BEHAVIOR OF MERCURY IN THE FORMIC ACID VENT CONDENSER- FINAL REPORT (U)

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BACKGROUND

The performance of the Defense Waste Processing Facility (DWPF) Formic Acid Vent Condenser (FAVC) is the subject of a DWPF Technology Issue. Several studies of the performance of this condenser were performed in the Integrated DWPF Melter System (IDMS) at TNX. The FAVC is a chilled water condenser with a High Efficiency Mist Eliminator (HEME) and is designed to cool to 10°C the offgas from the Sludge Receipt and Adjustment Tank (SRAT), Slurry Mix Evaporator (SME), Melter Feed Tank (MFT), Recycle Collection Tank (RCT) (all via the Ammonia Scrubbers), and the Precipitate Reactor Bottoms Tank (PRBT). The offgas system is shown in Figure 1 (for IDMS, there is no PRBT and the SRAT is also used as the SME). The scrubbing liquid supply system for the Ammonia Scrubbers is taken from the SMECT, which is maintained at a pH of 1-3 by addition of nitric acid. By cooling to 10°C or less, water vapor is removed such that it will not condense downstream in the Process Vessel Vent Header, and the mercury content should be reduced to saturation at or below 10°C. Mercury emissions from DWPF are limited by an environmental permit;¹ in this permit it is assumed that the mercury concentration exiting the FAVC does not exceed saturation at the exit temperature (which is assumed to be 10°C except during peak NO_x evolution).

Figure 1. Offgas System Schematic (IDMS).

In the DWPF nitric acid flowsheet, nitric acid is first added to the SRAT at 90-95°C to add nitrate and to neutralize basic components in the sludge. No mercury is stripped during this step, since the mercury exists as the oxide in the sludge. Next, Precipitate Hydrolysis Aqueous, or PHA (product from the DWPF Precipitate Hydrolysis Process,

which contains the cesium removed during the In-Tank Precipitation process), is added to the SRAT at boiling. The PHA contains formic acid and formate that reduce mercuric oxide to elemental mercury; the elemental mercury is then stripped from the SRAT by evaporation during the addition of the PHA. Most of the stripped mercury is condensed in the SRAT condenser and collected in the Mercury Water Wash Tank (MWWT).

To determine if the mercury content of the offgas exiting the FAVC will be at or below saturation, measurements of the mercury concentration in the offgas were performed during the BL1, PX6, and PX7 runs of the Integrated DWPF Melter System (IDMS). Results from the BL1 and PX6 runs have been previously reported.² In these runs, it was found that the concentration of mercury at the FAVC exit substantially exceeded the saturation concentration. For both of these runs, the High Efficiency Mist Eliminator (HEME) in the FAVC was bypassed. In the PX7 run, the HEME was not bypassed, and results from this run are reported herein.

SUMMARY

The concentrations of mercury at the FAVC inlet and exit were measured during the BL1 and PX6 runs of the Integrated DWPF Melter System (IDMS) with the HEME bypassed and without the ammonia scrubber. The results showed that mercury concentrations of approximately 1.02-12.7 (mean 5.74) times saturation occurred at the FAVC exit. The concentration of mercury at the FAVC inlet was found to be 0.66-6.2 times the saturation value (based on the SRAT condenser exit).

In the PX7 run, the ammonia scrubber was used and the FAVC HEME was not bypassed. The results from this run showed that the FAVC inlet concentrations again were above saturation (1.45-15.5 times saturation), but that the FAVC exit concentrations were only 0.02-0.41 times saturation (except for one data point at 1.61 times saturation).

Operation of the FAVC without the HEME could therefore result in FAVC exit mercury concentrations of greater than 5.74 times saturation, which would result in DWPF emitting greater than 405 lb/yr of mercury at 100% attainment; this quantity is well in excess of the permit limit of 175 lb/yr (for all of DWPF). However, with the HEME in place, the emissions are predicted to be only about 40 lb/yr for an FAVC exit temperature of 10°C. The experimental results also indicate that the ammonia scrubbers have little effect on the removal of mercury.

EXPERIMENTAL

The concentration of total mercury (as Hg^{+2} and elemental Hg) in the offgas was measured by extracting samples from the offgas system. These samples were passed through impingers (bubblers) to absorb the mercury. The gas samples were first passed through two impingers containing 2 M NaOH to remove most of the NO_x and protect the downstream impingers from oxidation. The gas samples were then passed through three impingers containing 1.5-4 (w/v)% KMnO_4 in 10 (v/v)% H_2SO_4 . The use of

KMnO₄ in H₂SO₄ has been described as the most effective method for absorbing elemental mercury, mercury compounds (except organomercury compounds), and particulate mercury. The mercury is oxidized to form Hg⁺². A removal efficiency of 90-96% for a single impinger and 99% for two or more impingers has been reported.^{3,4,5,6,7}

In the presence of oxidizing gases such as SO₂ or NO_x, pretreatment of the gas sample is necessary to preserve the absorbing ability of the KMnO₄/H₂SO₄ absorbent.³ For SO₂, the use of acidic H₂O₂ is recommended. Caustic (NaOH) may also be used, but it will absorb some of the mercury present and convert it to HgO. However, for this work, caustic was used since the impingers containing the caustic were also analyzed for mercury.

