amsa

Association of
Metropolitan
Sewerage Agencies



May 5, 2000

Geoff Grubbs
Director, Office of Science and Technology
U.S. Environmental Protection Agency
Ariel Rios Building (4301)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Dear Geoff:

As you know, AMSA's Mercury Workgroup was interested in performing additional sampling and analysis for mercury at four of the nine POTWs in EPA's 1994 *Analytical Survey of Nine POTWs from the Great Lakes Basin.* The four POTWs of interest had shown undetectable levels of mercury for one effluent grab sample taken at each of the facilities during EPA's study. AMSA's recent compilation of low level mercury sampling data at 23 POTWs[1] had not indicated any concentrations less than detection in 397 sample events. The four POTWs in EPA's 1994 study that showed undetectable levels of mercury were located in the following localities:

- West Bay County, Michigan
- City of Luddington, Michigan
- City of Buchanan, Michigan
- City of Delphos, Ohio

To perform the study, Frontier Geosciences was hired to conduct sampling and analysis at two of the four facilities in early March 2000. Efforts to secure EPA's original contractor for its 1994 study, Dyncorp I&ET, were unsuccessful due to the conflict of interest concerns cited by EPA officials.

Because the City of Delphos, Ohio had recently begun a low level mercury sampling effort as part of their NPDES permit renewal, AMSA did not feel the need to duplicate

[1] May 20, 1999 Letter to Tudor Davies (Attachment 3)

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their efforts. This facility provided AMSA with sampling results from 10 samples taken over the course of four months which are summarized in Attachment 1. The City of Buchanan was not able to authorize sampling at their facility due to a recent privatized takeover of their wastewater management operations.

A summary of the results for three of the four POTWs that had been previously achieved less than detectable levels of mercury in their effluent in 1994 are summarized in Table 1 below. Attachment 2 provides a copy of the sampling and analytical report provided by Frontier Geosciences, Inc. for West Bay County and the City of Luddington.

**Table 1 - Mercury Data for 3 POTWs From EPA GLI Study**

| Facility | # Samples | Average ppt | Minimum ppt | Maximum ppt | Median ppt |
|---|---|---|---|---|---|
| West Bay County, MI | 10 | 2.59 | 1.58 | 5.23 | 2.33 |
| Luddington, MI | 10 | 1.73 | 1.25 | 2.01 | 1.77 |
| Delphos, OH | 10 | 1.89[2] / 2.37[3] | < 1.2 | 7.48 | 1.74 |
| **Average** | 10 | 2.07 / 2.23 | 0.94 / 1.34 | 4.91 | 1.94 |

The average concentration of all the samples was 2.07 to 2.23 pt (depending on the handling of results below detection). This is less than the average of 7.71 ppt that was achieved at 23 POTWs in AMSA's May 20, 1999 compilation. However, this average effluent concentration is still almost twice that of the current GLI wildlife criterion level. One facility, Delphos, Ohio did achieve less than 1.2 ppt (below detection) in four of its 10 samples. Table 2 compares the individual sample results with existing or anticipated mercury permit limitations. As you will note, even these facilities with very low mercury effluents will have a difficult time meeting EPA's most stringent criterion of 1.3 ppt. Also, due to the

**Table 2 - Comparison to Existing or Anticipated Limits**

| Limit - ppt | % of Samples Above Value (n = 30) |
|---|---|
| 12 | 0 |
| 3 | 13% |
| 2 | 47% |
| 1.3 | 83% |

[2] Assigning less than detects at zero concentration.

[3] Assigning less than detects at concentration equal to level of detection.

variability in low level effluent results, the data also emphasize the need to base regulatory and compliance decisions on multiple sample results, and not upon single grab samples.

We also encourage EPA to use these data, along with mercury data presented in AMSA's May 20, 1999 letter, to supplement its cost analysis for its recent October 4, 1999 proposal to *Amend the Final Water Quality Guidance for the Great Lakes System to Prohibit Mixing Zones for Bioaccumulative Chemicals of Concern.* In this proposal, EPA provided for a limited exception to allow minimal BCC mixing zones to accommodate technical and economic factors only in exceptional circumstances. As our data indicate, even POTWs that have "clean" levels of mercury in effluent, can have levels of mercury significantly higher than regulatory compliance levels, illustrating the need for a broader compliance strategy than what is presented in EPA's proposal.

In addition to this targeted mercury sampling effort, AMSA's Mercury Workgroup is continuing its research in several other areas. We are nearing completion of a sampling study on domestic and household product sources of mercury and will be transmitting to you a final report in the next few weeks. We look forward to our meeting at 3:00 pm on May 23, 2000 where we can discuss the results of the POTW mercury sampling and domestic and household mercury sampling study, as well as other mercury-related issues in more detail. In the interim, if you have any questions, please feel free to call me at 202/833-9106.

Sincerely,

Margaret Nellor, Co-Chair
AMSA Mercury Workgroup

Guy Aydlett, Co-Chair
AMSA Mercury Workgroup

cc: Mark Hoeke, AMSA
Mike Cook, U.S. EPA Office of Wastewater Management
Mark Morris, U.S. EPA Office of Science and Technology

*ATTACHMENT 1*

*Mercury Sampling Results for the City of Delphos, Ohio*

# ATTACHMENT 1

## Mercury Sampling Results For the City of Delphos, Ohio

| Sample Date | Effluent Concentration (ppt) |
|---|---|
| 11/17/99 | 2.22 |
| 12/2/99 | 3.33 |
| 12/9/99 | 2.42 |
| 12/21/99 | 1.81 |
| 1/4/00 | < 1.2 |
| 1/18/00 | 1.68 |
| 2/2/00 | 7.48 |
| 2/15/00 | < 1.2 |
| 2/23/00 | < 1.2 |
| 2/29/00 | < 1.2 |

## *ATTACHMENT 2*

*Trace Mercury in Effluent Samples at West Bay County and the City of Luddington*

# Trace Mercury in Effluent Samples
# Association of Metropolitan Sewerage Agencies

March 22, 2000

Frontier Geosciences Inc.
414 Pontius N
Seattle, WA 98109

## 1. Scope of Work

Ten grab samples of effluent and one "composite" sample was collected from two sewage treatment plants (West Bay County WWTF and City of Luddington WWTF). Samples were collected using the clean-hands/dirty-hands methodologies described in EPA Method 1669. These samples were analyzed for total mercury using cold vapor atomic fluorescence spectrometry (CVAFS, EPA 1631).

## 2. Sampling Procedures

### West Bay County WWTP

Samples were collected from the flume immediately downstream of the chlorine contact chamber. Roughly 3-4" of water were flowing across this flume and it was possible to collect samples by hand. After collection of an equipment blank, ten grab samples and one "composite" sample were collected. The composite sample consists of roughly equal (~100mL) volumes of each grab sample poured into a 1-L Teflon container. The equipment blank was collected at the same location as the grab samples and simply consists of laboratory water poured into a randomly selected sample bottle.

### City of Luddington WWTP

Samples were collected from the discharge flume at the end of the final classifier (after chlorination). Approximately ½ inch of water flows over a weir and into the flume. The water flowing over the weir easily accessed by hand. Ten grab samples and one "composite" sample were collected. The composite sample and equipment blank were collected as described above.

## 3. Sample Receipt

All samples were sent to Frontier via FedEx on the day of sampling. Samples arrived the following day and were logged in according to Frontier's protocols. Samples were received secure and in good condition.

## 4. Analysis

Samples were processed using ultra-clean sample handling techniques in class 100 clean areas known to be low in atmospheric mercury. Reagents, gases, and deionized water are all reagent or ultra-pure grade, and previously analyzed for mercury to ensure very low blanks. Mercury analyses were performed using CVAFS (EPA Method 1631).

Daily analytical runs for were begun with a 5 point standard curve, spanning the entire analytical range of interest, with additional standards run every 10 samples. The daily standard curves were calculated using the blank-corrected initial standards, a linear regression forced through zero. For each analytical batch one matrix duplicate, two matrix spikes, and at least three method blanks were co-processed and analyzed in exactly the same manner as ordinary samples.

*Sample Digestion.* Mercury samples were oxidized with the addition of 1% (v/v) of BrCl in concentrated HCl (directly to the sample bottle) and allowed to oxidize overnight at room temperature.

*Total Hg analysis.* Digested samples were analyzed for total Hg in accordance with the standard operating procedures (SOPs) described in the Frontier Geosciences Quality Assurance manual. Aliquots of each digest (100 mL for whole water) were reduced in pre-purged double-distilled water to $Hg^{\circ}$ with $SnCl_2$, and then the $Hg^{\circ}$ purged onto gold traps as a preconcentration step. The Hg contained on the gold traps was then analyzed by thermal desorption into a cold vapor atomic fluorescence detector (CVAFS) using the dual amalgamation technique. Peak heights were measured by chart recorder and recorded on bench sheets in "chart units" to the nearest 0.2 unit.

## 5. Analytical Issues

There were no significant analytical difficulties experienced with these samples and all quality control analyses looked good. All blanks, standard reference materials, matrix spikes and matrix spike duplicate samples were within acceptable quality control limits.

