## I. Triple Ranking Approach to Identify Best Performing Sources

We request comment on an approach suggested by a commenter[1] that would identify best performing sources when establishing floor emission levels for hazardous air pollutants that are controlled by feedrate control—metals and chlorine. The commenter calls this approach the SRE/Feed/Emissions Triple Ranking Approach. We are considering this methodology, as well as other methodologies discussed in the proposal, for the final rulemaking.

We proposed an approach we called the SRE/Feed Double Ranking Approach, where we defined the best performing sources as those sources with the best combined front-end hazardous waste feed control and back-end air pollution control efficiency as defined by a ranking procedure. This approach is applicable to those hazardous air pollutants (HAP) for which emissions can be controlled by limiting the hazardous waste feedrate of the HAP--metals and chlorine—as well as by conventional backend stack emission control equipment. We apply this approach when the data allow us to assess the effectiveness of both front-end and back-end air pollution control. We explained at proposal that use of feed control and system removal efficiency as measures of performance is appropriate because these parameters account for the myriad factors that can affect emissions, such as level of maintenance of the combustor or emission control equipment, and operator training, as well as design and operating parameters that directly affect performance of the emission control device (*e.g.,* air to cloth ratio and bag type for a fabric filter; use of a power controller on an electrostatic precipitator). See 69 FR at 21223.

Under the SRE/Feed/Emissions Triple Ranking Approach, we would define the best performing sources as those with the best combination of front-end hazardous waste feed control, back-end air pollution control efficiency, and stack gas emissions, as defined by a ranking procedure. This approach is identical to the proposed SRE/Feed Double Ranking Approach, except we would include stack gas emissions in the ranking procedure to identify the best performing sources. As with the SRE/Feed Approach, the SRE/Feed/Emissions Approach is applicable to metals and chlorine, and we would use it where we have the data to assess the three parameters.

We have calculated potential floor levels for existing and new sources under the Triple Ranking Approach using our revised emissions data base and revised data handling procedures (e.g., the Max Dev approach for handling nondetects discussed in Section IV of this document). The results are presented below.

[1] Environmental Technology Council (ETC), Docket Number OAR-2004-0022-0360.

## Floor Levels for Existing Sources under the Triple Ranking Approach

| Source Category | Hg (ug/dscm, or lb/MMBtu) | SVM (ug/dscm, or lb/MMBtu) | LVM (ug/dscm, or lb/MMBtu) | TCL (ppmv or lb/MMBtu) |
|---|---|---|---|---|
| Incinerators | 130 (400) | 49 | 71 | 1.7 |
| Cement Kilns | Triple Ranking Not Used | 330 and 3.1E-4 (3.1E-4) [280] | 1.8E-5 [16] | Triple Ranking Not Used |
| Lightweight Aggregate Kilns | Triple Ranking Not Used | 3.0E-4 and 250 (3.0E-4) [340] | 9.5E-5 and 110 (9.5E-5) [110] | 600 (3.0E-0) [2300] |
| Solid Fuel-Fired Boilers | 11 | 180 | 380 | 440 |
| Liquid Fuel-Fired Boilers | Triple Ranking Not Used | Triple Ranking Not Used | 1.6E-4 Cr only [190] | 7.0E-3 [5.7] |

## Floor Levels for New Sources under the Triple Ranking Approach

| Source Category | Hg (ug/dscm, or lb/MMBtu) | SVM (ug/dscm, or lb/MMBtu) | LVM (ug/dscm, or lb/MMBtu) | TCL (ppmv or lb/MMBtu) |
|---|---|---|---|---|
| Incinerators | 8.1 | 10 | 23 | 0.43 |
| Cement Kilns | Triple Ranking Not Used | 6.2E-5 [57] | 1.8E-6 [1.6] | Triple Ranking Not Used |
| Lightweight Aggregate Kilns | Triple Ranking Not Used | 3.7E-5 and 43 (3.7E-5) [42] | 3.2E-5 [36] | 600 (2.6E-0) [1500] |
| Solid Fuel-Fired Boilers | 11 | 180 | 190 | 73 |
| Liquid Fuel-Fired Boilers | Triple Ranking Not Used | Triple Ranking Not Used | 1.1E-5 Cr only [13] | 2.0E-3 [1.6] |

**NOTES to Tables**
Scientific Notation (e.g., E-5). Thermal emissions are presented in scientific notation and expressed as lb/MM Btu (lb of HAP attributable to HW per million Btu of heat input from HW)

(___) The number in parenthesis is the calculated floor level, which is provided for information purposes only. The number ahead of the parenthesis is the default floor, which is the promulgated Interim Standard, and which would be the actual standard promulgated under this approach.