The analysis of the impinger samples was performed by Vapor Generation Apparatus (VGA) (cold vapor) atomic absorption (AA) spectroscopy by the DWPT laboratory at TNX. The caustic impinger solutions were treated with acidic permanganate to oxidize all the mercury to Hg⁺² and then the mercury was reduced to elemental Hg by hydroxylamine before measurement on the AA. The KMnO₄/H₂SO₄ impinger solutions were also treated with hydroxylamine before measurement on the AA.

RESULTS AND DISCUSSION

Sampling for mercury at the exit of the FAVC (without the HEME or ammonia scrubber) was conducted during the BL1 (6/90), PX6 (12/93), and PX7 (12/94) runs of the IDMS. In the BL1 and PX7 runs, sampling at the FAVC inlet was also performed. The BL1 run used the DWPF formic acid flowsheet, whereas the PX6 and PX7 runs used the nitric acid flowsheet. Sampling in BL1 was performed during the formic acid reflux period, during which most of the mercury is stripped from the sludge. In PX6 and PX7, sampling was done during the Precipitate Hydrolysis Aqueous (PHA) addition, where most of the mercury is stripped. Sampling during nitric acid addition was not performed since mercury is not evolved during this phase.

Figures 2a-c show the total mercury loading (mg) in each impinger for the samples taken during the three runs (the data are shown on multiple scales so that the values from the start of each train to the end can be seen more clearly). In most cases, the loading of the last (KMnO₄) impinger was close to zero or much less than the previous impinger. For these samples, virtually all of the mercury was scrubbed in the sample train. However, for some samples, with high mercury loadings in the last impinger, not all of the mercury was scrubbed in the sample train. Therefore, the actual mercury concentrations in the offgas samples were higher than reported. The samples where the mercury would be higher than reported are identified by a ♦.

The total amount of mercury absorbed by the impinger train was calculated from the analyses of the individual impingers. This information, combined with the volume of gas sampled, was then used to determine the concentration of mercury in the gas sample.

Figure 2a. Total Mercury Loading per Inlet Impinger for the BL1 and PX7 Runs.

Figure 2b. Total Mercury Loading per Outlet Impinger for the BL1 and PX6 Runs.

Figure 2c. Total Mercury Loading per Outlet Impinger for the PX7 Run.

Figure 3. Concentration of Mercury at the FAVC Inlet.

Figure 3 shows the concentration of mercury measured at the FAVC inlet and the concentration of mercury that would have existed if the offgas had been saturated with mercury at the scrubber exit. The concentration expected at the FAVC inlet is less than that at the scrubber exit due to the dilution by the tank (MWWT, MFT, WWPT) air purges (see Figure 1).

It was expected that the ammonia scrubber would reduce the concentration of mercury in the vapor by stripping since elemental mercury dissolves in nitric acid solutions, forming $\text{Hg}(\text{NO}_3)_2$, or mercuric nitrate. However, the concentration of mercury exiting the scrubber was equal to or greater than the saturation concentration at the exit of the SRAT condenser for all but two of the samples. Figure 4 shows the concentration of mercury in the scrubber liquid and the total amount of mercury scrubbed into the scrub solution, both as functions of time. The total amount of mercury increases both from condensation in the SRAT condenser (and dissolution in the condensate) and from scrubbing in the scrubber.

Higher than saturation concentrations could have occurred at the scrubber exit by two mechanisms. The BL1 data can be explained by supersaturation of mercury (or supercooling of the offgas with respect to mercury) at the SRAT condenser exit. Supersaturation is often known as "fogging", where a condensable vapor is condensed to form small droplets or fog in the vapor phase rather than condensing on the condenser tubes into the liquid phase. When fogging occurs, a HEME or other disengagement device is needed to remove the mist. The FAVC has a HEME installed for this very reason. Fogging of mercury at the SRAT condenser exit probably also occurred in the PX7 run, but the scrubber should have removed this fog. However, in PX7, the scrubber vapor exit often contained a fog or entrained scrubber liquid. This entrained liquid or fog would contain mercury at the concentration of the liquid shown in Figure 4 and could account for vapor concentrations greater than saturation.