**Total Mercury Results for AMSA - West Bay County WWTP**



Reported March 21, 2000

Frontier Geosciences Inc., 414 Pontius Ave. N, Seattle WA 98109

*Sample Results*

| Sample ID | Hg (ng/L) | Date | Time |
|---|---|---|---|
| WB-1 | 1.58 | 03/07/00 | 8:55 |
| WB-2 | 2.52 | 03/07/00 | 9:25 |
| WB-3 | 2.67 | 03/07/00 | 9:48 |
| WB-4 | 2.49 | 03/07/00 | 10:15 |
| WB-5 | 3.01 | 03/07/00 | 10:37 |
| WB-6 | 2.14 | 03/07/00 | 11:03 |
| WB-7 | 2.04 | 03/07/00 | 11:27 |
| WB-8 | 2.17 | 03/07/00 | 11:53 |
| WB-9 | 2.09 | 03/07/00 | 12:18 |
| WB-10 | 5.23 | 03/07/00 | 12:45 |
| WB-C | 2.30 | 03/07/00 | N/AP |

ng/L = nanograms/liter or parts-per-trillion
N/AP = not applicable

**Total Mercury Results for AMSA - City of Luddington WWTP**

Reported March 21, 2000

Frontier Geosciences Inc., 414 Pontius Ave. N, Seattle WA 98109

***Sample Results***

| Sample ID | Hg (ng/L) | Date | Time |
|---|---|---|---|
| CL-1 | 1.77 | 03/08/00 | 8:45 |
| CL-2 | 1.81 | 03/08/00 | 9:13 |
| CL-3 | 1.77 | 03/08/00 | 9:35 |
| CL-4 | 1.82 | 03/08/00 | 10:02 |
| CL-5 | 1.71 | 03/08/00 | 10:30 |
| CL-6 | 1.89 | 03/08/00 | 10:54 |
| CL-7 | 1.55 | 03/08/00 | 11:18 |
| CL-8 | 1.25 | 03/08/00 | 11:45 |
| CL-9 | 2.01 | 03/08/00 | 12:10 |
| CL-10 | 1.59 | 03/08/00 | 12:38 |
| CL-C | 1.73 | 03/08/00 | N/AP |

ng/L = nanograms/liter or parts-per-trillion
N/AP = not applicable

# Total Mercury Results for AMSA - Quality Control



Reported March 21, 2000

Frontier Geosciences Inc., 414 Pontius Ave. N, Seattle WA 98109

*Quality Control Data - Preparation Blank Report*

| Analyte (ng/L | PB1 | PB2 | PB3 | Mean | Std Dev | st. MDL |
|---|---|---|---|---|---|---|
| Hg | 0.017 | 0.051 | 0.012 | 0.027 | 0.021 | 0.10 |

Est. MDL = Estimated method detection limit

Std Dev = Standard deviation

*Quality Control Data - Equipment/Trip Blank Report*

| Analyte (ng/L | Sample ID | Hg |
|---|---|---|
| Hg | Trip Blank | ND |
| Hg | Equipment Blank - 3/7 | ND |
| Hg | Equipment Blank - 3/8 | ND |

ND = not detected

*Quality Control Data - Standard Reference Material Report*

| Analyte (mg/L | SRM Identity | Cert. Value | Obs. Value | % Rec. |
|---|---|---|---|---|
| Hg | NIST 1641d | 1.59 | 1.47 | 92.5 |

SRM Identity = Standard reference material identity

Cert. Value = Certified value

Obs. Value = Experimental result

% Rec. = Percent recovery

*Quality Control Data - Duplicate Report*

| Analyte (ng/L | Sample QC'd | Rep. 1 | Rep. 2 | Mean | RPD |
|---|---|---|---|---|---|
| Hg | WB-4 | 2.49 | 2.62 | 2.55 | 5.2 |

N/AP = another client's information used

ND = value below the MDL

N/C = not calculated.

*Quality Control Data - Matrix Spike / Matrix Spike Duplicate Report*

| Analyte (ng/L | Sample QC'd | Result | pike Leve | MS | % Rec. | MSD | % Rec. | RPD |
|---|---|---|---|---|---|---|---|---|
| Hg | CL-4 | 1.819 | 7 | 8.5 | 94.6 | 7.5 | 80.9 | 12.1 |
| Hg | WB-2 | 2.519 | 10 | 11.4 | 87.6 | 12.3 | 96.8 | 7.9 |
| Hg | WB-3 | 2.67 | 10.10 | 12.39 | 96.1 | 12.67 | 99.0 | 2.3 |

MS = matrix spike

MSD = matrix spike duplicate

RPD = relative percent difference

N/C = not calculated.

*ATTACHMENT 3*

*May 20, 1999 AMSA Letter to Tudor Davies - Compilation of Mercury Sampling Results*

amsa

Association of
Metropolitan
Sewerage Agencies



May 20, 1999

Mr. Tudor Davies
Director
Office of Science & Technology
Office of Water
U.S. Environmental Protection Agency
401 M Street, S.W., 4301
Washington, D.C. 20460

Dear Tudor:

As a follow-up to the January 19, 1999 meeting with AMSA's Mercury Workgroup, the purpose of this letter is to transmit some of the results from our mercury characterization project and to discuss issues related to Method 1631 regarding method detection levels (MDLs) and minimum levels (MLs).

## *Mercury Final Effluent Sampling Results*

As you will recall, our mercury characterization effort began in August 1998, when a call for data was distributed to identify AMSA members with mercury data obtained using clean sampling and sensitive analytical techniques. A number of other agencies with low level mercury data were also identified. Surveys were sent to each agency to obtain influent, effluent and biosolids data, as well as supporting information on the specific methods used, the type and model of instrumentation, contamination prevention protocols, containers, blanks, and holding times. Information was also obtained on populations served, flows, industrial contributions, and total suspended solids levels.

We have completed our compilation of final effluent mercury data, a summary of which is presented below.

1. The database is made up of 397 samples (both grab and composite) from 24 facilities that were analyzed using Method 1631.

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Suite 410
Washington, DC 20036-5302
202.833.AMSA
202.833.4657 FAX
info@amsa-cleanwater.org

2. Samples were collected and/or analyzed by DynCorp Environmental, Frontier Geosciences, Brooks Rand, Ltd., Battelle Marine Sciences, a university laboratory and various in-house laboratories.

3. The final effluent mercury values ranged from a minimum of 0.7 ppt to a maximum of 69.9 ppt, with average and median concentrations of 7.25 ppt and 5.0 ppt respectively. The 90$^{th}$ percentile value was 15.36 ppt.

4. The number of samples for each facility ranged from a minimum of two to a maximum of 70.

5. Facilities providing effluent data were located in six states: California, Connecticut, Minnesota, New York, Ohio and Oregon. We have not included data from Maine in our database, as the Maine Department of Department of Environmental Protection has recently completed its own characterization of mercury discharges from POTWs. A copy of that report is enclosed for your review and is discussed later in this letter as the data relate to our database.

6. Facility flows ranged from 0.65 million gallons per day (MGD) to 225 MGD with a median of 39.5 MGD.

7. The facilities serve populations ranging from 18,200 to 1.74 million with a median population of 384,000.

8. Average final effluent suspended solids ranged from 2 mg/L to 100 mg/L with a median concentration of 7.1 mg/L.

9. Percent industrial flow ranged from 0% to 80% with a median of 7%.

A summary of the final effluent data for each of the 24 facilities is presented below.

**Table 1 - AMSA Mercury Data**
**Final Effluent Samples By Facility**

| Facility ID | # Samples | Average ppt | Minimum ppt | Maximum ppt | Median ppt |
|---|---|---|---|---|---|
| A1 | 30 | 2.45 | 0.70 | 9.10 | 1.30 |
| B1 | 21 | 2.76 | 1.30 | 5.20 | 2.50 |
| C1 | 8 | 3.71 | 2.91 | 4.32 | 3.69 |
| D1 | 11 | 11.93 | 4.46 | 23.57 | 11.27 |

**Table 1 - AMSA Mercury Data
Final Effluent Samples By Facility**

| Facility ID | # Samples | Average ppt | Minimum ppt | Maximum ppt | Median ppt |
|---|---|---|---|---|---|
| G1 | 3 | 3.96 | 1.45 | 6.77 | 3.66 |
| L1 | 4 | 20.03 | 8.22 | 38.60 | 16.65 |
| M1 | 2 | 8.01 | 5.31 | 10.70 | 8.01 |
| N1 | 2 | 3.06 | 2.93 | 3.19 | 3.06 |
| O1 | 3 | 12.53 | 2.19 | 25.20 | 10.20 |
| Q1 | 4 | 5.13 | 2.59 | 11.60 | 3.17 |
| R1 | 4 | 2.59 | 1.88 | 3.07 | 2.70 |
| S1 | 3 | 6.81 | 1.80 | 16.10 | 2.53 |
| T1 | 3 | 3.00 | 3.00 | 3.00 | 3.00 |
| U1 | 16 | 12.44 | 4.00 | 25.00 | 13.00 |
| V1 | 21 | 6.52 | 3.00 | 15.00 | 7.00 |
| W1 | 4 | 4.00 | 3.00 | 5.00 | 4.00 |
| X1 | 4 | 3.75 | 3.00 | 5.00 | 3.50 |
| Y1 | 3 | 16.33 | 13.00 | 23.00 | 13.00 |
| Z1 | 62 | 12.10 | 2.50 | 69.90 | 10.60 |
| F2 | 27 | 7.29 | 3.70 | 11.20 | 6.40 |
| G2 | 14 | 8.39 | 4.40 | 12.10 | 9.10 |
| H2 | 61 | 6.30 | 3.00 | 21.30 | 5.20 |
| K2 | 17 | 19.35 | 10.00 | 49.00 | 16.00 |
| L2 | 70 | 2.56 | 1.00 | 9.00 | 2.00 |
| **Average** | **17** | **7.71** | **3.72** | **16.91** | **6.73** |

As part of our presentation at the January 19th meeting, we discussed how our data compared to existing or anticipated mercury limits. The data were also compared to data collected by EPA in 1994, which showed that total mercury was detected in five of the nine samples at levels ranging from 3 to 36 ppt.[1] We have revised that information using our updated database as shown below.

