Department of Ecology's Hazardous Waste and Toxics Reduction Program

Background and Rationale for the Update of *Biological Testing Methods 80-12 for the Designation of Dangerous Waste* Publication #80-12, Revised March 2008

The Washington State Department of Ecology (Ecology) is updating *Biological Testing Methods 80-12 for the Designation of Dangerous Waste* Publication #80-12 at the same time the Dangerous Waste Regulations are being amended. A Biological Testing Methods Team met and evaluated this publication in light of current scientific knowledge, and recommends the following modifications:

- Remove the percent-moisture requirement
- Add 45-day holding-times
- Correct certain minor errors and clarify the guidance

This document explains the background and rationale for these changes.

Remove the percent-moisture requirement

The percent- (%-) moisture requirement is recommended for elimination from the guidance document.

One Ecology-certified laboratory was concerned about the requirement to determine %-moisture of a sample. As a toxicology lab, the facility was not accustomed to doing chemical tests such as %-moisture, was concerned with possible safety hazards associated with running the analysis, and they questioned why Ecology required the %-moisture determination when it was not used in either of the two testing methods covered in the guidance publication. The strongest concern raised was that the %-moisture value was not an integral part of the method, so no technical justification existed for the requirement.

This requirement had been added to the guidance document because of earlier concerns that generators could take advantage of variability in sample moisture to affect the test results, such as in a soil pile that might need to be sampled and tested. There was some concern that a generator could delay sampling until the rainy season began. The amount of actual waste in the sample could be less because of the increased amount of water in the sample. If the sample had been obtained during the dry season, the amount of waste would be greater. The %-moisture requirement was added so Ecology could review the amount of water in a sample and determine if the moisture content was sufficient to bias the testing results.

Options for the %-moisture issue were:

1. Leave the guidance as it was, and continue to require %-moisture determination,
2. Edit the sampling procedure to use %-moisture to alter the amount of sample used during testing, or
3. Eliminate the %-moisture requirement from the guidance document.

Ecology reached the conclusion that option 1 was not workable. Although %-moisture determinations are standard analytical procedures for a chemical laboratory, many of the

laboratories running these analyses are toxicology labs and not chemical labs. Therefore , they are less accustomed to running %-moisture determinations and may not have the appropriate procedures in place to minimize safety concerns associated with this test. In addition, Ecology needed to provide a technical justification for the %-moisture test to require it. Therefore, this alternative was eliminated from consideration.

The team discussed option #2 in depth. They acknowledged that there may be some substance to the concerns identified during the previous update. There may be instances where samples could be obtained with a bias towards higher concentrations of water. In these instances, the amount of dangerous materials in the sample may be diluted. This could skew the final testing results. Ecology discussed the possibility of using the %-moisture as a factor in determining the total amount of sample used in the test. The current guidance requires the use of 10 and 100 mg/L of waste. Ecology discussed the possibility of normalizing these amounts using %-moisture. If normalized, a larger sample would be used when the moisture content was high and a smaller sample when it was low.

Two main concerns were raised with this option. First, the number of times when samples are intentionally skewed is thought to be few. Previous concerns regarding moisture content and sampling over time can be addressed through the representative sampling requirements in WAC 173-303-110. The team determined that the impact upon the results was small.

The second and, perhaps, more important concern was whether a %-moisture test actually provided accurate information on the water content of the sample. Most methods used to determine % of moisture require the placement of an aliquot of sample into a drying cup. The sample is subjected to high temperatures until the weight remains constant, indicating all volatile components have been removed. The main limitation of this methodology is that, in addition to water, other volatile components are also removed from the sample during the drying process.

Since volatile organic contaminants can be an important waste component, %-moisture determination can actually over-estimate the water content of the sample. If %-moisture were used to normalize the sample amount, it could lead to larger and potentially unrealistic sample amounts being used in the tests. This over-estimation could lead to an increase of state-only wastes that could expand to include wastes that would not otherwise designate.

Based upon these discussions, option 2 was also discounted. This left option 3—to remove the %-moisture requirement from the guidance document—as the only option, and it is recommended to be removed from the guidance.

Add of 45-day holding-times

A holding-time of 45 days is recommended to be added to the guidance.

Holding-times were not previously identified in the guidance document. Other bioassay guidance documents provide information on appropriate holding-times. In addition, since holding-times are an important part of SW-846, the team thought that the guidance document should address how impacts from holding-times should be minimized.

There were several concerns around appropriate holding-times. Unlike other analyses, such as those found in SW-846, bioassay methods look solely at results and not at waste constituents. Therefore, when a waste sample fails the bioassay analysis, no information is provided on what specifically caused the mortality, only that the waste had a deleterious effect on the organisms. Since specific chemical components are not an integral part of the analysis, it is difficult to determine what holding-times would be appropriate.

Ecology contacted several certified laboratories and asked for their input. Those companies conducting fish bioassays indicated that it would be technically impossible to begin the analyses in seven days as is required for some semi-volatile organic compounds in SW-846. Fish are required to acclimate for at least seven days. The labs indicated that a test could begin within 14 days. Those companies conducting rat bioassays have even further restrictions and indicated they could not run analyses in as short a period as 14 days, but 21 days was possible.

Another concern was the effect on the regulated community. Traditionally, a generator will designate his waste first for federal criteria. If a waste designates for a federal requirement, there is no need to conduct any state-only analyses. Samples are only submitted for state-only criteria when wastes are shown not to designate under federal requirements. If a short holding-time is placed upon the bioassay analyses, it could substantially increase generator designation costs by requiring unnecessary bioassay testing. The bioassay test costs approximately $450 and $1,200 for the fish and rat bioassays, respectively, so this is an appreciable increase in designation costs.

Given these concerns, Ecology set a holding-time of 45 days for the bioassay analyses. Forty-five days provides enough time to determine if the waste stream designates for federal requirements before determining if additional analyses are necessary for state-only criteria. The extended period may have an adverse effect upon potential waste constituents (such as semi-volatile and volatile organics). All samples must be kept under conditions that minimize changes in the waste prior to analysis. A holding-time of 45 days prior to analysis, however, provides the compromise that best meets all of the concerns identified above.

Correct minor errors, and clarify the guidance

Except for the %-moisture and holding-time issues, Ecology review found mostly non-substantive changes that needed to be made to correct previous errors and to make the guidance technically current. An example of a minor technical change was a change to the aeration requirement for control tests. Ecology decided it was more technically defensible if the controls were subjected to the same aeration procedure as the test subjects. Therefore, the two were made equivalent.

Another minor change was the deletion of the section dealing with Toxicity Identification Evaluation (TIE). Inclusion of this information was confusing to the reader and rarely implemented. Instead of providing detailed information in the document, a reference to TIE was made in the Introduction. TIE is offered as an acceptable method for a generator to petition Ecology to allow an alternative management standard for a state-only toxic waste. Based on specific TIE results, this alternative standard would need to be protective of human health and the environment.