Figure 4. SMECT Mercury Concentration, Total Mercury and Volume of Liquid

Figure 5. Estimated and Measured Mercury Concentrations at the Scrubber Exit

An estimate of the amount of mercury entrained from the scrubber was made based on limited data (Dräger tube measurements) on the water vapor/fog concentration at the scrubber exit (O in Figure 5). Typical values for water content were 35 mg/liter of gas. Estimated water concentrations were also made by a material balance around the FAVC (heavy line in Figure 5):

$$\text{Entrainment} = \frac{\text{Condensate Flow}}{\text{Flow}} - \left(\frac{\text{Scrubber Water Vapor Flow}}{\left(\begin{smallmatrix} \text{sat'd at Scrubber} \\ \text{Liquid Temp.} \end{smallmatrix} \right)} - \frac{\text{FAVC Exit Water Vapor Flow}}{\left(\begin{smallmatrix} \text{sat'd at FAVC} \\ \text{Exit Temp.} \end{smallmatrix} \right)} \right)$$

The concentration of mercury in the scrubber exit vapor was assumed to be the amount contained in the entrainment plus the amount of elemental mercury that would exist at saturation at the scrubber exit temperature.

The first three and last points match reasonably well, but the calculated values do not predict the peak seen. Note that the data for the condensate flow was based on the change in the level of the WWPT, which, because of the very low condensate flow, is subject to substantial error. Nonetheless, the data do agree qualitatively with the values calculated assuming 35 mg/liter water in the scrubber exit vapor and do predict higher mercury concentrations near the peaks in the measured data.

Interestingly, the increase in the concentration of mercury exiting the scrubber corresponds almost exactly to the time at which the total amount of mercury in the SMECT liquid levels out (after vertical dotted line in Figure 6), which is also when the

concentration of mercury in the SMECT begins to drop after the initial increase. Figure 6 also shows that the amount of mercury exiting the SRAT into the offgas system was probably zero during the last two samples (horizontal dotted line), which could help explain the very low values found. (Note: the solid lines are the result of fitting the concentrations as exponentials versus time, but only for data where the SRAT was near boiling ($T > 90^{\circ}\text{C}$); a plot of these curvefits are shown in the Appendix.)

Figure 6. Mercury at the FAVC Inlet, in the SRAT, and in the SMECT

Figure 7 shows the concentration of mercury exiting the FAVC for the BL1 and PX6 runs, without the HEME in line, and the PX7 run with HEME. For the BL1 and PX6 runs, the concentration of mercury leaving the FAVC was substantially above the value at saturation, indicating that fogging occurred. However, for the PX7 run, with the HEME, the concentration of mercury was less than saturation (0.02-0.41 times saturation) for all samples except for one. Even for this one sample above saturation, the concentration was only 1.61 times saturation compared with a mean of 5.74 times saturation for the BL1 and PX6 runs. Concentrations less than saturation were not expected since it should not be possible to reduce the concentration of a vapor below saturation by condensation. A possible reason for the low values could be due to air leakage into the sample train; however, the EPA Method 111⁷ procedures on leak checking were closely followed during the sampling, so air leakage is very unlikely.

Two possible mechanisms for mercury removal below saturation are proposed. In previous pilot plant runs, the FAVC has been shown to form very concentrated nitric/nitrous acid solutions in the condensate. Acidic condensate on the HEME would be able to dissolve and oxidize (scrub) elemental mercury that condensed, and thus remove it to a concentration below the vapor pressure.

Figure 7. Concentration of Mercury at the FAVC Exit

The second mechanism is based on the previous discussion of entrainment from the scrubber. If most of the mercury exiting the scrubber was dissolved in the entrained water, it would be easily removed in the FAVC and HEME, since the HEME is designed to efficiently remove entrained droplets. This mechanism seems to be the most likely, but the first may also play a part.

All the concentrations measured at the FAVC inlet and exit for all three runs are summarized in Table I. The DWPF mercury emissions from the FAVC are also shown in this table. The maximum emission would have been 114 lb/yr for the data point that exceeded saturation; the mean value for all of the data was 24.9 lb/yr for temperatures from 3-7°C (5°C mean). The mean value for the FAVC without the HEME was 405 lb/yr. At the expected operating temperature of 10°C, the emission rate should be about 40 lb/yr (calculated as the ratio of vapor pressure at 10°C to that at 5°C).

CONCLUSIONS

The data suggest that the Ammonia Scrubber helps in the removal of mercury, but that entrainment from the scrubber results in a total FAVC inlet mercury concentration approximately equal to what would exist if the scrubber were not present. The entrained mercury is then easily removed in the FAVC and HEME.

Overall, the combination of the Ammonia Scrubber and the Formic Acid Vent Condenser is effective at removing mercury vapor to at or below the saturation concentration at the temperature of the condenser vapor phase, but only with the High

Efficiency Mist Eliminator (HEME) in place. With the HEME in place, and an operating temperature of 3-7°C, the emission of mercury from the FAVC in the DWPF should not exceed about 25 lb/yr. For a 10°C operating temperature, the emissions should be about 40 lb/yr.