**Table 2 - Comparison to Existing or Anticipated Limits**

| Limit - ppt | % Facilities Exceeding (At Least One Sample) | % Facilities Always Exceeding | EPA Study % Facilities Exceeding[1] |
|---|---|---|---|
| 12 | 46% | 4% | 11% |
| 3 | 96% | 33% | 44% |
| 2 | 100% | 75% | 56% |
| 1.3 | 100% | 88% | 56% |
| 0.6 | 100% | 100% | 56% |

[1] Based on one sample per facility.

The Maine Department of Environmental Protection conducted a comprehensive monitoring program involving 75 POTWs in the fall of 1998. Method 1669 was used to collect the samples and Method 1631 was used to analyze them. The results of the sampling program are shown below.

**Table 3 - Mercury in Maine Municipal Effluents[2]**

| Number of Samples | Mercury Concentration (ppt) | | | |
|---|---|---|---|---|
| | Average | Minimum | Maximum | Median |
| 121 | 11.30 | 0.74 | 99.23 | 6.21 |

The minimum concentration reported by Maine DEP is very similar to the minimum value of 0.70 ppt in AMSA's data base. The other values are higher: DEP's maximum concentration was 99.23 ppt versus AMSA's maximum of 69.90 ppt; DEP's average concentration was 11.30 ppt versus AMSA's average of 7.25 ppt; and DEP's median concentration was 6.21 ppt versus AMSA median of 5.0 ppt.

[1] U.S. Environmental Protection Agency, An Analytical Survey of Nine POTWs from the Great Lakes Basin (Draft Report, December 15, 1994), p. 1.

[2] Based on 75 communities in Maine. From *Mercury in Wastewater: Discharges to the Waters of the State 1999*. Maine DEP, February 1, 1999.

As can be seen from Tables 2 and 3, the data collected by both AMSA and the Maine DEP differ significantly from the data collected by EPA as part of the 9 POTW study. Of most significance to AMSA is the apparent finding that all of these facilities will have a difficult time meeting low ppt effluent limits. In his January 27, 1999 letter to AMSA, Mark Morris indicated that EPA's clean methods study found that the concentrations of mercury in the effluent were "just above" EPA's most stringent criterion (presumably meaning the 1.3 ppt GLI wildlife criterion). As shown by our data and the data collected by Maine DEP, mercury levels are not "just above" the 1.3 ppt criterion. In fact, using AMSA's data, meeting the existing wildlife criterion of 1.3 ppt would require significant reductions in mercury concentrations ranging from 57% to 98%. While we believe that opportunities exist for source reduction and pollution prevention, these typically occur when there are industrial sources and associated high loading rates. However, when you get to these kinds of lower levels, most of the mercury is coming from non-industrial sources making it tougher, more costly and in many cases infeasible to achieve these reductions solely through pollution prevention.

However, please be assured that we are continuing to work on the issue of pollution prevention effectiveness and feasibility. As a first step, the AMSA Mercury Workgroup has identified at least 10 programs throughout the country that have characterized mercury in their effluents using sensitive sampling and analytical techniques, and have implemented different types of control programs. These case study sites are located in the Great Lakes States, Maine, Massachusetts, and California. The Workgroup plans to conduct telephone surveys of these cities during the spring of 1999, to determine:

- Why the programs were initiated;
- Where they started in terms of mercury loadings (sources and quantities);
- How they worked (program elements/design)
- What they achieved;
- What they cost; and
- If there is any potential for further reductions and the anticipated cost.

In concert with this work, AMSA has submitted a grant application to EPA[3] for support of a project that would develop more detailed information on a subset of these 10 case studies. The goals of the project are to demonstrate and evaluate the environmental benefits that result from implementation of mercury source control programs; to determine the feasibility of reducing POTW effluent levels to new regulatory compliance standards (<1 to 3 ppt) through the implementation of mercury source control programs; and to assist Federal, state, and local officials in determining appropriate cost effective mechanisms to control mercury discharges from POTWs.

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[3] *Evaluation of the Effectiveness of Publicly-Owned Treatment Works (POTW) Mercury Pollution Prevention / Minimization Programs*. AMSA, May 1999.

## *MDLs/MLs*

In EPA's March 5, 1999 Notice of Data Availability[4], a number of documents were referenced including a report by Battelle Marine Sciences Laboratory entitled *Method 1631 Effluent MDL Study*, November 1997.[5] As part of the effluent MDL study performed on October 8, 1997, the report indicates that:

> "Four samples of effluent from the City of Eugene, Oregon were composited into a 1 liter acid-cleaned teflon bottle. The previously determined Hg concentrations of these samples ranged from 0.563 to 0.782 ng/l."

When we first saw these effluent results, we were very surprised because they were at least an order of magnitude lower than what the City of Eugene had reported to us. Upon further investigation we have learned that the Eugene effluent samples presented in the Battelle report were in fact not effluent samples, but ambient river samples, mistakenly collected by a field technician.[6] This has been confirmed with the field technician and by Battelle comparing the results with other samples from the ambient water. Consequently, we request that EPA acknowledge this error and make any necessary correction in the public record, including some type of public notice.

In light of this information, it is apparent that EPA has not established an MDL and ML for Method 1631 that takes into consideration a wastewater matrix. Thus we urge EPA to:

1. Consider the results from at least one actual Method 1631 effluent MDL study utilizing actual, undiluted POTW effluent samples. If EPA is going re-do the effluent MDL study utilizing undiluted effluent samples, then the results of the study should go back out for public comments.

2. If EPA cannot find any POTW effluent samples with pre-dilution mercury concentrations suitable for an effluent MDL study, EPA must acknowledge that fact as a limitation in determining the appropriate MDL and ML for Method 1631. Diluting effluent mercury concentrations to suitably low levels for an MDL study is not an acceptable alternative, because the potential effluent matrix effects on the MDL are also diluted.

3. EPA must explicitly provide for and encourage effluent-specific determinations of MDLs and MLs in Method 1631, especially if the MDL and ML published for the method are not based on any effluent MDL studies utilizing actual, undiluted POTW effluent samples. The 1631protocol

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[4] Federal Register: March 5, 1999, Volume 64, Number 43, Page 10596-10597.

[5] Docket Report II-DCN B.6.

[6] Conversation with Mark Hoeke, AMSA and Linda Bingler, Battelle; April 19, 1999.

should include a requirement for labs to determine matrix-specific MDLs and use them in data reporting. There is now a somewhat indirect statement in the method that reads: "The detection limit and minimum level of quantitation in this Method usually are dependent on the level of interferences rather than instrumental limitations." That language should be revised to be more specific.

## *Next Steps*

We would very much like to meet with you in the near future to discuss these findings and issues, as well as some of the other tasks being conducted by the Workgroup. In the interim, if you have any questions, please feel free to call Margie Nellor at 562/699-7411, x-2801 or Mark Hoeke, AMSA Manager of Government Affairs at 202/833-9106.

Sincerely,

Margaret H. Nellor, Co-Chair
AMSA Mercury Workgroup

Guy Aydlett, Co-Chair
AMSA Mercury Workgroup

cc: Mark Hoeke, Manager, Government Affairs, AMSA
Mike Cook, Director, Office of Wastewater Management
Maria Gomez-Taylor, Office of Science &Technology, EAD
Matt Mitchell, EPA Region 9
Chris Bailey, California Water Resources Control Board
Sterling Pierce, Maine DEP

# AMSA POTW Low-Level Mercury Data Survey

*Total Mercury Using EPA Method 1631*

| Facility ID | Type | Test Method | Avg | Min | Max | Npts | Units | Avg Final Eff TSS | % Industrial Flow | Actual(A) or Design(D) Flow (MGD) | Service Population for Area(A) or Plant(P) | Lab | Instrumentation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | Influent | NA | | | | | | | | | | | NP |
| | Effluent | 1631 | 2.45 | 0.7 | 9.1 | 30 | ng/L | 4 | 2.7 | 155(D) | 1100000(A) | Dyncorp Analytical/EPA | |
| | Biosolids | NA | | | | | | | | | | | |
| B1 | Influent | NA | | | | | | | | | | Dyncorp Analytical/EPA | NP |
| | Effluent | 1631 | 2.76 | 1.3 | 5.2 | 21 | ng/L | 4 | 6.7 | 175(D) | 1100000(A) | Dyncorp Analytical/EPA | |
| | Biosolids | | 0.9 | 0.3 | 3.2 | 139 | mg/kg dry | | | | | | |
| C1 | Influent | | 161.26 | 56.75 | 432.1 | 4 | ng/L | | | | | Frontier Geosciences | Tekran |
| | Effluent | 1631 | 3.7 | 2.91 | 4.32 | 8 | ng/L | 13 | 41 | 103(D) | 384000(A) | Frontier Geosciences | Spectrophotometer |
| | Biosolids | | 0.81 | 0.2 | 3.3 | 46 | mg/kg | | | | | Frontier Geosciences | |
| D1 | Influent | NA | | | | | | | | | | | Tekran 2500 |
| | Effluent | 1631 | 11.9 | 4.46 | 23.57 | 11 | ng/L | 10 | NP | 80(D) | 370000(A) | University Laboratory | Hg Detector-CVAFS |
| | Biosolids | | <.25 | <.25 | 2.6 | 35 | mg/kg | | | | | | |
| G1 | Influent | | 87.12 | 62.35 | 111.4 | 3 | ng/L | | | | | Frontier Geosciences | Tekran |
| | Effluent | 1631 | 3.96 | 1.45 | 6.77 | 3 | ng/L | 7.1 | 10 | 18.5(D) | 60000(A) | Frontier Geosciences | Spectrophotometer |
| | Biosolids | | 1.61 | 1.21 | 3.33 | 12 | mg/kg | | | | | | |
| L1 | Influent | | 425.5 | 191 | 660 | 2 | ng/L | | | | | Brooks, Rand Ltd. | Analysis by Brooks |
| | Effluent | 1631 | 20.03 | 8.22 | 38.6 | 4 | ng/L | 15 | 8 | 92(A) | 460000(P) | Brooks, Rand Ltd. | Rand, LTD. |
| | Biosolids | | 1.349 | 0.062 | 5.1 | | mg/kg | | | | | Brooks, Rand Ltd. | (206) 632-6206 |
| M1 | Influent | | 307.5 | 226 | 389 | 2 | ng/L | | | | | Brooks, Rand Ltd. | Analysis by Brooks |
| | Effluent | 1631 | 8 | 5.31 | 10.7 | 2 | ng/L | NP | NP | 15(D) | NP | Brooks, Rand Ltd. | Rand, LTD. |
| | Biosolids | NA | | | | | | | | | | | (206) 632-6206 |
| N1 | Influent | | 52.45 | 50.5 | 54.4 | 2 | ng/L | | | | | Brooks, Rand Ltd. | Analysis by Brooks |
| | Effluent | 1631 | 3.06 | 2.93 | 3.19 | 2 | ng/L | NP | NP | NP | NP | Brooks, Rand Ltd. | Rand, LTD. |
| | Biosolids | NA | | | | | | | | | | | (206) 632-6206 |
| O1 | Influent | NA | | | | | | | | | | | Analysis by Brooks |
| | Effluent | 1631 | 12.53 | 2.19 | 25.2 | 3 | ng/L | 100 | 80* | 4(D) | NP | Brooks, Rand Ltd. | Rand, LTD. |
| | Biosolids | NA | | | | | | | | | | | (206) 632-6206 |
| Q1 | Influent | NA | | | | | | | | | | | Analysis by Brooks |
| | Effluent | 1631 | 5.13 | 2.59 | 11.6 | 4 | ng/L | 3 | NP | 0.65(D) | NP | Brooks, Rand Ltd. | Rand, LTD. |
| | Biosolids | NA | | | | | | | | | | | (206) 632-6206 |