[___] A number in brackets is the mass concentration equivalent (ug/dscm) of a thermal emission floor, assuming 100% hazardous waste firing rate.

Triple Ranking is not used where the data are inappropriate for this approach (e.g., where available data may not be representative of either compliance test or normal operations, or where only normal emissions data are available such that we are concerned that the calculated SRE may not be reliable).

HCl Production Furnaces are not listed because we proposed to use the TCl standard as a surrogate for metals, and to use SRE as the measure of performance to identify the best TCl performing sources.

## II. Approach to Identify a Floor Level for Mercury for Lightweight Aggregate Kilns

We request comment on an approach to express a floor for mercury emissions from existing and new lightweight aggregate kilns as a short-term emission limit rather than as a long-term average.

A. Background

We proposed a floor level of 67 ug/dscm for new and existing lightweight aggregate kilns based on "normal" emissions data using the SRE/Feed Approach. See 69 FR at 21263. When we identified standards based on normal emissions data, we proposed to largely account for emissions variability by expressing the floor level as a long-term, yearly, average. Thus, as proposed, compliance with the mercury feedrate limits would be based on an annual average feedrate. See 69 FR at 21232.

As discussed in the proposed rule, we have "compliance test" emissions data for only one source; however, we have "normal" emissions data for all sources at the three lightweight aggregate facilities.[2] We used available "normal" emissions data to represent the average emissions from these best performing lightweight aggregate kilns even though we did not know whether the emissions represent the high end, low end, or close to average emissions from those sources. Given the uncertainty as to the representativeness of the "normal" emissions data, we asked for comment as to whether the proposed floor levels are achievable by the best performing sources and whether there is a more appropriate method to identify floor levels that are based on "normal" data from the best performing sources. Id.

In comments responding to the proposed rule, Solite Corporation (Solite), operator of two of the three lightweight aggregate facilities,[3] stated that the mercury concentrations associated with the test results in EPA's data base only represent a limited snapshot of the universe of mercury concentrations that exist in the waste fuel market. Solite's comments to the proposed rule are in EPA's E-Docket[4] (see comment OAR-2004-0022-0270). To demonstrate the extent that actual mercury concentrations can vary, Solite submitted eight months of actual mercury concentration measurements (measurements of mercury concentrations in hazardous waste fuel, as-fired) collected during the period October 2003 through June 2004. Over 300 actual measurements are included in Appendix B to their comments (see comment OAR-2004-0022-0333). The measurements range from a low of 0.099 ppmw to a maximum of 1.18 ppmw. The $50^{th}$ and $99^{th}$ percentile concentrations were 0.02 and 1.02 ppmw, respectively.

We evaluated Solite's data by comparing the concentrations of mercury in the hazardous waste fuel during emissions testing to the actual as-fired hazardous waste fuel measurements provided in Solite's comments. The data may show that the mercury concentrations fed during emissions testing represent the low-end of average feedrates. In

2 A discussion of "normal" and "compliance test" data can be found at 69 FR at 21218.
3 The third facility is Norlite Corporation (Norlite).
4 The E-Docket is available at www.epa.gov/edocket.

fact, nearly all concentrations of mercury fed in hazardous waste during emissions testing are less than the 50th percentile value of the as-fired measurements in the larger data set. Further, more than half of the concentrations are less than the 10th percentile. Thus, given that our data base of "normal" emissions data appear to represent the low-end of average mercury concentrations in hazardous waste feedrates, we might conclude in the final rule that these data are not representative of normally occurring variability in hazardous waste feed concentrations at best performing sources, and therefore that it might not be appropriate to use these data to calculate a floor emission level.

B. What Would Be A Revised SRE/Feed Approach?

We are considering a revised SRE/Feed Approach whereby we would project emissions for the Solite kilns based on the as-fired waste fuel mercury concentration data submitted by Solite.[5] Under this approach, to adequately express normal variability, we would project the upper range of normal mercury emissions for the Solite kilns by assuming they were feeding hazardous waste with a mercury concentration equal to the 99th percentile actual feed concentration (i.e., 1.02 ppmw). When projecting emissions, we would assume that the kilns achieve zero system removal efficiency (SRE) given that there is no engineering reason or empirical data that would suggest the kilns are achieving mercury removal. We would also include the mercury emissions attributable to raw materials based on raw material contribution during the normal emissions testing in our data base.

