

A NEW APPROACH TO CONDUCTING MSW COMPOSITION STUDIES

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Discussion by:

Carolyn S. Konheim
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The principal innovation appears to be the use of mechanical equipment which enabled the sample size to be increased by an order of magnitude, leading the authors to a higher degree of confidence in the representativeness of the sampling results. Curiously, in the literature search undertaken by the authors, they do not report on the five volume New York City Waste Composition Study, conducted in 1990–91. This comprehensive approach — designed to sample the residential waste based on nine different demographic characteristics, commercial waste by generator type, and representative institutions — had the benefit of not being constrained by the short turnaround time imposed on these authors, due to contractual demands on the client. In view of the time limitation, the large sample method used here helps to capture some of the variability in the waste stream. Given the greater demographic homogeneity of the suburban town under study compared to New York City, it is probable that the sample results could be projected to the entire town. However, the premise that is questionable is that one can account for the 20% contribution of commercial waste to the total waste stream by sampling on only one day of the work. The authors should explain how the one day was selected, since commercial waste varies considerably by day of week and very greatly by generator type. This aspect of the waste stream deserves special attention because the greater uniformity of commercial waste by type of generator produces a waste stream that offers disproportionately greater potential for the recovery of materials.

AUTHORS' REPLY

- (1) Unfortunately, in our search of published literature we did not find the New York City study reported by Ms. Konheim. We are sure that the New York City study would have assisted us in our project. Sometimes it is

difficult to find studies prepared for specific clients or municipalities if they are not reported at a technical meeting or published in a journal. We recommend that anyone who intends to undertake a waste composition study for a major urban area review the New York City report. We hope that Ms. Konheim will publish the results of the study at the NAWTEC Conference in 1997.

- (2) We could only collect commercial waste samples on Wednesday because there are no residential collections in the town on that day. The primary reason for only sampling commercial waste on Wednesday was that the town used alternate weeks to collect commingled containers and paper. On Wednesday, the collection trucks with recyclables went directly to the MRF and not the transfer station. Only trucks with commercial waste came to the transfer station. Although the trucks that collect commercial waste are not suppose to pick up residential waste, it has been known that some collection companies have at times combined routes to save money. Therefore, the only time that we could be assured of sampling only commercial waste was one day per week.

We agree that only one day per week of sampling commercial waste provided an insufficient sample; however, due to the time allowed, we could see no alternative.

Discussion by:

George Savage
CalRecovery, Inc.

This paper describes the methods employed for the conduct of a solid waste composition study and the results and conclusions of the study. A case is presented for the use of composite sort samples composed of several whole-vehicle loads of waste.

First, some preliminary general remarks are offered. A careful reading of the paper supplies further evidence, if any is still needed, of the importance of characterizing the raw material of the solid waste processing industry, i.e., solid waste. Characterization is an absolute necessity for the design

of successful processing facilities. A caveat is that the characterization must be representative, reliable, and accurate in order to be of value. The paper either describes or alludes to the expensive problems that can be rooted in a poorly laid foundation of knowledge about relevant waste characteristics. Lastly, waste composition is usually only one characteristic that is relevant. Material recovery facilities (MRFs) are mentioned in the paper; a relevant characteristic for MRFs (since many use screening systems) is component particle size distribution.

My specific remarks address two items in the paper. The argument for the use of composite whole-vehicle samples for waste composition determination is not convincing. The discussion of precision by the authors centered on a statistical analysis of data presented for the newspaper component. Unfortunately, the discussion by the authors of the precision of data analyzed in Britton (1972) was general, and did not compare data for the same component, i.e., newspaper (paper was the closest equivalent category he analyzed). The discussion and analysis of Britton's data omits the value used for the standard deviation; thus the reader cannot conclude which data were selected from Britton for analysis. As a separate check, I reviewed some waste composition results from several studies performed by CalRecovery. I found that in the case of the overall paper category, on the order of fifteen to twenty 200-lb samples are required to achieve an error $\leq 10\%$ at a 95% level of confidence (the author's test program accuracy criterion). Twenty 200-lb samples would correspond to 4,000 lb of waste required for sorting.

In closing, my perception from reading the acknowledgments is that adequate time and resources may not have been available to the investigators. If I am correct in my perception, it points out a problem that still exists in our industry: Even though waste characterization may be deemed important for system design, it remains difficult in most cases to obtain adequate funds and other resources for characterization — until after problems develop, of course.

AUTHORS' REPLY

(1) The primary reason for undertaking the study was not to establish a research study on the composition of MSW, but to demonstrate to the financial community and elected officials that there was sufficient recoverable materials left in the waste to make the project viable. After several meetings with bond underwriters and town officials, we could not convince them that a few 200 lb samples out of 800 tons would be representative. At the time of the study, the mixed waste MRF in the Town of Babylon, NY operated under private ownership and they had filed for Chapter 11. One of the reasons stated for the economic failure was that the operator claimed the waste he was receiving did not contain the amount of recyclables as stated in his design criteria.

We do not know how to address the ultimate question as to which method is most accurate unless someone undertakes a detailed study comparing both methods under controlled conditions.

(2) We agree with Mr. Savage that MSW composition studies are vital tools for both engineering design and economic evaluation of solid waste management facilities. However, they always appear to be left to the end and you have to fight to get the proper funding.

Discussion by:

Herb Hollander

Waste composition components have great precision, but there is no accounting for loss in moisture and dirt. Hollander's prior test indicated about 4% moisture loss. How does the sum of the components in this study equal 100% without accounting for the moisture loss?

AUTHORS' REPLY

We do not understand the exact nature of Mr. Hollander's question. If he wants to know about the moisture loss due to aerobic activities in the waste, then he did not understand the nature and purpose of the study. This was not a research study; this was an engineering design study to determine if there was sufficient recoverable materials in the waste. We were not concerned about aerobic moisture losses because the waste we were sampling was the same waste that the new MFR would be processing. All the data in Tables 1A, 1B, 2A, 2B, and 4 were reported on an "as received basis." We are sorry if the report was not clear on this issue. As far as dirt losses are concerned, the entire tipping floor and waste processing areas were broom swept every night and the material was added to container No. 3. One of the benefits of sampling 20-ton composites is that the loss of a small amount of material such as floor sweepings is insignificant.

An analysis of the moisture contents of the materials collected in containers 1 and 3 was done and this data is in the report. The moisture content of container 1 was important, since this material would be sent to a composting facility.

Discussion by:

Rob Dunnette

How much did the study cost?

AUTHORS' REPLY

The cost of the study was about \$60,000 for professional staff and the sorters involved in the project. This cost did not include the cost of using the MRF, which was not made available to us.

Discussion by:

Peter Waznys

Did you see a comparison between week #1 and week #2 in the paper?

What is the long term value of this data?

AUTHORS' REPLY

(1) We did not look at the variation between the two weeks of the study. We only looked at the combined data as a composite to try to increase the reliability of the data.

(2) This is a most interesting question on which we could discuss and argue for a long time. We believe the most important result of our study is not the sampling method or the accuracy of the method but that there were still sufficient recoverable materials in MSW even after an effective curbside recycling program. Should municipalities continue with curbside programs? Would mixed waste MRFs or bluebag programs be more economic for large urban areas? We believe that studies show that mixed waste or “dirty MRFs” are a viable component to integrated solid waste management and that their application should be considered as an alternative or in combination with curbside programs.