, schools, etc.

- It would be close to a gate so that the long haul trucks travel only a short distance on the installation

- It would be located close to a truck scale (or have a scale incorporated into its design)

- It would have access to water and electricity.

Many installations have installed full-service operations that provide public waste and recyclables drop-off accommodations on the same site as their transfer stations. A materials recovery facility (MRF) is a type of transfer station that separates, processes, and consolidates recyclable materials for shipment to one or more recovery facilities rather than a landfill or other disposal site. The transfer station’s primary function is to reduce costs of transporting waste to disposal facilities.

Current MSW landfills are highly regulated. Regulatory compliance deals with many regulations, laws, permits, etc. at several levels, e.g., local, state, and Federal. Operation and maintenance (O&M) is complex and many commercial operations operate extensive hours to achieve acceptable economics. In the landfill business, the philosophy is "Time is Money" and, to that end, owners want to keep trucks hauling waste to the landfill as much as possible.

Under the Installation Management Command (IMCOM), there has been a move toward performance-based contracting (PBC) and consideration has been given to possible centralization or regionalization of contracts. The positive side of PBC is its potential to yield cost savings and standardization of service. The negative side of PBC is its lack of quick response and limiting of local control. Additionally, the installation might lose recycling revenues generated under the Qualified Recycling program (QRP). In general, local control is preferred. PBC is discussed in more detail later in this appendix.

Cost Drivers Impacting Collection and Recycling

Equipment entails 20 to 40 percent of the owning and operating cost for a landfill business. IMCOM, in a 2007 report, found that disposal (transfer/tipping) accounted for 40 percent of the cost drivers, and that labor costs accounted for 20 percent (Figure A-2). For recycle collection and processing, labor increases accounted for 30 percent of the cost drivers, while processing/transfer station fees and transportation accounted for 28 percent (Figure A-3).

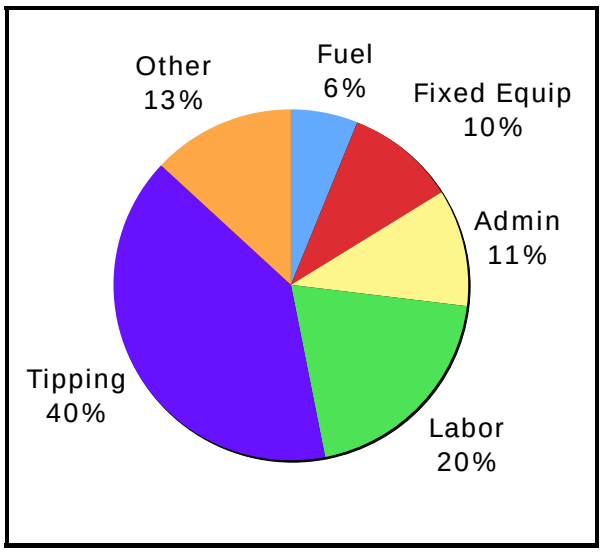

Figure A-2. Refuse collection and disposal cost driver percentages (source: IMCOM 2007).

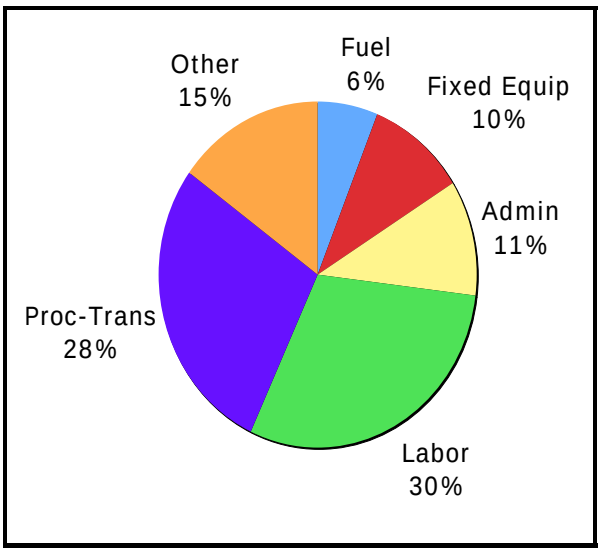

Figure A-3. Recycle collection and processing cost driver percentages (source: IMCOM 2007).