Table I. Summary of Mercury Concentrations

Run	FAVC Inlet Meas. Conc. (mg/scm)	FAVC Inlet Conc. (sat. at Scrubber Exit) (mg/scm)	FAVC Inlet % Saturation	FAVC Exit Meas. Conc. (mg/scm)	FAVC Exit Sat. Conc. (mg/scm)	FAVC Exit % Saturation	FAVC Inlet Temp. (°C)	FAVC Exit* Temp. (°C)	Estimated DWPF Hg Emission (lb/yr)
BL1	63.3	96.4	66.	14.0	13.7	102.		20.5	72.
	346.	56.0	618.	77.5	6.09	1270.		11.1	896.
	125.	34.8	359.	36.0	4.90	735.		8.7	519.
PX6				34.3	7.96	432.		13.6	305.
				24.0	5.54	434.		9.6	306.
				13.4	4.50	298.		7.4	210.
				42.0	4.69	895.		7.9	632.
				26.5	6.27	423.		11.0	299.
		Mean	348.		Mean	574.		Mean	405.
PX7	31.3	17.3	181.	0.082	4.28	1.9	21.2	6.9	1.34
	39.9	15.8	253.	7.10	4.41	161.	20.5	7.2	114.
	42.8	17.9	239.	1.70	4.36	38.9	21.5	7.1	27.5
	67.5	15.5	435.	1.73	4.24	40.9	20.0	6.8	28.9
	110.	11.1	990.	0.440	3.93	11.2	19.2	6.0	7.91
	142.	9.2	1550.	0.590	3.24	18.2	17.2	4.0	12.8
	10.8	7.5	145.	0.108	2.94	3.7	15.8	3.0	2.61
	0.1	10.9	1.	0.197	3.60	5.5	16.5	5.1	3.88
		Mean	474.		Mean	35.		Mean	24.9

* FAVC exit temperature calculated as shown in the Appendix⁸

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REFERENCES

1. Jacobs, R. A., *Bounding Estimate of DWPF Mercury Emissions*, WSRC-RP-92-1205, Rev. 2, November 15, 1993.
2. Zamecnik, J. R., *Behavior of Mercury in the Formic Acid Vent Condenser- Interim Report*, WSRC-RP-94-1141, Rev. 0, October 11, 1994.

3. Driscoll, J. N., *Sampling and Analytical Techniques for Mercury in Stationary Sources: A State-of-the-Art Report*, Health Lab. Sci., 11(4), p. 348 (1974).
4. McQuaker, N. R., Sandberg, D. K., *The Determination of Mercury Source Emissions in the Presence of High Levels of SO₂*, J. Air Poll. Cont. Assoc., 32(6), p. 634 (1982).
5. Makris, W. E., Crawford, C. J., Miller, R. O., Bell, Z. G., Jr., *The Comparison of Five Published Methods for the Determination of Mercury-In-Air*, Jt. Conf. Sens. Environ. Pollut., (Conf. Proc., 4th), p. 192 (1978).
6. Shendrikar, A. D., Briden, F. E., *Mercury Atmosphere Generation and Media Collection Efficiency Evaluations for the SASS Impinger System*, Specialty Conf. on: Measurement and Monitoring of Non-Criteria (Toxic) Contaminants in Air, Frederick, E. R. (ed.), Chicago IL, Mar. 22-24, 1983.
7. Method 111. *Determination of Particulate and Gaseous Mercury Emissions From Sewage Sludge Incinerators*, Federal Register, Doc. 80-31822, October 15, 1980.
8. Zamecnik, J. R., *The Effect of Nitric Oxide Oxidation on the DWPF Formic Acid Vent Condenser (FAVC) Exit Temperature (U)*, WSRC-RP-92-1174, October 29, 1992.

APPENDIX

SUMMARY OF PX7 MERCURY RESULTS

Table. PX7 Summary

Date	Time	Inlet (mg/scm)	Outlet (mg/scm)	Mercury % Removal in FAVC	FAVC Outlet % Saturation
12/9-10/94	19:05-07:50	31.3	0.082	99.7	1.9
12/10/94	08:15-15:15	39.9	7.10	82.2	161.
12/10-11/94	15:30-10:30	42.8	1.70	96.0	38.9
12/11/94	11:35-16:20	67.5	1.73	97.4	40.9
12/11/94	16:45-21:45	110.	0.440	99.6	11.2
12/11-12/94	23:00-04:00	142.	0.59	99.6	18.2
12/12/94	04:14-09:45	10.8	0.108	99.0	3.7
12/13/94	03:30-08:30	0.076	0.197	-228.	5.5

