Why Ceramic Tiles Should Not Be Tested for Lead

By Michael A. Breu, Risk Assessor Fiberquant Analytical Services

It is well established that many types of ceramic tiles used in residential and commercial construction contain high concentrations of lead in their glaze. One misconception is that tiles with lead in the glaze are no longer allowed to be used but these tiles continue to be manufactured in the United States and imported from all over the world. The reason they continue to go into buildings is that lead in ceramic glazes was never banned. When the Environmental Protection Agency (EPA) and Consumer Products Safety Commission (CPSC) implemented rules and regulations regarding the use of lead in paints, they first had to define paint. The CPSC Office of Compliance defined paint in 16 CFR 1303 in which they published that “paint or similar surface coating materials” were terms that generally applied to liquid or semi-liquid products that change to a solid film when thinly applied to wood, stone, metal, cloth, plastic or a similar surface. Lead-glazed ceramics are commonly made by dusting a dry mixture onto the tiles and then kiln-firing it such that it bonds to the substrate. That is why glazes are exempt from the EPA and CPSC regulations where lead is concerned. Furthermore, HUD and the EPA maintain that the exposures resulting from intact tiles in residential housing are minimal compared to other sources of lead dust (exposures to lead dust generated from the disturbing of lead-glazed tiles will be discussed below).

To test or not to test? Briefly stated, the answer is no. There are four common scenarios in which the question of whether or not to test ceramic tiles for lead arises. In the first scenario a company is hired to perform a lead-based paint inspection using the method from the HUD Guidelines for the Evaluation and Control of Lead-based Paint Hazards in Housing, Second edition, 2012. Does the lead inspector or risk assessor test ceramic tiles? The answer is in the title. Control of lead-based paint hazards. As pointed out in the opening, unpainted ceramic tiles are not considered paint and in fact are specifically exempt from the CPSC definition. That is not to say that nearly all lead testing firms won’t be happy to test the tiles. Most of them are. However, those companies must be very deliberate and careful about how those results are reported. The company for which I work approaches reporting one of two ways. 1) We will inform the person requesting the additional testing of ceramic tiles that we will measure, report the result verbally, and then delete the reading from the instrument and thus the written report. Or, 2) measure and include the readings in the written report along with a paragraph explaining that ceramic tiles are outside of the HUD protocol and that results equal to or above the HUD action level of 1.0 milligrams/cm² are not considered lead-based paint. If there are no painted materials in the home that test positive, then the home is considered lead-based paint free regardless of the presence of lead-glazed tiles.

Scenario number 2 is when a company is hired to do a risk assessment. The defined scope of a risk assessment is to determine the presence of lead hazards in a home. There are three types of lead hazards per the HUD Guidelines. Those are elevated lead in soil, elevated lead levels in dust, and lead-based paint that is in poor condition. Testing ceramic tiles will not address any of these three types of hazards and so, as with a lead-based paint inspection, testing of ceramic tiles is also outside of the scope of a risk assessment and should not be routinely performed.

The third scenario is trickier. It involves testing performed to comply with the EPA’s Renovation, Repair, and Painting Rule (RRP), which stipulates that if
thresholds amounts (6 square feet inside the home or 20 square feet outside the home) of painted surfaces are going to be disturbed, then the home either has to be determined lead-free via a lead-based paint inspection or the components being disturbed be tested. Again, the RRP specifically refers to painted surfaces. The EPA even went so far as to offer some clarification during published questions and answers in which it was specifically stated that ceramic tiles are not to be tested.\(^1\) However! Good contractors are wise to the liability of demolishing lead-glazed tiles and the resulting lead-dust hazards that are sure to result from the demo. And often they test them even though it is specifically not required.

The final common scenario involves testing ceramic tiles to comply with the OSHA Lead Safety and Health Regulations for Construction 29 CFR 1926.62 (which includes demolition). The standard is very comprehensive and includes far more information than can be recapped here. The important thing to take away is that employers have a legal obligation to protect their workers from lead exposures. Often times the Competent Person will request lead testing regardless of whether affected materials are painted or not. That testing leads to the final topic, which is about testing lead-containing glazed tiles.

There are three common methods for testing surface for lead concentration, all of which are specifically discounted by OSHA. The reason they are discounted is that OSHA considers bulk and surface samples to be of little use when determining airborne concentrations resulting from demolition or renovations.\(^2\) The surface or bulk concentrations can only be correlated to airborne concentrations through the use of air monitoring and negative exposure assessments (NEAs). That point aside, surface testing of ceramic tiles continues to be requested. One method is to use portable XRF and the another is to take a chip sample to a laboratory. A third method is to use chemical swab kits.

XRF Testing—XRF testing is an excellent way to confirm that lead is in glazed tiles. However, many XRF instruments are semi-quantitative in that they are designed to tell the user if the surface being tested is above a certain concentration, below a certain concentration, or too close to tell. The main problem is with the XRF instruments used in our industry is that they are set to determine if the surface contains more lead than the HUD limit of 1.0 mg/cm\(^2\). Milligrams. The action level for OSHA is 30 micrograms per cubic meter. That means that at the HUD level of 1.0 mg/cm\(^2\), there is enough lead one square centimeter to contaminate over 30 cubic meters of air if all of the lead is aerosolized. That is from one square centimeter! Conversely, if a worker is breathing 10 cubic meters a day, there is enough lead in one square centimeter to take him or her past the action level three times over and past the permissible exposure limit two times over. So XRF measurements below 1.0 mg/cm\(^2\) are meaningless and cannot be used to determine whether or not a glazed tile is safe to demolish.

Chip sampling—The issue with chip sampling is that the EPA methods used to digest the samples simply cannot digest the lead locked up in the glaze on ceramic tiles. We did a “let’s just see what happens” exercise in our laboratory wherein we took a tile that had enough lead in the glaze to peg out our XRF instruments. We then took some of that tile and digested it in heated nitric acid and 30% hydrogen peroxide (EPA method 3050b) and analyzed it using Flame Atomic Absorption Spectroscopy (FAAS). The resulting FAAS measurements were barely above the limit of detection for the method. One interpretation of that observation was that there exists a high degree of likelihood that ceramic tiles tested using chip samples will result in a false negative.

Finally, there are chemical swab kits. This method is the worst of the three. They combine the problems of XRF (semi-quantitative only) with the problems of chip sampling (the lead is locked up in the glaze) and add them to the problem that swabs are not intended nor have been tested on ceramic surfaces to comply with RRP testing. In case that was not perfectly clear, they are useless for anything but the most heavily contaminated ceramic surfaces that are in poor condition.

Conclusions: OSHA does not recognize surface or bulk sample testing. Add to that the problems associated with the methods described above. A reasonable conclusion would be to not test ceramic tiles at all. Instead, assume that they have high levels of lead in their glaze (assumption of positive is allowed for RRP and OSHA) if they are to be disturbed. If a client requests that they be tested in conjunction with a lead-based paint inspection or risk assessment, do so but include verbiage about what is and what is not paint and what are or are not lead hazards.

\(^1\) http://toxics.supportportal.com/ics/support/KBAnswer.asp?questionID=15691&hitOffset=41+40+25+24+17+11+10&docID=499
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6935 Wisconsin Avenue, Suite 306
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