Cost drivers impacting collection and recycle disposal can include:

- frequency of pickup
- volume of pickup
- type of collection system (automation).

Cost drivers impacting transfer stations include: O&M

Cost drivers impacting landfill or incinerators include:

- Disposal (volume-based tipping fee)
- O&M (if on-site).

Cost drivers impacting recycling operations include:

- frequency of pickup
- volume of pickup
- type of collection system (automation)
- O&M.

Opportunities for Cost Savings

Reducing labor and fees represents the greatest savings in refuse/recycle operations. Collection costs account for 50 to 70% of a solid waste budget and carry the most opportunity for cost savings (Duffy 2006). Collection costs can be lowered through economies of scale and reducing frequencies of pickup.

Opportunities to reduce costs for refuse collection include reducing frequencies of collection by using larger containers and raising the level of truck automation. Transportation opportunities include reducing the frequency by using larger containers and standardizing equipment, implementing tire management and warranty programs for the fleet, and evaluating the efficiency of collection routing. Because labor and fuel costs are the majority of collection costs, increasing container size will result in fewer trips to empty them, which will lower overall cost, given the same quantity of waste generated.

A cost-saving opportunity related to transfer stations includes an evaluation of costs to compare internal management with outsourcing. If a landfill or incinerator is on-site, evaluate costs to manage internally compared to outsourcing. For an on-site recycling center, costs should be evaluated internally to compare to outsourcing. If off-site, evaluate the cost of having an on-site qualified recycling center and operation.

Frequency of pickup varies greatly between installations. Some installations schedule pickup in a performance-based manner, while others specify the number of times to have waste collected with different types of buildings receiving different levels of service. For example, restaurants may receive daily pickups at one installation and weekly at another. Army hospitals were found to receive pickup service from 1 to 5 times per week as was housing. Office/educational facilities, laboratories, and warehouses also varied between 1 and 5 times per week. In summary, frequency of pickup varies greatly among installation building types. There is not a frequency of collection standard for any particular classification of building. Frequencies can vary at each building and installation as populations and container size fluctuate.

For an installation that uses smaller front-load containers (2, 3, and 4 cubic yard), moving to larger container sizes and dumping them less frequently will certainly yield a cost savings. In general, doing this could save 15-20% (Monte Davison Inland Service Corporation).

Using a commodity profile approach with PBC provided several possible opportunities:

- Standardize collection specifications across installations, i.e., performance-based with minimum frequencies.
- Reduce collection frequencies through better management of container use.
- Work closely with contractors to better understand the most efficient ways to collect refuse and cut costs.
- Larger containers provide a lower cost per cubic yard. Coordinate with contractors to determine the optimal container size to reduce collection costs.
- Consider implementing performance-based collection (empty when half full), which can further reduce collection costs.
- Allow flexibility in contracts for collection frequencies to adjust for changing waste volumes.

Table A-1 shows two criteria that could be used in performance-based contracts. The metric for holding the line on waste management cost must be dollars per year, such that the contractor can receive some percentage incentive for lowering this cost. If the installation population is expected to change dramatically (e.g., through BRAC), the 12-month baseline cost mentioned here could be pro-rated on a per capita basis.

Table A-1. Possible performance-based waste management and recycling options.

Task	Standard	Method
Task 1 Reduce annual waste costs	Waste costs will not exceed the previous 12-month baseline thus the client will receive a reduction in annual waste expenditures	- Monthly waste bill - Review contractor prepared measurement reports - Periodic inspections to ensure compliance with baseline audit
Task 2 Increase recycling	To meet or exceed waste diversion MOM	Tonnage reported by QRP

Performance-based Contracting

The FAR define PBC as the "means structuring all aspects of an acquisition around the purpose of the work to be performed with the contract requirements set forth in clear, specific, and objective terms with measurable outcomes" as opposed to either the manner by which the work is to be performed or broad and imprecise statements of work.