CURVEFITS OF MERCURY IN SRAT AND SMECT

APPENDIX

SATURATION VAPOR PRESSURE OF MERCURY

$$p_{Hg}^{sat} = \exp\left(18.072 - \frac{7079.256}{T + 265.47}\right)$$

where p_{Hg}^{sat} = torr

$T \equiv ^\circ\text{C}$

ESTIMATION OF FAVC TUBE EXIT TEMPERATURE

For the BL1 data, the FAVC HEME exit temperature was calculated by using models developed to predict the temperature rise in the FAVC due to NO oxidation (see reference 8):

$$T_{HEME} = 2.9171[NO_x]^{0.5681} + 3.7210\beta[NO_x]^{0.3331} + T_{amb} + T_c + T_{app}$$

where T_{HEME} = FAVC HEME exit temperature ($^\circ\text{C}$)

T_c = average cooling water temperature (inlet & outlet) ($^\circ\text{C}$)

T_{app} = approach temperature ($^\circ\text{C}$) ≈ 1.6

T_{amb} = temperature rise from tube exit to HEME exit due to ambient heat conduction ($^\circ\text{C}$)

$[NO_x]$ = concentration of NO_x at FAVC exit (mol %)

β = bypassing factor (= 0 if HEME bypassed; = 1 if HEME not bypassed)

APPENDIX

The predicted and measured FAVC HEME exit temperatures are shown in Figure A-1. Since the data fit well, estimation of the tube exit temperature using the models was deemed appropriate.

The FAVC tube exit temperature was estimated as:

$$T_{\text{tube}} = 2.9171[\text{NO}_x]^{0.5681} + T_c + T_{\text{app}}$$

where T_{tube} = FAVC tube exit temperature ($^{\circ}\text{C}$)

T_c = average cooling water temperature (inlet & outlet) ($^{\circ}\text{C}$)

T_{app} = approach temperature ($^{\circ}\text{C}$) = 1.6

$[\text{NO}_x]$ = concentration of NO_x at FAVC exit (mol %)

The predicted FAVC tube exit temperature is also shown in Figure A-1.

Figure A-1. Measured and Predicted FAVC Temperatures for IDMS Run BL1

ANALYSIS OF MERCURY SAMPLING DATA

See attached data analysis sheets.

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9119-9123 Inlet

DATE: 12/9-10/1994
 TIME: 19:05-20:15, 21:30-22:00, 04:50-07:50

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		9119	9120	9121	9122	9123
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	37.96	38.18	37.98	38.31	38.47
Sample + wash water	g	157.19	191.61	418.76	326.10	152.47
Weight of sample	g	119.23	153.43	380.78	287.79	114.00
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	108.4	139.5	346.2	261.6	103.6
Conc of Hg	mg/liter	133.0	20.4	15.6	1.9	0.3
Hg collected	mg	14.4	2.8	5.4	0.5	0.0
% of total collected	%	62.17	12.27	23.29	2.14	0.12
Total Hg collected	mg	23.2				

DRY GAS SAMPLE: Gas Volume cu ft 28.60

MERCURY CONCENTRATION MEASURED AT FAVC INLET:

		@-25°C	@ 0°C	
Hg concentration	µg/ft3	810.72	884.92	µg/std ft3
Hg concentration	g/m3	0.0286	0.0313	g/std m3
Hg concentration	mg/m3	28.6303	31.2506	mg/std m3
Saturation temp	°C		29.45	(by changing)

MERCURY CONCENTRATION AT SRATC EXIT CALCULATED FROM MEASURED FAVC INLET:

		@-25°C	@ 0°C	
Hg concentration	µg/ft3	916.07	999.91	µg/std ft3
Hg concentration	g/m3	0.0324	0.0353	g/std m3
Hg concentration	mg/m3	32.3506	35.3114	mg/std m3

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, SRATC EXIT) :

Average SRATC Exit Temperature °C 23.80

		@avg temp	@ 0°C	
Hg concentration	µg/ft3	509.2	553.6	µg/std ft3
Hg concentration	g/m3	0.0180	0.0195	g/std m3
Hg concentration	mg/m3	17.9824	19.5492	mg/std m3

MERCURY CONCENTRATION AT FAVC INLET CALCULATED FROM SATURATION:

SRAT/FAVC flow ratio 0.885
 FAVC Inlet Temperature °C 21.20

		@FAVC In T	@ 0°C	
Hg concentration	µg/ft3	454.6	489.9	µg/std ft3
Hg concentration	g/m3	0.0161	0.0173	g/std m3
Hg concentration	mg/m3	16.0550	17.3011	mg/std m3