# AMSA POTW Low-Level Mercury Data Survey

*Total Mercury Using EPA Method 1631*

| Facility ID | Type | Test Method | Avg | Min | Max | Npts | Units | Avg Final Eff TSS | % Industrial Flow | Actual(A) or Design(D) Flow (MGD) | Service Population for Area(A) or Plant(P) | Lab | Instrumentation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R1 | Influent | | 96.1 | 96.1 | 96.1 | 1 | ng/L | | | | | Brooks, Rand Ltd. | Analysis by Brooks |
| | Effluent | 1631 | 2.59 | 1.88 | 3.07 | 4 | ng/L | 30 | NP | 22(D) | NP | Brooks, Rand Ltd. | Rand, LTD. |
| | Biosolids | NA | | | | | | | | | | | (206) 632-6206 |
| | | | | | | | | | | | | | |
| S1 | Influent | NA | | | | | | | | | | | Analysis by Brooks |
| | Effluent | 1631 | 6.81 | 1.8 | 16.1 | 3 | ng/L | 5 | NP | 30(D) | NP | Brooks, Rand Ltd. | Rand, LTD. |
| | Biosolids | NA | | | | | | | | | | | (206) 632-6206 |
| | | | | | | | | | | | | | |
| T1 | Influent | NA | | | | | | | | | | | Brooks Rand Model 2 |
| | Effluent | 1631 | 3 | 3 | 3 | 3 | ng/L | 4 | 5 | 24.4(A) | 227330(P) | IN HOUSE | and Model 3 |
| | Biosolids | | 0.73 | 0.46 | 1.37 | 12 | mg/kg | | | | | IN HOUSE | |
| | | | | | | | | | | | | | |
| U1 | Influent | | 295 | 84 | 735 | 42 | ng/L | | | | | IN HOUSE | Brooks Rand Model 2 |
| | Effluent | 1631 | 12.44 | 4 | 25 | 16 | ng/L | 9 | 6.19 | 225(A) | 1738095(A) | IN HOUSE | and Model 3 |
| | Biosolids | | 1.22 | 0.67 | 1.8 | 11 | mg/kg | | | | | IN HOUSE | |
| | | | | | | | | | | | | | |
| V1 | Influent | | 295 | 84 | 735 | 42 | ng/L | | | | | IN HOUSE | Brooks Rand Model 2 |
| | Effluent | 1631 | 6.52 | 3 | 15 | 21 | ng/L | 9 | 6.19 | 225(A) | 1738095(A) | IN HOUSE | and Model 3 |
| | Biosolids | | 1.22 | 0.67 | 1.8 | 11 | mg/kg | | | | | IN HOUSE | |
| | | | | | | | | | | | | | |
| W1 | Influent | | 254 | 109 | 339 | 8 | ng/L | | | | | IN HOUSE | Brooks Rand Model 2 |
| | Effluent | 1631 | 4 | 3 | 5 | 4 | ng/L | 6 | 3.66 | 1.72(A) | 18200(P) | IN HOUSE | and Model 3 |
| | Biosolids | | 3.78 | 0.5 | 7.46 | 12 | mg/kg | | | | | IN HOUSE | |
| | | | | | | | | | | | | | |
| X1 | Influent | | 348 | 126 | 1293 | 6 | ng/L | | | | | IN HOUSE | Brooks Rand Model 2 |
| | Effluent | 1631 | 3.75 | 3 | 5 | 4 | ng/L | 10 | 0 | 2.01(A) | 31500(P) | IN HOUSE | and Model 3 |
| | Biosolids | | 0.79 | 0.44 | 1.29 | 9 | mg/kg | | | | | IN HOUSE | |
| | | | | | | | | | | | | | |
| Y1 | Influent | NA | | | | | | | | | | | Brooks Rand Model 2 |
| | Effluent | 1631 | 16.33 | 13 | 23 | 3 | ng/L | 6 | 9.2 | 26.5(A) | 211690 | IN HOUSE | and Model 3 |
| | Biosolids | | 0.85 | 0.44 | 1.86 | 12 | mg/kg | | | | | IN HOUSE | |
| | | | | | | | | | | | | | |
| Z1 | Influent | | | | | | | | | | | | Brooks-Rand Model 2 |
| | Effluent | 1631 | 12.1 | 2.5 | 69.9 | 62 | ng/L | NP | NP | NP | NP | IN HOUSE | Mercury Analyzer |
| | Biosolids | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| F2 | Influent | | 257.15 | 113 | 1086 | 41 | ng/L | | | | | Brooks, Rand Ltd. | NP |
| | Effluent | 1631 | 7.29 | 3.7 | 11.2 | 27 | ng/L | NP | NP | NP | NP | Brooks, Rand Ltd. | |
| | Biosolids | | 0.13 | 0.09 | 0.2 | 18 | mg/L | | | | | Brooks, Rand Ltd. | |



NP = Not Provided
NA = Not Analyzed

# AMSA POTW Low-Level Mercury Data Survey

*Total Mercury Using EPA Method 1631*

| Facility ID | Type | Test Method | Avg | Min | Max | Npts | Units | Avg Final Eff TSS | % Industrial Flow | Actual(A) or Design(D) Flow (MGD) | Service Population for Area(A) or Plant(P) | Lab | Instrumentation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G2 | Influent | | 227 | 113 | 384 | 14 | ng/L | | | | | IN HOUSE | NP |
| | Effluent | 1631 | 8.39 | 4.4 | 12.1 | 14 | ng/L | NP | NP | NP | NP | IN HOUSE | |
| | Biosolids | | 3.52 | 2.13 | 5.2 | 8 | mg/kg | | | | | IN HOUSE | |
| | | | | | | | | | | | | | |
| H2 | Influent | | | | | | | | | | | Battelle Marine Sciences | Custom built |
| | Effluent | 1631 | 6.3 | 3 | 21.27 | 61 | ng/L | 7 | 10 | 49(D) | 200,000 | Lab | by Battelle |
| | Biosolids | | 4.33 | 1.6 | 17 | 8 | mg/kg | | | | | | |
| | | | | | | | | | | | | | |
| J2 | Influent | | 163.7 | 163.7 | 163.7 | 1 | ng/L | | | | | Frontier Geosciences, Inc. | NP |
| | Effluent | | | | | | ng/L | 2 | 30 | 5.19(D) | 9500(P) | Frontier Geosciences, Inc. | |
| | Biosolids | | 0.508 | 0.29 | 0.76 | 5 | mg/kg | | | | | Maine Environmental Lab | |
| | | | | | | | | | | | | | |
| K2 | Influent | NA | | | | | | | | | | | Frontier Lab |
| | Effluent | 1631 | 19.35 | 10 | 49 | 17 | ng/L | 16 | 7 | 415(D) | 611000(P) | Frontier Geosciences | Equipment |
| | Biosolids | NA | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| L2 | Influent | 1631 | 289 | 97 | 923 | 35 | ng/L | | | | | | Perkin Elmer FIMS |
| | Effluent | 1631 | 2.56 | 1 | 9 | 70 | ng/L | 2 | 12 | 167(D) | 1200000(P) | IN HOUSE | Hg Hydride w/Amalgam |
| | Biosolids | | 2.2 | 0.072 | 3.3 | | mg/kg | | | | | | |

* Eighty percent of influent to this facility is from two paper plants.