For example, for basic trash collection, PBC criteria might include:

- Contractor must keep current with all reporting requirements.
- Contractor will initially place containers at the following locations.
- All containers must remain less than half full. (It is up to the contractor to determine how frequently to check and empty each container.)
- The area within a 15-ft radius of the container must be kept clear of trash.
- All trash collected must be taken to a permitted landfill. (The government can specify a specific landfill, or allow the contractor to decide.)

An example performance standard might be:

> Upon completion of this task, all records and reporting requirements . . . shall be complete; refuse containers shall be in-place, and less than one-half full; emptied containers and the area around each refuse container within a radius of 15 ft from the container shall be free of all refuse prior to the Contractor leaving the container site; and all removed refuse shall be transported to the landfill (except as described . . .).

Example PBC provisions could include:

> The Contractor may provide all trucks and waste containers. The contractor determines the type and number of containers to deploy, but the Contracts Officer (KO) must approve.

- The Government provides a list of customers and locations to serve.
- The Contractor must develop routes and schedules.

- The Contractor must develop a customer training plan.
- The Contractor is responsible for keeping hazardous materials out of the landfill.
- The Contractor must clean the waste containers periodically, either on-site or by hauling them to a sewered cleaning area. Food service and child care containers must be cleaned daily.
- The Contractor must police the ground within a 15-ft radius of dumpsters; 30-ft radius of roll-offs.

Contract components could include the following:

- General scope
- Background
- Hours of operation
- Federal holidays
- Wage determination
- Personnel
- Permits, taxes, licenses, ordinances, and regulations
- Inclement weather
- Rules of safety
- Definitions
- Government furnished property and services
- Contractor furnished items
- Specific tasks
- Services
- Contractor vehicles
- Unattended vehicles
- Special provisions:

  - Bulky items (sofas, refrigerators, etc.). Who is responsible for collection? Where should they be taken?

  - Placement of containers. (Are there any siting instructions for specific buildings?)

  - No entry. (There must be a delineation of boundaries where the contractor is allowed to operate.)

  - Uncollectable items. (What should the contractor do if something disallowed is put in the trash for disposal, e.g., hazardous materials or bulky items? Who to call?)

  - Damaged containers. (Who is responsible for maintaining containers?)

  - Cleaning of containers. (Who is responsible for cleaning trash containers? How often? Where should the cleaning occur?)

  - Spills (Who should the contractor notify in case of a spill?)

  - Special events. (Who will provide trash service at special events, such as a large festival? How many containers, etc.?)

  - Unscheduled collections. (If a container fills more quickly than usual and the contractor must make an unscheduled stop, who will notify the contractor? How will this be billed?)

  - Disposal. (List specific authorized disposal sites, or give criteria, such as state permits.)

- Reports:

  - Daily reports

  - Monthly reports

  - Weigh tickets.

- Installation route schedule

  - KO/Contracting Officer’s Representative (COR) reserves the right to change:
    - Number of containers
    - Number of locations.

Issues that may occur and impact on solid waste collection can include:

- Proper enforcement of legal waste
- Discipline of the user
- Inefficiency of placement of dumpsters
- Personal furniture being junked
- Illegally parked vehicles
- Inappropriate waste
- Waste outside of containers
- Dumpster management
  - Dumpster ownership
  - Cleaning and maintenance (on-site possible).

Special issues that may be applicable to an installation may include: mattresses, furniture, pulverized paper from classified documents, inclusion of composting, and green waste management. Inappropriate waste materials (Figures A-4 and A-5) may include military hardware, ammunition, Meals Ready to Eat (MREs), vehicle parts, and POL (Petroleum, Oils, and Lubricants). The contract must be clear on the responsibilities and actions required of the Contractor in relation to materials dumped inappropriately. It is essential to know and control what enters a landfill.

Figure A-4. Inappropriate waste including MREs.