MEASURED / EXPECTED @ SATURATION 1.806

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9124-9128 Inlet

DATE: 12/10/94
 TIME: 08:15-15:15

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		9124	9125	9126	9127	9128
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.04	37.95	38.45	38.76	38.01
Sample + wash water	g	166.94	336.34	277.53	318.36	200.50
Weight of sample	g	128.90	298.39	239.08	279.60	162.49
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	117.2	271.3	217.3	254.2	147.7
Conc of Hg	mg/liter (ppm)	405.0	1.6	1.7	2.6	2.5
Hg collected	mg	47.5	0.4	0.4	0.7	0.4
% of total collected	%	96.31	0.86	0.75	1.33	0.75
Total Hg collected	mg	49.3				

DRY GAS SAMPLE: Gas Volume cu ft 47.60

MERCURY CONCENTRATION MEASURED AT FAVC INLET:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	1035.26	1130.01	µg/std ft3
Hg concentration	g/m3	0.0366	0.0399	g/std m3
Hg concentration	mg/m3	36.5600	39.9060	mg/std m3
Saturation temp	°C		32.49	(by changing)

MERCURY CONCENTRATION AT SRATC EXIT CALCULATED FROM MEASURED FAVC INLET:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	1238.35	1351.69	µg/std ft3
Hg concentration	g/m3	0.0437	0.0477	g/std m3
Hg concentration	mg/m3	43.7320	47.7345	mg/std m3

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, SRATC EXIT) :

Average SRATC Exit Temperature °C 23.40

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	492.9	535.1	µg/std ft3
Hg concentration	g/m3	0.0174	0.0189	g/std m3
Hg concentration	mg/m3	17.4067	18.8978	mg/std m3

MERCURY CONCENTRATION AT FAVC INLET CALCULATED FROM SATURATION:

SRAT/FAVC flow ratio 0.836
 FAVC Inlet Temperature °C 20.50

		@ FAVC In T	@ 0°C	
Hg concentration	µg/ft3	416.1	447.4	µg/std ft3
Hg concentration	g/m3	0.0147	0.0158	g/std m3
Hg concentration	mg/m3	14.6957	15.7986	mg/std m3

MEASURED / EXPECTED @ SATURATION 2.526

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9129-9133 Inlet

DATE: 12/10-11/1994
 TIME: 15:30-16:45, 03:45-06:45, 09:30-10:30

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		9129	9130	9131	9132	9133
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.79	38.64	38.69	38.35	37.91
Sample + wash water	g	245.38	245.64	321.39	329.64	136.63
Weight of sample	g	206.59	207.00	282.70	291.29	98.72
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	187.8	188.2	257.0	264.8	89.7
Conc of Hg	mg/liter (ppm)	47.4	35.8	0.1	10.3	1.6
Hg collected	mg	8.9	6.7	0.0	2.7	0.1
% of total collected	%	48.00	36.33	0.18	14.71	0.78
Total Hg collected	mg	18.5				

DRY GAS SAMPLE: Gas Volume cu ft 16.70

MERCURY CONCENTRATION MEASURED AT FAVC INLET:

		@-25°C	@ 0°C	
Hg concentration	µg/ft3	1110.46	1212.09	µg/std ft3
Hg concentration	g/m3	0.0392	0.0428	g/std m3
Hg concentration	mg/m3	39.2154	42.8044	mg/std m3
Saturation temp	°C		33.37	(by changing)

MERCURY CONCENTRATION AT SRATC EXIT CALCULATED FROM MEASURED FAVC INLET:

		@-25°C	@ 0°C	
Hg concentration	µg/ft3	1341.13	1463.87	µg/std ft3
Hg concentration	g/m3	0.0474	0.0517	g/std m3
Hg concentration	mg/m3	47.3616	51.6962	mg/std m3

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, SRATC EXIT) :

Average SRATC Exit Temperature °C 25.00

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	561.1	612.5	µg/std ft3
Hg concentration	g/m3	0.0198	0.0216	g/std m3
Hg concentration	mg/m3	19.8155	21.6291	mg/std m3

MERCURY CONCENTRATION AT FAVC INLET CALCULATED FROM SATURATION:

SRAT/FAVC flow ratio 0.828
 FAVC Inlet Temperature °C 21.50

		@FAVC In T	@ 0°C	
Hg concentration	µg/ft3	470.1	507.1	µg/std ft3
Hg concentration	g/m3	0.0166	0.0179	g/std m3
Hg concentration	mg/m3	16.6021	17.9089	mg/std m3

MEASURED / EXPECTED @ SATURATION 2.390

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9134-9138 Inlet

DATE: 12/11/94
 TIME: 11:35-16:20

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		9134	9135	9136	9137	9138
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.36	38.45	38.76	38.60	38.07
Sample + wash water	g	247.03	290.51	413.11	397.67	138.99
Weight of sample	g	208.67	252.06	374.35	359.07	100.92
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	189.7	229.1	340.3	326.4	91.7
Conc of Hg	mg/liter (ppm)	134.0	1.7	5.1	5.2	0.2
Hg collected	mg	25.4	0.4	1.7	1.7	0.0
% of total collected	%	86.89	1.30	5.91	5.84	0.07
Total Hg collected	mg	29.3				

