Studies Define Solid Waste Stream at Base Camps

By Mr. Gary Gerdes

Base camp planning typically does not include a strategy for long-term management of nonhazardous solid waste, because this issue has low priority compared to other operational concerns. However, for camps that endure and evolve toward semipermanent status, solid waste quickly becomes a very large problem. Ideally, longer-term plans would put equipment and services in place when needed to handle the waste produced.

Solid Waste Studies

Before planners can identify ways to manage solid waste at base camps, they need to know the types and amounts of waste to be expected. Two studies completed by the United States Army Engineer Research and Development Center (ERDC) characterize, for the first time, the makeup of solid waste generated at military base camps. The findings are published in two ERDC technical reports and summarized in a public works technical bulletin (PWTB) issued by the United States Army Corps of Engineers.[1]

ERDC's Construction Engineering Research Laboratory (CERL) conducted the studies at two base camps in the Balkans. The sites included Camp A, which in 2003 had recently transitioned from contingency operations (CONOPS), and Camp B, which in 2006 had matured to semipermanent infrastructure capable of sustaining long-term missions. The research covered only nonhazardous solid waste such as plastic, light metal, paper and cardboard, scrap wood, sewage sludge, ashes, and miscellaneous trash.

Solid Waste Types

Results showed that the types of solid waste produced at the two camps were roughly similar. However, the amounts of specific waste types differed greatly. For example, much more plastic trash was found at the transitioning CONOPS site, Camp A, than at the more established Camp B. This was probably due to gradual replacement of single-serving bottled water with central distribution points for purified water at the older camp. The table on page 71 summarizes the waste produced at each camp. (Sites are not identified for operational security reasons.)

Plastic. The number of plastic bottles significantly decreased from 2003 at Camp A to 2006 at Camp B. This is likely due to efforts in the Balkan camps to provide bulk drinking water supplies to replace bottled water. However, the generation of "other plastic" significantly increased, possibly due to increased post exchange (PX) services on the base camps, which created an increase in disposal of plastic packaging.

Light Metal. The light metal increased in 2006 at Camp B, perhaps because of an increase in the disposal of metal cans by the dining facility, where fewer meals, ready-to-eat, were issued, and more canned drinks became available at the PX.

Paper and Cardboard. The amount of paper and cardboard generated per person almost tripled from the 2003 Camp A sorting to the 2006 Camp B sorting. The greatest increases were in paper. This may be due in part to a fully stocked PX and

Photograph courtesy U.S. Army Engineer Research and Development Center

To characterize the waste stream at both base camps, garbage was first sorted by category.

Results of Characterization Studies				
	2006 Data (Camp B)		2003 Data (Camp A)	
Component	lb/person/yr	Percent	lb/person/yr	Percent
Plastic bottles	196	3.0	295	5.1
Other plastic	502	7.6	143	2.5
Aluminum	46	0.7	10	0.2
Light metal	202	3.0	11	0.2
Cardboard (and paper)	529	8.0	349	6.1
Other paper	974	14.7	179	3.1
Food and vegetation waste	609	9.2	418	7.3
Textiles	95	1.4	25	0.4
Glass	37	0.6	40	0.7
Rubber	4	0.1	4	0.1
Polystyrene	21	0.3	9	0.2
Scrap wood	1076	16.2	4151	72.1
Sewage sludge	688	10.4	70	1.2
Ashes	811	12.2		0.0
Miscellaneous	838	12.6	52	0.9
Total	6627	100.0	5756	100.0

disposal of packaging. A high moisture content undoubtedly contributed to the high generation rate as well.

Scrap Wood. The amount of scrap wood showed a decrease of 75 percent in 2006 at Camp B compared to 2003 at Camp A, which might be attributed to two factors: Camp A in 2003 may have had more construction activities that created a large amount of construction debris; and it may have been more dependent on goods shipped from the United States, as opposed to the local economy, where goods were not palletized and arrived in smaller trucks.

Sewage Sludge. The huge increase in sludge generation cannot be explained. The sewage sludge reported in the 2003 Camp A survey was reported as dried solids. The moisture content of the sludge reported in the 2006 Camp B survey was not known, but was probably somewhat dry according to pictures in the report. It is possible that at the 2006 survey site, sewage sludge was collected from other base camps for disposal at the composting facility, thus raising the apparent generation rate.

Ashes. The results of the 2003 Camp A survey were based on the waste before incineration, because all wastes at Camp A were incinerated. The camp where the 2006 Camp B survey was done used an incinerator to dispose of items for security reasons, such as uniforms and documents. Since these items were always incinerated to ash, the ash was considered to be a component of generated waste. The materials that were incinerated were not included in other component fractions.

Miscellaneous. This category was significantly higher in the 2006 Camp B survey. Descriptions of the waste being sorted indicated that it was much wetter in 2006 than in 2003 at Camp A, making it more difficult to sort. It is also possible that the workers in 2003 were much more diligent at pulling apart compressed waste.

Conclusion

By understanding the types of solid waste produced under different circumstances, military base camp planners will be better able to develop strategies for its disposal. This information will enable proactive efforts to procure equipment and services to handle the waste in a timely fashion and ensure sustainable base camp operations.

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Endnote

[1] Public Works Technical Bulletin 200-1-51, "Solid Waste Generation Rates at Army Base Camps," 1 April 2008, *<http://www.wbdg.org/ccb/ARMYCOE/PWTB/pwtb_200_1_51.pdf>*.

References

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