Because we considered the 99th percentile actual feed concentration level, these projected emissions reflect the upper range of emissions from the Solite kilns. Thus, for purposes of calculating a floor level, we would consider Solite=s projected emissions as analogous to Acompliance test@ data. See 69 FR at 21232.

To identify the MACT floor, we would evaluate Solite=s projected emissions and Norlite=s most recent compliance test stack emissions data using the SRE/Feed Approach. See 69 FR at 21230. Potential floor levels for existing and new lightweight aggregate kilns under the revised SRE/Feed Approach are presented below. We would consider expressing these floor levels as a short-term, 12-hour rolling average, limit given that they are based on the 99th percentile of the mercury concentrations in the hazardous waste feed, and so should encompass ordinary variability in those concentrations.

[5] Emissions would be projected only for the Solite kilns because we already have "compliance test" emissions data available for Norlite.

| Pollutant | Existing Sources | New Sources |
|---|---|---|
| Mercury (ug/dscm) | 120 (mass emission concentration) or 120 (HW MTEC) [940] | 120 (mass emission concentration) or 120 (HW MTEC) [180] |

Notes:

[___] The number in bracket is the calculated floor level, which is provided for informational purposes only. The number ahead of the parenthesis is the default level, which is the promulgated Interim Standard. The default level would be the promulgated standard for lightweight aggregate kilns.

AHW MTEC@ is hazardous waste maximum theoretical emissions concentration as defined in '63.1201(a).

## III. What Alternative Standards May EPA promulgate for Liquid Fuel Boilers?

We request comment on whether it is appropriate to establish alternative thermal emissions-based floors and mass emissions-based floors for liquid fuel boilers.

The American Chemistry Council, ACC, and several of its member and affiliated companies, requested that we consider alternative thermal emissions-based and mass emissions-based standards for liquid fuel boilers. See ACC=s comment in the eDocket at OAR-2004-0022-0277. We proposed thermal emissions-based metals and chlorine standards for liquid fuel boilers (see 69 FR at 21219 and 21283,) and while ACC supports thermal emissions-based standards, they requested that we also promulgate alternative, mass emission-based standards.

ACC is concerned that, while thermal emissions-based standards are appropriate for boilers burning wastes with a high heating value, thermal emission standards would be difficult to achieve for boilers burning relatively low heating value wastes. ACC notes that, under the thermal emissions format, wastes with a relatively low heating value must have proportionately lower concentrations of metals and chlorine to achieve the emission standard. Thus, thermal emission standards are biased against boilers that burn low heating value wastes.

ACC also believes it is unreasonable to expect liquid fuel boilers to burn cleaner wastes. These boilers are captive units that Aburn what they have[6].@ ACC believes waste minimization has already occurred such that it would be difficult to lower the metal or chlorine concentrations in the wastes, and no higher Btu wastes exist on site to offset the emissions from low Btu waste. Further, ACC believes it is not appropriate to send these wastes offsite for management, because, among other reasons, these other sourcesCcement kilns, for example--would likely have higher emissions standard, as high as 100 times those proposed for liquid fuel boilers. ACC contends that this would

6 All liquid fuel-fired boilers, except one, are on-site, captive sources.

increase the overall emissions of metals and chlorine, since there is little incentive to install a treatment train at these other sources due to their much higher emissions standards.

If we conclude that alternative mass emissions-based floors are appropriate, we would calculate the alternative floor based on the mass emissions of the best performing sources used to calculate the thermal emissions floor.

## IV. Approach to Avoid Variability Dampening when Applying Statistics to Nondetect Values

We request comment on a revised method of handling non-detect measurements when identifying best performing sources and calculating floor levels. We believe this new approach could avoid dampening of run-to-run variability when applying statistical procedures to account for variability.

### A. Background

We proposed using statistical techniques to help identify best performing sources and to calculate floor levels. Run-to-run variability as well as the average value of the parameter (e.g., feedrate, SRE, stack gas emissions) is used to calculate a 99% prediction limit (or lower 99% confidence limit for SRE). As discussed at proposal, the prediction limit is calculated for each source based on the average, standard deviation, and number of individual test runs. See 69 FR at 21231.

We proposed to determine floor levels by modeling a normally distributed population that has an average and variability that are equal to that of the ''average'' of the best performing sources. We calculated the floor using a modified prediction limit procedure designed to capture 99 out of 100 future three-run averages from the ''average'' of the best performing MACT sources. See *id*. at 21233.