DRY GAS SAMPLE: Gas Volume cu ft 16.70

MERCURY CONCENTRATION MEASURED AT FAVC INLET:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	1751.83	1912.16	µg/std ft3
Hg concentration	g/m3	0.0619	0.0675	g/std m3
Hg concentration	mg/m3	61.8653	67.5273	mg/std m3
Saturation temp	°C		39.23	(by changing)

MERCURY CONCENTRATION AT SRATC EXIT CALCULATED FROM MEASURED FAVC INLET:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	2131.18	2326.23	µg/std ft3
Hg concentration	g/m3	0.0753	0.0822	g/std m3
Hg concentration	mg/m3	75.2619	82.1500	mg/std m3

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, SRATC EXIT) :

Average SRATC Exit Temperature °C 23.40

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	492.9	535.1	µg/std ft3
Hg concentration	g/m3	0.0174	0.0189	g/std m3
Hg concentration	mg/m3	17.4067	18.8978	mg/std m3

MERCURY CONCENTRATION AT FAVC INLET CALCULATED FROM SATURATION:

SRAT/FAVC flow ratio 0.822
 FAVC Inlet Temperature °C 20.00

		@ FAVC In T	@ 0°C	
Hg concentration	µg/ft3	409.9	439.9	µg/std ft3
Hg concentration	g/m3	0.0145	0.0155	g/std m3
Hg concentration	mg/m3	14.4743	15.5340	mg/std m3

MEASURED / EXPECTED @ SATURATION 4.347

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9139-9143 Inlet

DATE: 12/11/94
 TIME: 16:45-21:45

WASHED SAMPLE:

		IDMS # ID-RUN-IMP-				
		9139	9140	9141	9142	9143
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	37.90	38.70	38.90	38.30	37.90
Sample + wash water	g	285.90	297.60	309.40	315.40	322.10
Weight of sample	g	248.00	258.90	270.50	277.10	284.20
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	225.5	235.4	245.9	251.9	258.4
Conc of Hg	mg/liter (ppm)	93.8	141.0	216.0	95.2	86.3
Hg collected	mg	21.1	33.2	53.1	24.0	22.3
% of total collected	%	13.76	21.59	34.55	15.60	14.50
Total Hg collected	mg	153.7				

DRY GAS SAMPLE: Gas Volume cu ft 54.10

MERCURY CONCENTRATION MEASURED AT FAVC INLET:

		@ -25°C		@ 0°C	
Hg concentration	µg/ft3	2841.57	3101.63	µg/std ft3	
Hg concentration	g/m3	0.1003	0.1095	g/std m3	
Hg concentration	mg/m3	100.3490	109.5331	mg/std m3	
Saturation temp	°C		45.71	(by changing)	

MERCURY CONCENTRATION AT SRATC EXIT CALCULATED FROM MEASURED FAVC INLET:

		@ -25°C		@ 0°C	
Hg concentration	µg/ft3	3469.56	3787.10	µg/std ft3	
Hg concentration	g/m3	0.1225	0.1337	g/std m3	
Hg concentration	mg/m3	122.5263	133.7400	mg/std m3	

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, SRATC EXIT) :

Average SRATC Exit Temperature °C 19.50

		@ avg temp		@ 0°C	
Hg concentration	µg/ft3	357.2	382.6	µg/std ft3	
Hg concentration	g/m3	0.0126	0.0135	g/std m3	
Hg concentration	mg/m3	12.6127	13.5131	mg/std m3	

MERCURY CONCENTRATION AT FAVC INLET CALCULATED FROM SATURATION:

SRAT/FAVC flow ratio 0.819
 FAVC Inlet Temperature °C 19.20

		@ FAVC In T		@ 0°C	
Hg concentration	µg/ft3	292.8	313.4	µg/std ft3	
Hg concentration	g/m3	0.0103	0.0111	g/std m3	
Hg concentration	mg/m3	10.3404	11.0672	mg/std m3	

MEASURED / EXPECTED @ SATURATION 9.897

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9144-9148 Inlet

DATE: 12/11-12/1994

TIME: 23:00-04:00

WASHED SAMPLE:

		IDMS # ID-RUN-IMPL-				
		9144	9145	9146	9147	9148
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.39	37.98	38.54	38.29	38.21
Sample + wash water	g	236.08	257.60	282.96	278.02	282.00
Weight of sample	g	197.69	219.62	244.42	239.73	243.79
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	179.7	199.7	222.2	217.9	221.6
Conc of Hg	mg/liter (ppm)	155.0	136.0	253.0	132.0	78.9
Hg collected	mg	27.9	27.2	56.2	28.8	17.5
% of total collected	%	17.69	17.24	35.70	18.27	11.10
Total Hg collected	mg	157.5				