# AMSA POTW Low-Level Mercury Data Survey

*Total Mercury Using EPA Method 1631*

| Facility ID | Low level Hg analysis | Clean room | Sample contamination prevention | Containers | Holding time | Sample | Sampling & analysis performed | MDL | Quantitation Limit | Blanks above MDL | Results reported |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | Presumably | Presumably | 1669 | Fluoropolymer | NP | | 5-97 to 6-97 | 0.6 ppt | NP | Field | No |
| | | | | | | Grab/Com | | | | | EPA Research |
| B1 | Presumably | Presumably | 1669 | Fluoropolymer | NP | | Dec-96 | 0.6 ppt | NP | Field | No |
| | | | | | | Grab/Com | | | | | EPA Research |
| | | | | | | Grab | | | | | |
| C1 | Yes | Yes | 1669 | Glass | <1 month | Grab | 5-98 and 9-98 | NP | No | NP | No |
| | | | | | | Grab | | | | | |
| D1 | Yes | Yes | Clean hands/Dirty hands | Teflon | < 1 week | | 11-95 to 4-97 | 0.165 ppt | No | NP | No |
| | | | Double-bag system | | | Grab | | | | | |
| G1 | Yes | Yes | 1669 | NP | 1-2 weeks | Grab | 9-97, 1-98, 6-98 | 0.03-0.6 ppt | No | Analytical | No |
| | | | | | | Grab | | | | | |
| L1 | NP | NP | 1669 | Teflon | NP | Grab | 1993-1996 | 0.03 - 0.2 ppt | 0.1 - 1.0 ppt | Field | NP |
| | | | | | | Grab | | | | | |
| M1 | NP | NP | 1669 | Teflon | NP | Grab | 1993-1996 | 0.03 - 0.2 ppt | 0.1 - 1.0 ppt | Field | NP |
| | | | | | | Grab | | | | | |
| N1 | NP | NP | 1669 | Teflon | NP | Grab | 1993-1996 | 0.03 - 0.2 ppt | 0.1 - 1.0 ppt | Field | NP |
| | | | | | | Grab | | | | | |
| O1 | NP | NP | 1669 | Teflon | NP | | 1993-1996 | 0.03 - 0.2 ppt | 0.1 - 1.0 ppt | Field | NP |
| | | | | | | Grab | | | | | |
| Q1 | NP | NP | 1669 | Teflon | NP | | 1993-1996 | 0.03 - 0.2 ppt | 0.1 - 1.0 ppt | Field | NP |
| | | | | | | Grab | | | | | |



NP = Not Provided
NA = Not Analyzed

# AMSA POTW Low-Level Mercury Data Survey

*Total Mercury Using EPA Method 1631*

| Facility ID | Low level Hg analysis | Clean room | Sample contamination prevention | Containers | Holding time | Sample | Sampling & analysis performed | MDL | Quantitation Limit | Blanks above MDL | Results reported |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R1 | NP | NP | 1669 | Teflon | NP | Grab | 1993-1996 | 0.03 - 0.2 ppt | 0.1 - 1.0 ppt | Field | NP |
| | | | | | | Grab | | | | | |
| S1 | NP | NP | 1669 | Teflon | NP | | 1993-1996 | 0.03 - 0.2 ppt | 0.1 - 1.0 ppt | Field | NP |
| | | | | | | Grab | | | | | |
| T1 | Yes | Yes | Clean hands/Dirty hands | Teflon | < 1 week | | NP | No | 0.05 - 0.04 ng/L | NP | No |
| | | | Class 100 clean areas | | | Grab | | | | | |
| | | | rigorous acid leaching | | | Grab | | | | | |
| U1 | Yes | Yes | Clean hands/Dirty hands | Teflon | < 1 week | Grab/Com | NP | No | 0.05 - 0.04 ng/L | NP | No |
| | | | Class 100 clean areas | | | Grab | | | | | |
| | | | rigorous acid leaching | | | Grab | | | | | |
| V1 | Yes | Yes | Clean hands/Dirty hands | Teflon | < 1 week | Grab/Com | NP | No | 0.05 - 0.04 ng/L | NP | No |
| | | | Class 100 clean areas | | | Grab | | | | | |
| | | | rigorous acid leaching | | | Grab | | | | | |
| W1 | Yes | Yes | Clean hands/Dirty hands | Teflon | < 1 week | Com | NP | No | 0.05 - 0.04 ng/L | NP | No |
| | | | Class 100 clean areas | | | Grab | | | | | |
| | | | rigorous acid leaching | | | Grab | | | | | |
| X1 | Yes | Yes | Clean hands/Dirty hands | Teflon | < 1 week | Com | NP | No | 0.05 - 0.04 ng/L | NP | No |
| | | | Class 100 clean areas | | | Grab | | | | | |
| | | | rigorous acid leaching | | | Grab | | | | | |
| Y1 | Yes | Yes | Clean hands/Dirty hands | Teflon | < 1 week | | NP | No | 0.05 - 0.04 ng/L | NP | No |
| | | | Class 100 clean areas | | | Grab | | | | | |
| | | | rigorous acid leaching | | | Grab | | | | | |
| Z1 | Yes | Yes | 1631 | Teflon | 1-2 weeks | | Since 95 | 1631 - <1 ppt | 1631 - ~1 ppt | NP | Yes |
| | | | | | | Grab | | | | | Hg Reduction Program |
| F2 | NP | NP | NP | NP | NP | Com | NP | NP | NP | NP | NP |
| | | | | | | Com | | | | | |

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Summary 1 Anon 1631 only

NP = Not Provided
NA = Not Analyzed

# AMSA POTW Low-Level Mercury Data Survey

*Total Mercury Using EPA Method 1631*

| Facility ID | Low level Hg analysis | Clean room | Sample contamination prevention | Containers | Holding time | Sample | Sampling & analysis performed | MDL | Quantitation Limit | Blanks above MDL | Results reported |
|---|---|---|---|---|---|---|---|---|---|---|---|
| G2 | NP | NP | NP | NP | NP | Grab/Com | NP | NP | NP | NP | NP |
| | | | | | | Grab/Com | | | | | |
| H2 | Yes | Yes | Clean Sampling | Teflon | NP | Composite | Since 12-95 | 0.05 ppt | NP | Field | Yes |
| | | | Procedures | | | | | | | | |
| J2 | NP | NP | As suggested by EPA | Glass | days | Grab | 9-98 | NP | NP | NP | Yes |
| | | | & MEDEP Protocol | | | Grab | | | | | |
| K2 | Yes | Yes | EPA 1669 | Teflon | 1-2 days | Grab/Com | 2/week | 0.06 ppt | NP | NP | No |
| L2 | Yes | Yes | EPA 1669 | Polypropylene | <2 weeks | Comp | 3-96 to 12/98 | 0.5 ppt | 2 ppt | NP | Yes |

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Summary 1 Anon 1631 only

NP = Not Provided
NA = Not Analyzed

## AMSA POTW Final Effluent Samples Collected Using Clean Techniques and Analyzed for Total Mercury Using EPA Method 1631 (Modified or Unmodified)

| Facility ID | Sample Date | Sample Type | Total Hg (ng/l) | Sampled by | Analyzed by |
|---|---|---|---|---|---|
| A1 | 5/30/97 | Grab | 1.1 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 5/30/97 | Grab | 1.2 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 5/30/97 | Grab | 1.4 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 5/30/97 | Grab | 0.9 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 5/30/97 | Grab | 1.0 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 5/30/97 | Grab | 0.9 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 5/30/97 | Grab | 1.1 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 5/30/97 | Grab | 1.2 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 5/30/97 | Shift Auto. Sampler Comp. | 3.0 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/3/97 | Grab | 1.2 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/3/97 | Grab | 1.4 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/3/97 | Grab | 2.9 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/3/97 | Grab | 7.7 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/3/97 | Grab | 1.3 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/3/97 | Grab | 1.8 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/3/97 | Grab | 1.3 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/3/97 | Grab | 9.1 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/3/97 | 24-hr. Auto. Sampler Comp. | 8.8 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/3/97 | Shift Auto. Sampler Comp. | 6.2 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/4/97 | Grab | 0.9 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/4/97 | Grab | 1.2 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/4/97 | Grab | 1.2 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/4/97 | Grab | 1.5 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/4/97 | Grab | 1.3 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/4/97 | Grab | 1.4 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/4/97 | Grab | 1.2 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/4/97 | Grab | 1.1 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/4/97 | 24-hr. Auto. Sampler Comp. | 5.3 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/4/97 | Shift Auto. Sampler Comp. | 0.7 | USEPA Analytical Methods Staff | DynCorp Environmental |
| A1 | 6/5/97 | 24-hr. Auto. Sampler Comp. | 4.1 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/3/96 | Grab | 1.8 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/3/96 | Grab | 2.5 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/3/96 | Grab | 1.7 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/3/96 | Grab | 2.3 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/3/96 | Grab | 2.1 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/3/96 | 24-hr. Auto. Sampler Comp. | 5.0 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/3/96 | Shift Auto. Sampler Comp. | 2.2 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/4/96 | Grab | 2.2 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/4/96 | Grab | 2.9 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/4/96 | 24-hr. Auto. Sampler Comp. | 3.8 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/5/96 | Grab | 3.2 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/5/96 | Grab | 2.9 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/5/96 | Shift Auto. Sampler Comp. | 5.2 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/6/96 | Grab | 2.6 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/6/96 | Grab | 3.3 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/6/96 | Grab | 1.3 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/6/96 | Grab | 2.3 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/6/96 | Grab | 2.8 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/6/96 | Grab | 2.0 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/6/96 | 24-hr. Auto. Sampler Comp. | 3.8 | USEPA Analytical Methods Staff | DynCorp Environmental |
| B1 | 12/6/96 | Shift Auto. Sampler Comp. | 2.1 | USEPA Analytical Methods Staff | DynCorp Environmental |
| C1 | 5/19/98 | Grab | 3.84 | In House | Frontier Geosciences |
| C1 | 5/21/98 | Grab | 4.19 | In House | Frontier Geosciences |
| C1 | 5/27/98 | Grab | 4.22 | In House | Frontier Geosciences |
| C1 | 5/29/98 | Grab | 4.32 | In House | Frontier Geosciences |
| C1 | 9/14/98 | Grab | 3.32 | In House | Frontier Geosciences |
| C1 | 9/16/98 | Grab | 3.53 | In House | Frontier Geosciences |
| C1 | 9/22/98 | Grab | 2.91 | In House | Frontier Geosciences |
| C1 | 9/24/98 | Grab | 3.31 | In House | Frontier Geosciences |
| D1 | 11/30/95 | Grab | 5.57 | University Laboratory | University Laboratory |