Figure A-5. Ammunition found in landfill

Resource Management Contracting

Resource management (RM) contracting is an innovative partnership between a waste-generating organization and a contractor. RM contracting changes the nature of current disposal services to support waste minimization and recycling. Because compensation for hauling and disposal contracts is currently based on volume, collectors and landfill operators have an incentive to handle ever-increasing volumes of waste. Their customers, on the other hand, have an equal incentive to decrease waste volumes.

These conflicting motivations work to impede serious progress in waste prevention, recycling, and recovery. RM is an alternative in which the financial prize of effective source reduction and increased material recovery is shared between waste generators and the providers of recycling and waste collection services. As a PBC strategy, RM taps into the expertise of external contractors to bolster waste reduction and recycling through value-added services, such as improved reporting, dedicated customer service, and analysis. The key to success in RM contracting is changing the compensation structure to provide incentives for contractors and rewarding them for achieving mutually determined goals — shifting the contractors' profitability model from "haul/dispose more volume" to "minimize waste and manage resources better."

A resource management contract is based on three premises:

1. That there are significant cost-effective opportunities to reduce waste, boost recycling, and otherwise optimize services exist,
2. That contractors will pursue these opportunities when offered proper financial incentives, and
3. That financial incentives to contractors are supported by the savings generated through cost-effective improvements to the current waste/recycle system.

For example, if contractors identify cost-effective recycling markets for disposed materials or techniques for preventing waste altogether, they receive a portion of the savings resulting from the innovation. This arrangement enhances the recovery of readily recyclable materials while promoting opportunities to develop new markets for difficult-to-recover materials. As a result, RM promotes a business-driven effort- rather than regulatory initiatives to make waste reduction and pollution prevention a priority.

Resource management is all about structuring contracts with service providers to incorporate recycling activities into daily operations. The trick is that the contract does not just require recycling services, but it financially rewards increasing levels of diversion. The contractor's profitability becomes driven by waste prevention (rather than waste generation).

Solid waste and recycling contracts directly influence how the vast majority of waste streams are managed. Most waste and recycling contracts, however, feature a profit incentive to contractors to maximize disposal levels (hauls) and/or a limited scope of service with multiple contractors handling separate waste streams or recyclables. This fragmented approach often

lacks an emphasis on recycling and resource efficiency. Furthermore, waste and recycling contracts are often loosely managed. For these reasons, traditional contracts do not tend to support waste reduction efforts.

RM makes good business sense because it allows organizations to save money, while receiving better service and improving resource efficiency. RM contracting helps achieve a higher level of recycling and waste minimization. Although the degree of success in existing recycling minimization programs varies widely, even the most successful programs reach a plateau. Benefits of RM contracting include:

- Reduced cost and potential liabilities
- Increased quantities of materials currently being recycled
- Addition of new materials for recycling
- Increased waste minimization opportunities
- Improved data tracking and reporting

Most organizations believe they could improve current recycling operations and waste minimization if they had more resources. Using an external RM contractor to perform additional activities for which there are no internal resources helps overcome the problem. RM contractors bring expertise that is simply not found in traditional waste and recycling contracts.

Features of resource management

Changing the way contracts are structured offers a variety of improvements over traditional hauling and disposal agreements. Disposal contracts cover the trip from container to landfill, and most contractors are paid on a regular basis whether a container is full or near empty. RM brings the contractor’s involvement upstream to address internal activities that affect waste generation and resource efficiency opportunities. This might include working onsite with installation staff to optimize diversion activities or becoming more active in public outreach and education about recycling.

Traditional hauling and disposal contracts emphasize container, hauling, and disposal service, in which service is defined by the number of locations and scheduled pickups. RM contracts, however, concentrate on prevention and recycling services; hauling and disposal are only the last resort for material that

cannot be diverted from landfills. For waste streams of difficult-to-manage materials, RM can provide a direct incentive to research and help create new markets for materials that would otherwise end up in a landfill.

For comparison, Table A-2 lists features of traditional and resource management contracts. The key dynamic to RM contracting is that the customer and the contractor work together to derive profit from increased levels of diversion, i.e., that they form a strategic alliance.

