



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

SEP 10 2014

OFFICE OF  
SOLID WASTE AND  
EMERGENCY RESPONSE

Mr. Chris York  
Sims Recycling Solutions  
2134 French Settlement Road  
Dallas, Texas 75212

Dear Mr. York:

Thank you for your inquiry regarding whether the U.S. Environmental Protection Agency (EPA) considers funnel glass from cathode ray tubes (CRTs) used as a substitute for lead oxide in the production of ceramic tiles to be legitimate recycling.

The Agency has a long-standing policy that all recycling of hazardous secondary materials must be legitimate, including both excluded recycling and the recycling of regulated hazardous wastes. The purpose of this letter is to provide you with guidance regarding how the Agency would apply the legitimate recycling factors in this case. In this scenario, Sims Recycling Solutions will not be recycling the CRT glass in the United States, but rather processing the CRT glass and exporting the processed glass to a company in Spain for recycling.

Based on the provided information, the EPA finds the legitimate recycling factors set forth in EPA policy – (1) the hazardous secondary material provides a useful contribution; (2) the recycling process produces a valuable product or intermediate; (3) the hazardous secondary material is managed as valuable commodity; and (4) the product of the recycling process is comparable to a legitimate product – appear to have been met.<sup>1</sup> Specifically, the EPA concludes:

*(1) The hazardous secondary material provides a useful contribution:* The CRT funnel glass can provide a useful contribution both to the recycling process (firing of ceramics) and to the product of the recycling (ceramic tile).

Lead oxide in ceramics has an extensive history in that lead oxide is used in glaze formulations to regulate the melting properties of other glaze components and to enable the use of a broad firing temperature range in the production process. In your case, you stated the lead oxide in the CRT funnel glass acts as a flux in the manufacturing process and reduces the energy needed for firing by approximately 10–15%. Additionally, the CRT funnel glass substitutes for up to 15–20% of raw materials (e.g., silica, strontium, clay, feldspar, and barium) in the tiles and glaze.

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<sup>1</sup> U.S. EPA. The History of Legitimate Recycling, June 2010. <http://www.epa.gov/epawaste/hazard/dsw/downloads/history-legit-recycling.pdf>.

*(2) The recycling process produces a valuable product or intermediate:* The ceramic tiles are a valuable product in that the ceramic tiles are being sold on the market and subsequently used in walls and flooring.

The CRT funnel glass will be exported to Europe where it will be prepared and sold to multiple ceramic tile manufacturers. The ceramic tile manufacturers in turn produce and sell ceramic tiles for use in walls and flooring for residential, commercial, and industrial areas. Additionally, based on your provided information and documentation, the product of this recycling process appears to comply with the European standard (UNE-EN 14411:2007) for ceramic tiles and the integrity of the tiles has been independently tested and verified.

*(3) The hazardous secondary material is managed as a valuable commodity:* The CRT funnel glass will be managed as a valuable commodity and will be managed to minimize loss to the environment.

Specifically, Sims will ship the CRT funnel glass in large Gaylord boxes that are shrink wrapped. Furthermore, the entities that will handle the CRT funnel glass are certified to standards set by the International Organization for Standardization (ISO), specifically ISO 14001 and ISO 9001, and the Occupational Health and Safety Advisory Service (OHSAS), specifically OHSAS 18001. Sims Recycling Solutions is certified to standards set forth by R2 and e-Stewards.

*(4) The product of the recycling process is comparable to a legitimate product:* The concentrations of lead and cadmium in the ceramic tiles are at levels that meet standards set by the European Union (EU) for ceramics intended to come into contact with food.

The CRT funnel glass will be used to produce ceramic tiles, for multiple uses, including for walls and flooring. It is also appropriate to consider that the ceramic tiles may come into contact with food (e.g., countertop). When glazes are properly formulated and fired at a high temperature, the lead is sealed or “vitrified” and its potential to leach from the glaze is limited. However, if the glazes are not properly prepared and fired, lead may leach (i.e. move from the glaze) into food stored in or on the ceramic ware.