## AMSA POTW Final Effluent Samples Collected Using Clean Techniques and Analyzed for Total Mercury Using EPA Method 1631 (Modified or Unmodified)

| Facility ID | Sample Date | Sample Type | Total Hg (ng/l) | Sampled by | Analyzed by |
|---|---|---|---|---|---|
| V1 | 4/16/94 | Grab | 4 | In House | In House |
| V1 | 4/19/94 | Grab | 4 | In House | In House |
| V1 | 4/22/94 | Grab | 7 | In House | In House |
| V1 | 4/25/94 | Grab | 5 | In House | In House |
| V1 | 4/28/94 | Grab | 5 | In House | In House |
| V1 | 5/1/94 | Grab | 8 | In House | In House |
| V1 | 5/4/94 | Grab | 7 | In House | In House |
| V1 | 5/7/94 | Grab | 7 | In House | In House |
| V1 | 5/10/94 | Grab | 7 | In House | In House |
| V1 | 5/13/94 | Grab | 6 | In House | In House |
| V1 | 5/16/94 | Grab | 6 | In House | In House |
| V1 | 5/19/94 | Grab | 9 | In House | In House |
| V1 | 5/22/94 | Grab | 5 | In House | In House |
| V1 | 5/25/94 | Grab | 7 | In House | In House |
| V1 | 5/28/94 | Grab | 15 | In House | In House |
| W1 | 7/16/98 | Grab | 3 | In House | In House |
| W1 | 7/17/98 | Grab | 4 | In House | In House |
| W1 | 7/20/98 | Grab | 4 | In House | In House |
| W1 | 7/21/98 | Grab | 5 | In House | In House |
| X1 | 7/16/98 | Grab | 4 | In House | In House |
| X1 | 7/17/98 | Grab | 5 | In House | In House |
| X1 | 7/20/98 | Grab | 3 | In House | In House |
| X1 | 7/21/98 | Grab | 3 | In House | In House |
| Y1 | 5/3/95 | Grab | 23 | In House | In House |
| Y1 | 5/4/95 | Grab | 13 | In House | In House |
| Y1 | 5/5/95 | Grab | 13 | In House | In House |
| Z1 | 9/14/95 | 24-hr. Auto. Sampler Comp. | 20.59 | In House | In House |
| Z1 | 9/14/95 | Grab | 20.8 | In House | In House |
| Z1 | 9/14/95 | Grab | 22.1 | In House | In House |
| Z1 | 9/14/95 | Grab | 21.4 | In House | In House |
| Z1 | 9/14/95 | Grab | 21.2 | In House | In House |
| Z1 | 9/14/95 | Grab | 20.0 | In House | In House |
| Z1 | 9/14/95 | Grab | 19.0 | In House | In House |
| Z1 | 9/14/95 | Grab | 18.8 | In House | In House |
| Z1 | 9/14/95 | Grab | 21.4 | In House | In House |
| Z1 | 10/16/96 | Grab | 17.2 | In House | In House |
| Z1 | 10/16/96 | Grab | 16.6 | In House | In House |
| Z1 | 10/16/96 | Grab | 15.6 | In House | In House |
| Z1 | 10/16/96 | Grab | 14.7 | In House | In House |
| Z1 | 10/16/96 | Grab | 14.5 | In House | In House |
| Z1 | 10/16/96 | Grab | 14.3 | In House | In House |
| Z1 | 10/16/96 | Grab | 14.6 | In House | In House |
| Z1 | 10/16/96 | Grab | 14.9 | In House | In House |
| Z1 | 5/6/97 | 24-hr. Auto. Sampler Comp. | 7.1 | In House | In House |
| Z1 | 5/7/97 | 24-hr. Auto. Sampler Comp. | 7.1 | In House | In House |
| Z1 | 5/7/97 | Grab | 3.2 | In House | In House |
| Z1 | 5/12/97 | 24-hr. Auto. Sampler Comp. | 8.3 | In House | In House |
| Z1 | 5/13/97 | 24-hr. Auto. Sampler Comp. | 8.3 | In House | In House |
| Z1 | 5/13/97 | Grab | 3.2 | In House | In House |
| Z1 | 5/20/97 | 24-hr. Auto. Sampler Comp. | 7.5 | In House | In House |
| Z1 | 5/21/97 | 24-hr. Auto. Sampler Comp. | 7.5 | In House | In House |
| Z1 | 5/21/97 | Grab | 2.5 | In House | In House |
| Z1 | 5/27/97 | 24-hr. Auto. Sampler Comp. | 4.1 | In House | In House |
| Z1 | 5/27/97 | Grab | 2.6 | In House | In House |
| Z1 | 5/27/97 | 24-hr. Auto. Sampler Comp. | 4.1 | In House | In House |
| Z1 | 6/2/97 | 24-hr. Auto. Sampler Comp. | 13.5 | In House | In House |
| Z1 | 6/3/97 | 24-hr. Auto. Sampler Comp. | 13.5 | In House | In House |
| Z1 | 6/11/97 | 24-hr. Auto. Sampler Comp. | 11.1 | In House | In House |
| Z1 | 6/12/97 | 24-hr. Auto. Sampler Comp. | 11.1 | In House | In House |
| Z1 | 6/16/97 | 24-hr. Auto. Sampler Comp. | 10.6 | In House | In House |

## AMSA POTW Final Effluent Samples Collected Using Clean Techniques and Analyzed for Total Mercury Using EPA Method 1631 (Modified or Unmodified)

| Facility ID | Sample Date | Sample Type | Total Hg (ng/l) | Sampled by | Analyzed by |
|---|---|---|---|---|---|
| V1 | 4/16/94 | Grab | 4 | In House | In House |
| V1 | 4/19/94 | Grab | 4 | In House | In House |
| V1 | 4/22/94 | Grab | 7 | In House | In House |
| V1 | 4/25/94 | Grab | 5 | In House | In House |
| V1 | 4/28/94 | Grab | 5 | In House | In House |
| V1 | 5/1/94 | Grab | 8 | In House | In House |
| V1 | 5/4/94 | Grab | 7 | In House | In House |
| V1 | 5/7/94 | Grab | 7 | In House | In House |
| V1 | 5/10/94 | Grab | 7 | In House | In House |
| V1 | 5/13/94 | Grab | 6 | In House | In House |
| V1 | 5/16/94 | Grab | 6 | In House | In House |
| V1 | 5/19/94 | Grab | 9 | In House | In House |
| V1 | 5/22/94 | Grab | 5 | In House | In House |
| V1 | 5/25/94 | Grab | 7 | In House | In House |
| V1 | 5/28/94 | Grab | 15 | In House | In House |
| W1 | 7/16/98 | Grab | 3 | In House | In House |
| W1 | 7/17/98 | Grab | 4 | In House | In House |
| W1 | 7/20/98 | Grab | 4 | In House | In House |
| W1 | 7/21/98 | Grab | 5 | In House | In House |
| X1 | 7/16/98 | Grab | 4 | In House | In House |
| X1 | 7/17/98 | Grab | 5 | In House | In House |
| X1 | 7/20/98 | Grab | 3 | In House | In House |
| X1 | 7/21/98 | Grab | 3 | In House | In House |
| Y1 | 5/3/95 | Grab | 23 | In House | In House |
| Y1 | 5/4/95 | Grab | 13 | In House | In House |
| Y1 | 5/5/95 | Grab | 13 | In House | In House |
| Z1 | 9/14/95 | 24-hr. Auto. Sampler Comp. | 20.59 | In House | In House |
| Z1 | 9/14/95 | Grab | 20.8 | In House | In House |
| Z1 | 9/14/95 | Grab | 22.1 | In House | In House |
| Z1 | 9/14/95 | Grab | 21.4 | In House | In House |
| Z1 | 9/14/95 | Grab | 21.2 | In House | In House |
| Z1 | 9/14/95 | Grab | 20.0 | In House | In House |
| Z1 | 9/14/95 | Grab | 19.0 | In House | In House |
| Z1 | 9/14/95 | Grab | 18.8 | In House | In House |
| Z1 | 9/14/95 | Grab | 21.4 | In House | In House |
| Z1 | 10/16/96 | Grab | 17.2 | In House | In House |
| Z1 | 10/16/96 | Grab | 16.6 | In House | In House |
| Z1 | 10/16/96 | Grab | 15.6 | In House | In House |
| Z1 | 10/16/96 | Grab | 14.7 | In House | In House |
| Z1 | 10/16/96 | Grab | 14.5 | In House | In House |
| Z1 | 10/16/96 | Grab | 14.3 | In House | In House |
| Z1 | 10/16/96 | Grab | 14.6 | In House | In House |
| Z1 | 10/16/96 | Grab | 14.9 | In House | In House |
| Z1 | 5/6/97 | 24-hr. Auto. Sampler Comp. | 7.1 | In House | In House |
| Z1 | 5/7/97 | 24-hr. Auto. Sampler Comp. | 7.1 | In House | In House |
| Z1 | 5/7/97 | Grab | 3.2 | In House | In House |
| Z1 | 5/12/97 | 24-hr. Auto. Sampler Comp. | 8.3 | In House | In House |
| Z1 | 5/13/97 | 24-hr. Auto. Sampler Comp. | 8.3 | In House | In House |
| Z1 | 5/13/97 | Grab | 3.2 | In House | In House |
| Z1 | 5/20/97 | 24-hr. Auto. Sampler Comp. | 7.5 | In House | In House |
| Z1 | 5/21/97 | 24-hr. Auto. Sampler Comp. | 7.5 | In House | In House |
| Z1 | 5/21/97 | Grab | 2.5 | In House | In House |
| Z1 | 5/27/97 | 24-hr. Auto. Sampler Comp. | 4.1 | In House | In House |
| Z1 | 5/27/97 | Grab | 2.6 | In House | In House |
| Z1 | 5/27/97 | 24-hr. Auto. Sampler Comp. | 4.1 | In House | In House |
| Z1 | 6/2/97 | 24-hr. Auto. Sampler Comp. | 13.5 | In House | In House |
| Z1 | 6/3/97 | 24-hr. Auto. Sampler Comp. | 13.5 | In House | In House |
| Z1 | 6/11/97 | 24-hr. Auto. Sampler Comp. | 11.1 | In House | In House |
| Z1 | 6/12/97 | 24-hr. Auto. Sampler Comp. | 11.1 | In House | In House |
| Z1 | 6/16/97 | 24-hr. Auto. Sampler Comp. | 10.6 | In House | In House |

