which would reduce the MMT partial pressure to an even smaller value.

It is obvious from the above that the possibility of hazardous exposure of customers has to be much lower even than would be the case for TEL. When this is considered in light of the studies of Kehoe et al. in the 1960s on lead alkyls and service station attendants (who would have more exposure than self-service customers) in which it is concluded that no hazard existed, it would be extremely difficult to visualize the possibility of any hazard from use of MMT.

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Dear Sir:

We noted in a recent publication by Hinn
ners et al. (1) that they had taken care to evaluate potential interferences in their atomic absorption spectrophotometric analyses of hair for sodium, magnesium, potassium, calcium, manganese, iron, nickel, copper, zinc, cadmium and lead. We were initially pleased to note that full recoveries indicated no interferences since we had earlier reported that there were no interferences when atomic absorption was used to determine cadmium, copper, lead and zinc (2). However, we did find the use of the expression full recoveries unusual since the percent recovery for each metal is usually reported and should have been included in this publication. On reading further we were disappointed to find a poor sense of logic in their discussion of interferences.

These authors had suggested that: since additions of standards to portions of both their extracts and digests gave full recoveries indicating no interferences, calibration by the method of standard additions was not necessary. What is confusing here is that additions of standards to portions of the extracts and digests is calibration by the method of standard additions. This error in logic is compounded by their statement that: the use of the method of standard additions seems redundant after demonstrating that interference was absence, since they had apparently used the method of standard additions to obtain the results which indicated a lack of interferences. We presume that the end of their above statement should have been more correctly written as: interferences were absent.

We also wish to point out that additions of standards to digests can not be used to claim total recovery since this technique does not evaluate losses, if any, in the process of digestion. It would have been better to have added the standards to the hair samples prior to digestion.

It does seem redundant that these authors after having correctly done recovery studies first, which suggested that their analyses for all metals determined were interference free, evaluated the presence of negative ionization and chemical interferences which if present would have been inconsistent with full recoveries. Another possible interference which appears to be absent, with assumed recoveries of the order of 100%, but was not mentioned was a matrix-matching interference. With full recovery of each metal while using a background corrector the data were in hand to claim the absence of all of these interferences.

It would have been simpler to first do recovery studies by the methods of interpolation and additions, using the data routinely obtained in the usual operation of the atomic absorption spectrophotometer in the method of additions, with the use of a background corrector to eliminate absorption interferences. If total recoveries of the order of 100% were obtained, there would be no need to evaluate chemical, ionization or matrix-matching interferences. In this case the method of interpolation, which is usually more convenient to use, could have been
used with demonstrated accuracy and precision. The purpose of our earlier publication (2) was to make a special plea for the adoption of these procedures so that the data could be more meaningfully compared on an interlaboratory basis for epidemiologic studies.

We were disappointed that these authors did not fully appreciate this as a useful procedure. This was somewhat surprising since Hinners and Simmons (3) had sagaciously recognized an error in our writing, where the word higher was substituted for the word lower; which was overstated as serious criticism, but has been corrected in the literature (4).

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Thank you for the opportunity to publish a rebuttal letter in Environmental Health Perspectives, 10.

We gladly accept Dr. Sorenson’s gratitude (1) for our correction (2) of his publication (3). To be considered sagacious by both Dr. Sorenson and Dr. Petering is indeed an honor. We are further indebted to them (and to the Editor) for this opportunity to clarify comments in our publication (4).

Since the metals considered in the report by Sorenson et al. (4) are not subject to ionization interference as measured (5-7), it is surprising that these authors, after agreeing (1) with our correction (2), still consider an evaluation of ionization interference in their publication (3) to be pertinent.

We suggest that the conflict between our view and the view of Sorenson and Petering on the method of standard additions is based on semantics rather than logic. Since Sorenson et al. (3) used the method of standard additions for calibration in their recovery tests, they compensate for any interference in measurement of the added analyte. Consequently, the term “recovery” in their discussion refers only to physical loss of the added analyte before the actual measurements. Since we calibrated (4) on standard solutions per se, we use the term “recovery” to encompass interference effects in the measurements.

As a consequence of this semantic difference, our comments (4) and the comments of Sorenson and Petering on the method of standard additions, while equally logical, appear to be contradictory. By our definition of “recovery,” use of the method of standard additions is “redundant” (4) when recovery tests have demonstrated that interferences are absent. But since the recovery tests as conducted by Sorenson et al. (3) do not reveal interferences, their comparative use of the method of standard additions is appropriate. In the context of the terminology used by Sorenson et al. (3), our recovery tests do seem confusing. However, our recovery tests do not constitute use of the method of standard additions because we did not calibrate on the response differences between fortified and unfortified samples. In addition, since the method of standard additions is a calibration procedure, it does not per se indicate

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