At proposal, when measurements in our data base were reported as nondetect at a minimum detection level, we assumed the analyte was present at the detection limit. We believed this approach ensured that the floor levels are achievable given that the analyte could have been present at just below the level of detection, and thus the actual feedrate or emission level, for example, could have been just below the nondetect level.

Commenters expressed concern that assuming nondetects are always present at the minimum level of detection dampens the run-to-run variability of the measurements when we apply the statistical techniques discussed above. Commenters noted that the actual (but unknown) measurements would have greater variability than results from assuming all nondetects are present at the same (or near same) minimum level of detection.

We have considered the commenters' concern, and have developed a procedure that would preclude dampening of run-to-run variability, as discussed below. We are seeking comment on that procedure.

B. What Procedure Is EPA Considering to Avoid Dampening Variability When Measurements Include Nondetect Values?

We first attempted to apply standard interval censoring techniques to calculate maximum likelihood estimates (MLE) of the average and standard deviation that provide the best fit for a normal distribution for the data containing nondetect values, taking into account that each censored (i.e., nondetect) data point can be anywhere within its allowable interval. For example, if a source measured lead emissions at 80 ug/m$^3$ but could not detect cadmium emissions at a detection limit of 20 ug/m$^3$, we report the semivolatile metal measurement, which combines these values, as 100 ug/m$^3$ with 20% nondetect, and the allowable interval is from 80 to 100 ug/m$^3$. These techniques are not applicable, however, to data sets where all data are nondetects, as is the case for several of our data sets. In that situation, we approximated the mean as the average of the midpoints of the nondetect intervals, and the standard deviation as one half of the possible range of the data.

In addition, we encountered numerical problems when we applied interval censoring techniques to datasets for best performing sources where the average values for the best performers were substantially different.

In summary, the MLE approach: (1) had to be modified to work for data sets where all data are nondetects; (2) experienced numerical problems and/or generated nonsensical results for some data sets (e.g., where the average values for the best performing sources individually were substantially different); and (3) generated valid results (insofar as we could reasonably determine) for many data sets.

After working with this approach for some time and iteratively developing complicated algorithms to address problems as they arose, we concluded that we needed a simpler approach that could be applied to all data sets. Consequently, we are considering whether it would be appropriate to use an approach to address nondetects whereby a value is assigned to each nondetect within its possible range such that the 99$^{th}$ percentile upper prediction limit for the data set is maximized. Thus, the deviation among runs containing nondetect values is maximized. Hence, we call the approach Maximum Deviation, or Max Dev.

As an example of how the Max Dev approach would work, assume a test condition has three runs as follows: Run 1: 10 at 20% nondetect; Run 2: 5 at 100% nondetect; and Run 3: 12 at 0% nondetect. The range of possible values is: 8-10 for Run 1; 0-5 for Run 2, and 12 for Run 3. The Max Dev approach assigns values iteratively within the allowable ranges for Run 1 and Run 2 such that the 99$^{th}$ percentile upper prediction limit for the 3-run data set is maximized. As a practical matter, the assumed value for a nondetect that maximizes the prediction limit is always either the highest or lowest value in the allowable range.

The Max Dev approach would generate floor levels that are only slightly higher than the MLE interval censoring approach. See the results of floor analyses for example data sets presented below using the three approaches we considered to address nondetects: (1) the proposed approach where nondetects are assumed to be present at the detection limit; (2) the maximum likelihood estimate (MLE) approach; and (3) the maximum deviation (Max Dev) approach.

We also note that, although the Max Dev approach would maximize the prediction limit rather than identifying the maximum likelihood estimate of the average and standard deviation, it would be applied to nondetect data where the detection limit is generally very low. Although the Max Dev approach would maximize the run-to-run deviation which maximizes the variability factor we use to calculate floor standards, this would affect only test conditions with nondetect emissions data. In addition, we note that, although the Max Dev approach would maximize the variability factor for nondetect data sets which would tend to increase the pooled variability of the best performing sources when we calculate the floor level, the average of the test condition runs for a best performing source with nondetects (that we use to calculate the average of the best performing sources and to which the pooled variability factor is applied) would be lower under the Max Dev approach than under the proposed approach.[7] This would tend to decrease the calculated floor level.

In summary, we are considering using the Max Dev approach because variability dampening of nondetects is a valid issue (i.e., failure to account for this variability would misestimate sources' performance) and the Max Dev approach is the only available approach that appears to be simple, works on all data sets, and produces valid results.

