Cost Analysis for the monitoring of NiCd batteries in municipal solid waste – Summary

Study on behalf of Umweltbundesamt - carried out by ARGUS – Berlin, October 2004

It was the aim of the study to assess the sampling volume and the costs that would be required to monitor NiCd-batteries in municipal solid waste. The following tasks have been carried out:

1. Identification of relevant waste streams, i.e. waste streams containing relevant amounts of NiCd batteries;
2. Selection of appropriate sampling strategies for the relevant waste streams;
3. Determination of the cost-affecting parameters;
4. Development of a sampling plan for the relevant waste streams;
5. Assessment of the monitoring costs.

About 2,000 tonnes of NiCd-batteries are either contained in municipal solid waste or temporarily stored in households and companies. They are assumed to be distributed among different waste streams as follows: about 1,106 tonnes are assigned to household waste and bulky waste, 72 tonnes to lightweight packaging from DSD-collection, 280 tonnes in commercial waste, and 144 tonnes in WEEE (remaining quantity after removal of batteries). About 55 tonnes are distributed among other waste types, and 200 tonnes are assumed to be stored in households and companies, or exported.

The sampling of waste bins at the premises and the sampling at waste treatment facilities have proven to be the most suitable sampling approaches. For both methods, the cost-affecting parameters were determined. The very low proportion of NiCd-batteries and the heterogeneous mass distribution of particles in the waste stream clearly show the strongest impact on the survey costs.

The sorting and reprocessing steps in waste treatment plants result in a accumulation and homogenisation in the NiCd-relevant output streams of the plants. A higher share of NiCd-batteries and a reduction of particle sizes in the output streams require smaller sampling volume and lead to considerably lower costs for this approach.

However, the investigation of household waste by sampling of treatment plants is connected with uncertainties. With this approach only 25 % of the household waste can be covered. To increase the accuracy and reliability of the results it is recommended to additionally investigate the household waste in some areas by sampling of bins.

On the basis of the determined sample volume and the estimated costs for planning, sampling, sorting and evaluation the total costs of the monitoring of NiCd-batteries is estimated to range between **1.1 and 3.3 Million EURO**. The costs are mainly caused by the sampling and sorting procedures. The high efforts are due to the big necessary sample size. The high variation of the presented costs is caused by the following reasons:

- different methodological approaches,
- uncertainties about the relevance of different waste streams ,

- uncertainties regarding the real shares of NiCd-batteries in the waste streams,
- uncertainties regarding the distribution of NiCd-batteries among the output streams of the facilities
- modification desired accuracy and reliability (confidence level)
- variation of hourly rates of the involved staff etc.