

RE-100 and RE-300 can result in high bias of Arsenic and potentially other metals in biosolids.

RE-100 (fka SorbX-100) is increasingly being used to remove phosphorus from wastewater. And it appears to serve that purpose well. The agency has looked into (and accepted) RE-100 from the whole effluent toxicity (WET) aspect, but what hasn't been adequately addressed is the impact of RE-100 (and possibly other treatment chemicals) on biosolids metals data. Note that a more concentrated product, RE-300, is also currently being marketed.

The power of RE-100 is in its use of rare earth metals (Cerium, Lanthanum, and others) to complex phosphorus. Being "rare", however, labs do not expect to encounter them, and therefore many have not evaluated these rare-earth metals for potential interferences let alone established proper interference corrections.

Most commercial labs will use ICP to analyze metals in sludge. ICP is an excellent technology, but, like a performance sports car, adjustments need to be made depending on environmental conditions. Most elements, when in their atomic state, will emit light at many different wavelengths; it is these characteristic emission wavelengths that ICP detects and uses to quantitate multiple elements. And it works exceptionally well—except that when the emission from one element falls into the emission range of a "target" (regulated) analyte. This spectral overlap, as it is termed, can be corrected for and virtually eliminated, thereby isolating the signal to the analyte of interest. However, in order to correct for the interference, the lab must be aware of the presence of the interfering element(s) and must have established a correction routine for its instrument configuration. Another way to resolve the bias is to use an alternate wavelength to measure the arsenic signal. Unfortunately, both the primary and secondary wavelength typically used for arsenic are impacted.

Thanks to a WWTP operator in northeast WI, we were alerted to apparent high bias in biosolids arsenic levels that was hampering the facility's ability to land spread sludge. Once we learned of the problem, we were able to determine that RE-100 had been used and two of the three labs that did the testing (with three different results) were not properly correcting for Cerium interference. One of the two labs using ICP correctly identified that cerium was interfering and chose to use an alternate emission line for the arsenic. Unfortunately, we later learned that RE-100 also contains Lanthanum and it interferes at the secondary wavelength.

It is critical to understand that this is not an indictment of this or any other product. RE-100 appears to be a great product. We just need to be aware that there are many facets to evaluating new products such as these. Lab Certification staff are knowledgeable on the methods and technologies used to analyze wastewater and biosolids. If we are aware of new products, we can provide valuable insight as to what the best technology for analysis would be as well as any special considerations required to properly analyze samples to obtain the highest quality data.

The DNR's Lab Certification Program, in conjunction with the State Laboratory of Hygiene, is currently working to assess the level of interference and establish protocols which can be used by laboratories to correct for or eliminate the arsenic bias. In the interim, facilities or WWTPs should alert their contract laboratories when they use either RE-100 or RE-300 for phosphorus removal.

For more information, contact Rick Mealy at mailto:Richard.Mealy@Wisconsin.gov or (608) 264-6006.