ISO standards prescribe a leaching test method for lead and cadmium extracted from glazed ceramic surfaces (ISO 10545-15 “Determination of the emission of lead and cadmium in ceramic tiles”). This test evaluates lead and cadmium released from the surface of glazed tiles over a 24 hour exposure to a 4% acetic acid solution (comparable to vinegar). The procedure of extraction may be expected to accelerate the release of lead from the glaze and to serve, therefore, as a test that is unlikely to be matched under the actual conditions of usage of such ceramic ware.

Sims Recycling Solutions submitted testing results using ISO test 10545-15 which show the levels of lead and cadmium could not be detected. The results were reported as  $<0.004$  mg/dm<sup>2</sup> for lead and  $<0.002$  mg/dm<sup>2</sup> for cadmium. These results are well below the EU’s current permissible limits for Category 1 (non-fillable) ceramics intended to come into contact with food which are 0.8 mg/dm<sup>2</sup> for lead and 0.07 mg/dm<sup>2</sup> for cadmium. (Although the U.S. Food and Drug Administration sets regulatory action levels for lead and cadmium released from ceramic ware, such as flatware, cups, and pitchers, the U.S. has not established regulatory levels that are comparable to the EU standards for Category 1 ceramics.) You should contact the FDA



concerning the suitability of the tiles for any intended use in the U.S. that would reasonably be expected to result in the glaze becoming a component of food.

Based on the test results, the EPA concludes the test results support a determination that the CRT glass is being legitimately recycled. These test results are applicable to ceramic tiles manufactured according to procedures formulated by the foreign recycler. Thus, deviations from the prescribed manufacturing of the ceramic tiles may impact the results of the lead and cadmium leach test, which could alter EPA's determination that the recycling is legitimate for those materials. Additionally, the EU has proposed to reduce their permissible limits and, should the EU finalize changes to their limits, the ceramic tiles would likely need to comply with the new limits.

Therefore, based on the information provided by Sims Recycling Solutions, the EPA finds that CRT funnel glass legitimately used as an effective substitute in the production of ceramic tiles to be excluded from the solid and hazardous waste regulations under 40 CFR 261.2(e) ("use/reuse exclusion"). As this determination is based on data submitted, EPA's conclusions are dependent on the completeness and accuracy of those data.

Additionally, because CRT funnel glass managed under the "use/reuse exclusion" would not be RCRA hazardous waste in the United States, the CRT glass would not be subject to notice and consent under U.S. export regulations in 40 CFR part 262 subparts E or H. However, because CRT glass is a listed hazardous waste under the Organization for Economic Cooperation and Development's (OECD)<sup>2</sup> Council Decision it would be subject to applicable regulations in the countries of transit and import implementing the OECD Council Decision. Under Section II.B.4 of the OECD Council Decision, if the waste being shipped is controlled as hazardous by only one of the countries of export and import, then the notice and consent procedures and other associated procedures are administered by the country that controls the waste as hazardous. This is referenced in 40 CFR 262.82(a)(2)(iii).

Please be aware that under Section 3006 of the Resource Conservation and Recovery Act (RCRA) individual states can be authorized to administer and enforce their own hazardous waste programs in lieu of the federal program. Under Section 3009 of RCRA, states retain authority to promulgate regulatory requirements that are more stringent than the federal regulatory requirements. You should consult with the appropriate U.S. regulatory authority (i.e., the authorized state agency or EPA) for any particular facility wishing to use an exclusion.

Thank you for your interest in CRT recycling. If you have any further questions, please contact Amanda Kohler (703-347-8975, kohler.amanda@epa.gov) of my staff.

Sincerely,



Barnes Johnson, Director  
Office of Resource Conservation and Recovery

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<sup>2</sup> OECD Council Decision C (2001)107/FINAL on the Control of Transboundary Movements of Waste Destined for Recovery Operations (CRT glass is listed as A2010, "Glass waste from cathode-ray tubes and other activated glasses").