[7] Under the proposed approach of assuming nondetects are present at the detection level, the average of the test condition runs is maximized while run-to-run variability is dampened. Under the Max Dev approach, run-to-run variability would be maximized while the average of the test condition runs would be lower than if nondetects are assumed to be present at the detection limit. This is because each nondetect value is assumed to be present at either the minimum or maximum value in its possible range, depending on which value produces the highest 99$^{th}$ percentile upper prediction limit for the test condition runs.

Floor Calculations Using Alternative Approaches to Address Nondetects

| | | NDs at Detection Limit | MLE | Max Dev |
|---|---|---|---|---|
| Data Set 1 (3 of 5 best performers have ND data) | Potential Existing Source Floor | 16 | 24 | 25 |
| | Avg of Best Performers | 7.5 | 6.2 | 5.9 |
| | Pooled Variability | 3.2 | 6.7 | 6.8 |
| | Potential New Source Floor | 4.3 | 5.4 | 6.2 |
| Data Set 2 (2 of 6 best performers have ND data) | Potential Existing Source Floor | 200 | 200 | 200 |
| | Avg of Best Performers | 130 | 130 | 130 |
| | Pooled Variability | 26 | 28 | 28 |
| | Potential New Source Floor | 6.5 | 9.4 | 10 |
| Data Set 3 (Almost all data are ND) | Potential Existing Source Floor | 8.1 | 12 | 15 |
| | Avg of Best Performers | 3.5 | 1.9 | 2.2 |
| | Pooled Variability | 1.7 | 4.0 | 4.5 |
| | Potential New Source Floor | 0.37 | 1.2 | 1.2 |

## V. What Mercury Standard Might EPA Promulgate for a Mixed-Waste Liquid Fired Boiler?

We request comment on whether it is appropriate to apply the incinerator mercury emission standard to a commercial liquid fuel-fired boiler that burns mixed Alegacy@ wastes containing mercury. Mixed waste is both radioactive and hazardous waste that was generated during the manufacture, research, testing, and maintenance of the United States nuclear arsenal. It is called a "legacy" waste, because it was generated decades ago.

In comments on the proposed emissions standards for liquid fuel-fired boilers, DSSI (Diversified Scientific Services, Inc.) stated that it cannot achieve the proposed mercury standard using either feedrate control or MACT floor back end emission controls when it burns legacy mixed waste because those waste contains far more mercury than the hazardous waste burned by other liquid fuel-fired boilers. See OAR-0022-0285.

DSSI believes that waste minimization is not feasible for mixed legacy waste given that the waste has already been generated. In addition, DSSI states that it already employs significant feedrate control through fuel blending, and that further feedrate control is not practical. It also does not appear that this waste can be diverted to another source. The mixed waste must be disposed of at one of the two remaining combustion sources permitted to accept these wastes[8]. Only one other permitted mixed waste combustion source exists, and DSSI is believed to have better mercury emission controls and has been tested at higher mercury feedrate levels to accommodate treatment of these types of wastes. DSSI states that Athe mercury standard for liquid boilers as proposed would effectively create ›orphan= mercury wastes B wastes with no viable disposal outlet.@

[8] The other mixed waste combustor is a Department of Energy owned and operated incinerator located at Oak Ridge, TN.

DSSI also claims to have the same back-end control used by other hazardous waste combustors that have superior mercury control. DSSI employs a complex air pollution control train that includes a packed bed wet scrubbing system that achieves 93% mercury removal. DSSI also claims additional emission gas treatment using activated carbon is not practicable because it would generate a high quantity of spent carbon that would require disposal at other sources permitted to accept secondary radioactive waste.

DSSI claims that they can meet the proposed mercury standard for incinerators, and recommends that we establish a separate mercury standard for their source as the mercury standard we promulgate for incinerators. Should we agree that DSSI appears to be processing different types of mercury-bearing wastes than those combusted by all other liquid fuel boilers, establishing a separate mercury standard for DSSI may be warranted (as it would for any source with demonstrably unique, unalterable feedstock.) The incinerator MACT standard for mercury is one potential alternative. DSSI believes these legacy, mixed wastes have mercury concentrations similar to the types of hazardous wastes going to incinerators, they have the same, superior emission controls used at many incinerators, and, thus, the incinerator mercury standard is an appropriate standard to adopt for a boiler burning legacy, mixed waste.

If we were to adopt the incinerator mercury standard to address DSSI=s concerns, the incinerator mercury standard would apply only to DSSI and only when burning legacy, mixed waste.