RM contracts limit disposal compensation while providing opportunities for a contractor to profit from efficiency innovations. These incentives enhance recovery of readily recyclable materials while producing prevention opportunities or market development for difficult-to-manage materials such as paint sludge or solvents.

Table A-2. Features of traditional and resource management contracts.

Features	Tradition waste contracts	RM Contracts
Scope	- trash container maintenance - contractor responsibilities span from container to landfill disposal	- RM includes a broader range of upstream services: process design, material purchase, internal storage and handling, education
Incentive Structure	- payment to contractor based on quantity of waste hauled, or number of pickups - Recycling considered an add-on or afterthought - Contractor has incentive to maximize waste service and volume	- total waste service cost is capped - waste hauling and disposal cost is capped and restricted to a “cost recovery” basis to eliminate profit in waste - bonuses based on resource efficiency savings from baseline - Contractor has incentive to seek savings through efficiency and waste reduction
Customer-Contractor Relationship	- minimal collaboration	- strategic alliance to get value from waste reduction

Potential RM approaches

Emphasize that maximizing cost-effective diversion is a priority in the garbage and recycling collection bid documents. Army installation priorities should be stated up front.

Require separate bid prices for collection of garbage and recyclable materials. Although it may make sense to have these both done by the same provider, it provides transparency to aid in the evaluation of contractor bid prices.

Provide a financial incentive for recyclable tonnage collected over a specified quantity. A performance bonus could be paid to the contractor for each recyclable ton collected without increasing the overall costs of the contract. This would be accomplished by establishing a baseline price for current levels of recycling and paying a performance bonus for each ton of recycled material over the baseline recycling level. Savings on avoided landfill disposal fees and revenues received for recycled commodities (or some combination of the two) could finance the performance bonus. Alternatively, the installation could require bidders to submit both a fixed price bid for baseline services and a performance-based bid, at or below a maximum performance bonus level established by the Army installation.

Require collection contractors to achieve minimum recycling levels or to pay liquidated damages. To help ensure gains in recycling, minimum recycling levels could be increased over each year of the contract period. Compensation could be structured so that the contractor receives performance bonuses against a baseline as long as the minimum annual recycling level is achieved.

Summary

This PWTB has discussed a few elements of efficient solid waste collection:

1. The Army is a large producer and disposer of solid waste, creating, disposing, and recycling millions of tons of material in municipal solid waste; construction and demolition waste; and yard waste in addition to over 1200 tons of metals. Army costs were $63,000,000 in FY05 for refuse and recycle services. All installations use contracts for solid waste collection with some using multiple contracts for different wastes (MSW, medical, hazardous waste, etc.). Army disposal costs vary between installations for many reasons: competition between haulers, competition between landfills, hauling

distance, tipping fees, whether or not monopolies exist, with geography playing an important role (e.g., less competition at Fort Irwin, CA versus Fort Monroe, VA).

2. Opportunities for cost savings were presented. Possibilities include changing frequency of pickup, changing from smaller to larger container size, evaluation of on-site versus off-site costs for recycling centers or transfer stations, flexibility in contracts, and standardization of equipment. However, all of these facets have to be considered on a local basis as there may be specific reasons why a previous local choice was made (e.g., logistics, health, or safety).
3. Performance-based contracting is an acquisition mechanism that is encouraged by IMCOM and FAR to be used for solid waste collection. A brief summary presented elements to be included and differences between a performance-based type of contract and one that is more prescribed. Also presented were some of the problem wastes and collection concerns that may need to be addressed
4. Resource management contracting is another concept presented in this PWTB. It is an innovative partnership between a waste-generating organization (the installation) and a contractor. The contract changes the nature of the service away from disposal to more support of waste minimization and recycling with shared incentives between parties to promote waste reduction and pollution prevention. Benefits include reduced costs, increased waste minimization, and increased recycling. Basic philosophy and potential resource management approaches were presented and examples given of how to achieve goals.