## AMSA POTW Final Effluent Samples Collected Using Clean Techniques and Analyzed for Total Mercury Using EPA Method 1631 (Modified or Unmodified)

| Facility ID | Sample Date | Sample Type | Total Hg (ng/l) | Sampled by | Analyzed by |
|---|---|---|---|---|---|
| Z1 | 6/17/97 | 24-hr. Auto. Sampler Comp. | 10.6 | In House | In House |
| Z1 | 6/30/97 | 24-hr. Auto. Sampler Comp. | 5.2 | In House | In House |
| Z1 | 7/1/97 | 24-hr. Auto. Sampler Comp. | 5.2 | In House | In House |
| Z1 | 8/19/97 | 24-hr. Auto. Sampler Comp. | 6.96 | In House | In House |
| Z1 | 8/27/97 | 24-hr. Auto. Sampler Comp. | 8.74 | In House | In House |
| Z1 | 9/3/97 | 24-hr. Auto. Sampler Comp. | 7.98 | In House | In House |
| Z1 | 9/9/97 | 24-hr. Auto. Sampler Comp. | 10.9 | In House | In House |
| Z1 | 9/23/97 | 24-hr. Auto. Sampler Comp. | 69.9 | In House | In House |
| Z1 | 9/30/97 | 24-hr. Auto. Sampler Comp. | 17.2 | In House | In House |
| Z1 | 10/7/97 | 24-hr. Auto. Sampler Comp. | 7.26 | In House | In House |
| Z1 | 10/16/97 | 24-hr. Auto. Sampler Comp. | 17.9 | In House | In House |
| Z1 | 10/22/97 | 24-hr. Auto. Sampler Comp. | 11.0 | In House | In House |
| Z1 | 10/28/97 | 24-hr. Auto. Sampler Comp. | 4.8 | In House | In House |
| Z1 | 11/4/97 | 24-hr. Auto. Sampler Comp. | 8.39 | In House | In House |
| Z1 | 11/12/97 | 24-hr. Auto. Sampler Comp. | 5.26 | In House | In House |
| Z1 | 11/18/97 | 24-hr. Auto. Sampler Comp. | 7.48 | In House | In House |
| Z1 | 11/24/97 | 24-hr. Auto. Sampler Comp. | 10.77 | In House | In House |
| Z1 | 12/3/97 | 24-hr. Auto. Sampler Comp. | 8.81 | In House | In House |
| Z1 | 12/9/97 | 24-hr. Auto. Sampler Comp. | 9.62 | In House | In House |
| Z1 | 12/15/97 | 24-hr. Auto. Sampler Comp. | 10.6 | In House | In House |
| Z1 | 12/21/97 | 24-hr. Auto. Sampler Comp. | 5.53 | In House | In House |
| Z1 | 12/28/97 | 24-hr. Auto. Sampler Comp. | 6.81 | In House | In House |
| Z1 | 5/4/98 | 24-hr. Auto. Sampler Comp. | 5.37 | In House | In House |
| Z1 | 5/12/98 | 24-hr. Auto. Sampler Comp. | 12.0 | In House | In House |
| Z1 | 5/18/98 | 24-hr. Auto. Sampler Comp. | 15.8 | In House | In House |
| Z1 | 5/25/98 | 24-hr. Auto. Sampler Comp. | 9.81 | In House | In House |
| Z1 | 6/1/98 | 24-hr. Auto. Sampler Comp. | 9.11 | In House | In House |
| Z1 | 6/9/98 | 24-hr. Auto. Sampler Comp. | 7.99 | In House | In House |
| F2 | 07/10/96 | Composite | 8.1 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 08/07/96 | Composite | 9.2 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 09/04/96 | Composite | 8.6 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 09/11/96 | Composite | 9 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 09/18/96 | Composite | 10 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 09/25/96 | Composite | 9.1 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 10/09/96 | Composite | 10.6 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 11/13/96 | Composite | 6.2 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 12/11/96 | Composite | 5.1 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 01/27/97 | Composite | 5.4 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 02/05/97 | Composite | 3.9 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 03/05/97 | Composite | 4.7 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 04/02/97 | Composite | 10.6 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 05/14/97 | Composite | 11.2 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 06/11/97 | Composite | 7.7 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 07/09/97 | Composite | 6.4 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 08/06/97 | Composite | 10.9 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 09/03/97 | Composite | 10.2 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 10/01/97 | Composite | 5.8 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 11/12/97 | Composite | 6.2 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 12/10/97 | Composite | 3.7 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 01/07/98 | Composite | 7.5 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 02/25/98 | Composite | 5.8 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 03/18/98 | Composite | 5.4 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 04/15/98 | Composite | 5.9 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 05/13/98 | Composite | 4.6 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| F2 | 06/10/98 | Composite | 5 | Brooks Rand, Ltd. | Brooks Rand, Ltd. |
| G2 | 03/12/98 | Comp/Grabs | 9.5 | In House | In House |
| G2 | 03/13/98 | Comp/Grabs | 9.2 | In House | In House |
| G2 | 03/14/98 | Comp/Grabs | 9.4 | In House | In House |
| G2 | 03/15/98 | Comp/Grabs | 9.5 | In House | In House |
| G2 | 03/16/98 | Comp/Grabs | 9.5 | In House | In House |

# AMSA POTW Final Effluent Samples Collected Using Clean Techniques and Analyzed for Total Mercury Using EPA Method 1631 (Modified or Unmodified)

| Facility ID | Sample Date | Sample Type | Total Hg (ng/l) | Sampled by | Analyzed by |
|---|---|---|---|---|---|
| G2 | 03/17/98 | Comp/Grabs | 8.6 | In House | In House |
| G2 | 03/18/98 | Comp/Grabs | 12.1 | In House | In House |
| G2 | 06/18/98 | Comp/Grabs | 7.4 | In House | In House |
| G2 | 06/19/98 | Comp/Grabs | 7.4 | In House | In House |
| G2 | 06/20/98 | Comp/Grabs | 6.6 | In House | In House |
| G2 | 06/21/98 | Comp/Grabs | 5.5 | In House | In House |
| G2 | 06/22/98 | Comp/Grabs | 4.4 | In House | In House |
| G2 | 06/23/98 | Comp/Grabs | 9.3 | In House | In House |
| G2 | 06/24/98 | Comp/Grabs | 9 | In House | In House |
| H2 | 12/19/95 | Composite | 3.3 | In House | Battelle Marine Sciences |
| H2 | 12/20/95 | Composite | 3.9 | In House | Battelle Marine Sciences |
| H2 | 12/21/95 | Composite | 4.5 | In House | Battelle Marine Sciences |
| H2 | 01/30/96 | Composite | 8.7 | In House | Battelle Marine Sciences |
| H2 | 01/31/96 | Composite | 7.7 | In House | Battelle Marine Sciences |
| H2 | 02/01/96 | Composite | 7.2 | In House | Battelle Marine Sciences |
| H2 | 02/27/96 | Composite | 5.7 | In House | Battelle Marine Sciences |
| H2 | 02/28/96 | Composite | 7.9 | In House | Battelle Marine Sciences |
| H2 | 02/29/96 | Composite | 4.3 | In House | Battelle Marine Sciences |
| H2 | 03/26/96 | Composite | 5.7 | In House | Battelle Marine Sciences |
| H2 | 03/27/96 | Composite | 6.7 | In House | Battelle Marine Sciences |
| H2 | 03/28/96 | Composite | 4.9 | In House | Battelle Marine Sciences |
| H2 | 05/23/96 | Composite | 4 | In House | Battelle Marine Sciences |
| H2 | 05/24/96 | Composite | 3 | In House | Battelle Marine Sciences |
| H2 | 08/28/96 | Composite | 8.8 | In House | Battelle Marine Sciences |
| H2 | 08/29/96 | Composite | 8.6 | In House | Battelle Marine Sciences |
| H2 | 08/30/96 | Composite | 8.2 | In House | Battelle Marine Sciences |
| H2 | 09/30/96 | Composite | 16.3 | In House | Battelle Marine Sciences |
| H2 | 10/02/96 | Composite | 21.3 | In House | Battelle Marine Sciences |
| H2 | 12/19/96 | Composite | 4.8 | In House | Battelle Marine Sciences |
| H2 | 12/20/96 | Composite | 5.2 | In House | Battelle Marine Sciences |
| H2 | 12/20/96 | Composite | 5.7 | In House | Battelle Marine Sciences |
| H2 | 02/18/97 | Composite | 4.1 | In House | Battelle Marine Sciences |
| H2 | 02/18/97 | Composite | 4.2 | In House | Battelle Marine Sciences |
| H2 | 02/19/97 | Composite | 5.2 | In House | Battelle Marine Sciences |
| H2 | 02/20/97 | Composite | 4.8 | In House | Battelle Marine Sciences |
| H2 | 04/29/97 | Composite | 3.6 | In House | Battelle Marine Sciences |
| H2 | 04/29/97 | Composite | 3.2 | In House | Battelle Marine Sciences |
| H2 | 04/30/97 | Composite | 4.2 | In House | Battelle Marine Sciences |
| H2 | 05/01/97 | Composite | 3.90 | In House | Battelle Marine Sciences |
| H2 | 08/05/97 | Composite | 3.40 | In House | Battelle Marine Sciences |
| H2 | 08/05/97 | Composite | 12.00 | In House | Battelle Marine Sciences |
| H2 | 08/06/97 | Composite | 3.30 | In House | Battelle Marine Sciences |
| H2 | 08/07/97 | Composite | 3.20 | In House | Battelle Marine Sciences |
| H2 | 11/05/97 | Composite | 4.30 | In House | Battelle Marine Sciences |
| H2 | 11/05/97 | Composite | 4.60 | In House | Battelle Marine Sciences |
| H2 | 11/06/97 | Composite | 4.70 | In House | Battelle Marine Sciences |
| H2 | 11/07/97 | Composite | 4.60 | In House | Battelle Marine Sciences |
| H2 | 02/03/98 | Composite | 3.00 | In House | Battelle Marine Sciences |
| H2 | 02/03/98 | Composite | 3.30 | In House | Battelle Marine Sciences |
| H2 | 02/03/98 | Composite | 3.00 | In House | Battelle Marine Sciences |
| H2 | 02/04/98 | Composite | 6.30 | In House | Battelle Marine Sciences |
| H2 | 02/05/98 | Composite | 3.40 | In House | Battelle Marine Sciences |
| H2 | 4/29/98 | Composite | 4.70 | In House | Battelle Marine Sciences |
| H2 | 4/29/98 | Composite | 5.40 | In House | Battelle Marine Sciences |
| H2 | 4/30/98 | Composite | 4.30 | In House | Battelle Marine Sciences |
| H2 | 4/30/98 | Composite | 3.70 | In House | Battelle Marine Sciences |
| H2 | 8/12/98 | Composite | 8.90 | In House | Battelle Marine Sciences |
| H2 | 8/12/98 | Composite | 10.10 | In House | Battelle Marine Sciences |
| H2 | 8/13/98 | Composite | 7.70 | In House | Battelle Marine Sciences |
| H2 | 8/14/98 | Composite | 5.50 | In House | Battelle Marine Sciences |

