Successful amalgam waste disposal: A report from Germany

Anke Schiemann

LEIPZIG, Germany: Liquids slowly simmer in a small chamber of the factory. It is a company secret which liquids are at work in the never-ending distillation process, but the final product on the surface of three water basins shimmers like silver. Perhaps, the inspiration for the novel by the German author Karl May Treasure of Silver Lake may not have been the precious metal but rather pure mercury. At the factory site of the Society for Metal Recycling (GMR) based in an formerly industrial section of the Eastern German town of Leipzig, mercury is distilled from amalgam and other industrial waste in a vacuum process and then refined and bottled to put it back on the market. All in all, 20 to 25 tons of amalgamate sludge are recycled by the GMR each year.

The sludge is delivered daily by companies like enretec from the town of Velten near Berlin, an enterprise that has long specialised in the recycling of residues originating from dental practices, including developer and fixation dissolution, syringes and amalgam waste. Two and a half years ago, the company along with the NWD Group, one of the largest dental dealers in Germany, conceptualised a pilot project. The idea behind the project was to make recycling for dental practices more effective, so that all waste products can be cumulated with a flexible container system and collected within only 24 hours. According to enretec CEO Martin Dietrich, this procedure is not only more consumer-oriented, but also contributes to legal and safe transportation, as well as to professional waste disposal. “We take care of the recycling process by conforming to the law and reduce the danger of the environmentally harmful disposal of amalgam waste,” he says.

According to figures of the Institute for Environmental Medicine and Hospital Hygiene at the University Medical Center in Freiburg/Breisach, Germany, Germans have 200 to 300 million amalgam fillings. Each year, more than 70 tons of mercury are used for making new fillings, a substance that is categorised as very poisonous, according to the German Storage Regulations for Hazardous Substances. Worrying figures show how important it is to separate amalgam waste from the water cycle through separators because only one gram of mercury has the potential to intoxicate one million litres of water. Through fish and seafood, these residues can enter the human organism.

Experts say that 80 to 90 per cent of mercury in the German sewage system originates from dental practices. A law introduced in 1990 made amalgam separators for each treatment unit mandatory, which resulted in higher costs for the dentist and raised questions regarding the emptying and recycling of collecting containers. Most amalgam producers in Germany now offer dentists the option to return amalgam waste via disposal contractors, but these do not fulfill existing requirements for hygiene and safety. Often, the transport from the dentist to the producer is through regular mail packages.

“With our system, we have found a safer means of transport and improved legally-binding alternatives to transport waste,” says Dietrich. “The dentist is excluded from liability during transport through means of the existing collection system from most of the dealers, which is also exempt from charges. Fitted packaging has also resulted in higher security.”

Enretec, however, only provides the first step in the amalgam recycling cycle. “We open the containers, extract the contents, collect, dehumidify and dry the mud, and forward it to specialised recycling companies like GMR,” says Dietrich. Then at GMR, the mud is finally separated into its single components. The former public enterprise in Leipzig has decades-long experience in the recycling of mercury-containing waste. After the German reunification in 1990, the company recycled, amongst other things, the majority of the ammunition left by the Soviet troops stationed in the former German Democratic Republic. According to company founder Dr Wolfgang Mothes, the recycling of amalgam contributes to a 10 to 15 per cent annual turnover.

Regarding the use of amalgam, Dietrich sees change happening; concerning amalgam will lose significance in the future, not only in German dentistry, but also worldwide. The amount of amalgam that is recycled is declining by 5 to 7 per cent each year. Of course, science will also have to play its part. As long as amalgam is considered harmless and recognised as the most durable material for dental fillings, it will be subsidised by any health-care provider,” he says.

At GMR, the burning point has not yet been reached. For the last six years, the flow of amalgam that reaches the factory premises has remained constant. Approximately 50 to 55 tons of recycled mercury is used again for producing new amalgam fillings.

“Perceptively speaking, the amount of mercury will definitely decrease,” Dr Mothes explains. “And the recent ban of mercury exports from countries of the EU will not have a major impact on this development. But what will happen if mercury is not brought back into the cycle? How can mercury be transported safely and disposed of without risk to health? These scenarios, answers have to be found that the EU does not offer yet.”

Containers with dried amalgam waste mud. (DTI/Photo Anke Schiemann)

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How the recycling process works

Mercury in amalgam fillings is bound to other chemical elements, such as silver, zinc and copper. These bonds are first broken, so that the mercury can vapourise through a process called vacuutherm de-mercurisation. In the recycling cycle, the mercury-containing metal is heated in thinmics covers, where the mercury and water, as well as organic substances, vapourise. The organic components are oxidised, if required, in a combustion chamber at 850 to 1,050°C with the addition of air and oxygen, while the raw mercury is refined to pure mercury. The duration of the procedure varies from 48 to 60 hours, depending on the volume and humidity of the base material.

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