## AMSA POTW Final Effluent Samples Collected Using Clean Techniques and Analyzed for Total Mercury Using EPA Method 1631 (Modified or Unmodified)

| Facility ID | Sample Date | Sample Type | Total Hg (ng/l) | Sampled by | Analyzed by |
|---|---|---|---|---|---|
| H2 | 10/27/98 | Composite | 7.2 | In House | Battelle Marine Sciences |
| H2 | 10/27/98 | Composite | 13.6 | In House | Battelle Marine Sciences |
| H2 | 10/27/98 | Composite | 12.3 | In House | Battelle Marine Sciences |
| H2 | 10/28/98 | Composite | 7.1 | In House | Battelle Marine Sciences |
| H2 | 10/29/98 | Composite | 6.6 | In House | Battelle Marine Sciences |
| H2 | 2/24/98 | Composite | 7 | In House | Battelle Marine Sciences |
| H2 | 2/24/98 | Composite | 7 | In House | Battelle Marine Sciences |
| H2 | 2/24/98 | Composite | 7 | In House | Battelle Marine Sciences |
| H2 | 2/25/98 | Composite | 6.2 | In House | Battelle Marine Sciences |
| H2 | 2/26/98 | Composite | 11.3 | In House | Battelle Marine Sciences |
| K2 | 1/7/99 | Comp/Grabs | 18 | In House | Frontier Geosciences |
| K2 | 1/7/99 | Comp/Grabs | 20 | In House | Frontier Geosciences |
| K2 | 1/7/99 | Comp/Grabs | 15 | In House | Frontier Geosciences |
| K2 | 1/12/99 | Comp/Grabs | 13 | In House | Frontier Geosciences |
| K2 | 1/12/99 | Comp/Grabs | 13 | In House | Frontier Geosciences |
| K2 | 1/12/99 | Comp/Grabs | 12 | In House | Frontier Geosciences |
| K2 | 1/21/99 | Comp/Grabs | 34 | In House | Frontier Geosciences |
| K2 | 1/21/99 | Comp/Grabs | 11 | In House | Frontier Geosciences |
| K2 | 1/26/99 | Comp/Grabs | 11 | In House | Frontier Geosciences |
| K2 | 1/26/99 | Comp/Grabs | 13 | In House | Frontier Geosciences |
| K2 | 1/26/99 | Comp/Grabs | 10 | In House | Frontier Geosciences |
| K2 | 2/5/99 | Comp/Grabs | 16 | In House | Frontier Geosciences |
| K2 | 2/5/99 | Comp/Grabs | 19 | In House | Frontier Geosciences |
| K2 | 2/9/99 | Comp/Grabs | 42 | In House | Frontier Geosciences |
| K2 | 2/9/99 | Comp/Grabs | 17 | In House | Frontier Geosciences |
| K2 | 2/18/99 | Comp/Grabs | 49 | In House | Frontier Geosciences |
| K2 | 2/18/99 | Comp/Grabs | 16 | In House | Frontier Geosciences |
| L2 | 3/21/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 4/15/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 5/7/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 6/3/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 7/8/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 8/4/96 | 24-hr Comp | 3 | In House | In House |
| L2 | 9/4/96 | 24-hr Comp | 3 | In House | In House |
| L2 | 10/27/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 11/3/96 | 24-hr Comp | 3 | In House | In House |
| L2 | 12/1/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 12/4/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 12/13/96 | 24-hr Comp | 3 | In House | In House |
| L2 | 12/14/96 | 24-hr Comp | 3 | In House | In House |
| L2 | 12/15/96 | 24-hr Comp | 3 | In House | In House |
| L2 | 12/16/96 | 24-hr Comp | 3 | In House | In House |
| L2 | 12/17/96 | 24-hr Comp | 3 | In House | In House |
| L2 | 12/22/96 | 24-hr Comp | 3 | In House | In House |
| L2 | 12/23/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 12/24/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 12/25/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 12/26/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 12/27/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 12/28/96 | 24-hr Comp | 2 | In House | In House |
| L2 | 1/1/97 | 24-hr Comp | 3 | In House | In House |
| L2 | 1/8/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 1/9/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 1/11/97 | 24-hr Comp | 3 | In House | In House |
| L2 | 1/12/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 1/13/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 1/22/97 | 24-hr Comp | 1 | In House | In House |
| L2 | 1/23/97 | 24-hr Comp | 1 | In House | In House |
| L2 | 1/24/97 | 24-hr Comp | 1 | In House | In House |
| L2 | 1/25/97 | 24-hr Comp | 2 | In House | In House |

## AMSA POTW Final Effluent Samples Collected Using Clean Techniques and Analyzed for Total Mercury Using EPA Method 1631 (Modified or Unmodified)

| Facility ID | Sample Date | Sample Type | Total Hg (ng/l) | Sampled by | Analyzed by |
|---|---|---|---|---|---|
| L2 | 1/26/97 | 24-hr Comp | 4 | In House | In House |
| L2 | 1/27/97 | 24-hr Comp | 4 | In House | In House |
| L2 | 2/3/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 2/4/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 2/7/97 | 24-hr Comp | 3 | In House | In House |
| L2 | 2/8/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 2/9/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 2/10/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 2/11/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 2/12/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 2/23/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 3/3/97 | 24-hr Comp | 5 | In House | In House |
| L2 | 3/5/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 4/2/97 | 24-hr Comp | 3 | In House | In House |
| L2 | 5/5/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 5/15/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 6/1/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 7/1/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 8/5/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 9/3/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 10/2/97 | 24-hr Comp | 1 | In House | In House |
| L2 | 11/4/97 | 24-hr Comp | 2 | In House | In House |
| L2 | 12/2/97 | 24-hr Comp | 2.5 | In House | In House |
| L2 | 1/5/98 | 24-hr Comp | 3 | In House | In House |
| L2 | 2/4/98 | 24-hr Comp | 9 | In House | In House |
| L2 | 3/3/98 | 24-hr Comp | 4 | In House | In House |
| L2 | 3/10/98 | 24-hr Comp | 4 | In House | In House |
| L2 | 4/7/98 | 24-hr Comp | 3 | In House | In House |
| L2 | 5/5/98 | 24-hr Comp | 3 | In House | In House |
| L2 | 5/13/98 | 24-hr Comp | 4 | In House | In House |
| L2 | 6/4/98 | 24-hr Comp | 3 | In House | In House |
| L2 | 7/7/98 | 24-hr Comp | 2 | In House | In House |
| L2 | 8/6/98 | 24-hr Comp | 4 | In House | In House |
| L2 | 9/1/98 | 24-hr Comp | 2 | In House | In House |
| L2 | 10/27/98 | 24-hr Comp | 3 | In House | In House |
| L2 | 11/3/98 | 24-hr Comp | 3 | In House | In House |
| L2 | 12/1/98 | 24-hr Comp | 3.5 | In House | In House |
| | | | | | |
| | | **Number =** | **397** | | |
| | | **Arithmetic Mean =** | **7.25** | | |
| | | **Maximum =** | **69.90** | | |
| | | **90th Percentile =** | **15.36** | | |
| | | **75th Percentile =** | **9.20** | | |
| | | **Median =** | **5.00** | | |
| | | **25th Percentile =** | **3.00** | | |
| | | **10th Percentile =** | **2.00** | | |
| | | **5th Percentile =** | **1.30** | | |
| | | **Minimum =** | **0.70** | | |
| | | **GEOMEAN =** | **5.17** | | |