DRY GAS SAMPLE: Gas Volume cu ft 42.70

MERCURY CONCENTRATION MEASURED AT FAVC INLET:

		@=25°C	@ 0°C	
Hg concentration	µg/ft3	3688.05	4025.59	µg/std ft3
Hg concentration	g/m3	0.1302	0.1422	g/std m3
Hg concentration	mg/m3	130.2424	142.1624	mg/std m3
Saturation temp	°C		49.32	(by changing)

MERCURY CONCENTRATION AT SRATC EXIT CALCULATED FROM MEASURED FAVC INLET:

		@=25°C	@ 0°C	
Hg concentration	µg/ft3	4519.67	4933.32	µg/std ft3
Hg concentration	g/m3	0.1596	0.1742	g/std m3
Hg concentration	mg/m3	159.6108	174.2186	mg/std m3

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, SRATC EXIT) :

Average SRATC Exit Temperature °C 17.40

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	299.1	318.2	µg/std ft3
Hg concentration	g/m3	0.0106	0.0112	g/std m3
Hg concentration	mg/m3	10.5643	11.2372	mg/std m3

MERCURY CONCENTRATION AT FAVC INLET CALCULATED FROM SATURATION:

SRAT/FAVC flow ratio 0.816
 FAVC Inlet Temperature °C 17.20

		@FAVC In T	@ 0°C	
Hg concentration	µg/ft3	244.3	259.7	µg/std ft3
Hg concentration	g/m3	0.0086	0.0092	g/std m3
Hg concentration	mg/m3	8.6264	9.1696	mg/std m3

MEASURED / EXPECTED @ SATURATION 15.504

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9149-9153 Inlet

DATE: 12/12/94
 TIME: 04:15-09:45

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		9149	9150	9151	9152	9153
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.91	37.89	38.57	37.98	38.72
Sample + wash water	g	277.17	259.47	262.82	272.30	274.90
Weight of sample	g	238.26	221.58	224.25	234.32	236.18
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	216.6	201.4	203.9	213.0	214.7
Conc of Hg	mg/liter (ppm)	9.3	21.4	27.2	2.7	1.3
Hg collected	mg	2.0	4.3	5.5	0.6	0.3
% of total collected	%	15.85	33.85	43.54	4.52	2.24
Total Hg collected	mg	12.7				

DRY GAS SAMPLE: Gas Volume cu ft 45.30

MERCURY CONCENTRATION MEASURED AT FAVC INLET:

		@ ~25°C	@ 0°C	
Hg concentration	µg/ft3	281.13	306.86	µg/std ft3
Hg concentration	g/m3	0.0099	0.0108	g/std m3
Hg concentration	mg/m3	9.9281	10.8367	mg/std m3
Saturation temp	°C		16.99	(by changing)

MERCURY CONCENTRATION AT SRATC EXIT CALCULATED FROM MEASURED FAVC INLET:

		@ ~25°C	@ 0°C	
Hg concentration	µg/ft3	344.10	375.59	µg/std ft3
Hg concentration	g/m3	0.0122	0.0133	g/std m3
Hg concentration	mg/m3	12.1519	13.2640	mg/std m3

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, SRATC EXIT) :

Average SRATC Exit Temperature °C 15.10

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	245.6	259.2	µg/std ft3
Hg concentration	g/m3	0.0087	0.0092	g/std m3
Hg concentration	mg/m3	8.6735	9.1529	mg/std m3

MERCURY CONCENTRATION AT FAVC INLET CALCULATED FROM SATURATION:

SRAT/FAVC flow ratio 0.817
 FAVC Inlet Temperature °C 15.80

		@ FAVC In T	@ 0°C	
Hg concentration	µg/ft3	200.2	211.8	µg/std ft3
Hg concentration	g/m3	0.0071	0.0075	g/std m3
Hg concentration	mg/m3	7.0691	7.4779	mg/std m3

MEASURED / EXPECTED @ SATURATION 1.449

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9154-9158 Inlet

DATE: 12/13/94
 TIME: 03:30-08:30

WASHED SAMPLE:

		IDMS # ID-RUN-IMPL-				
		9154	9155	9156	9157	9158
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.30	37.90	38.60	38.00	38.20
Sample + wash water	g	271.40	268.50	304.50	310.10	317.30
Weight of sample	g	233.10	230.60	265.90	272.10	279.10
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	211.9	209.6	241.7	247.4	253.7
Conc of Hg	mg/liter (ppm)	0.0	0.0	0.1	0.0	0.1
Hg collected	mg	0.0	0.0	0.0	0.0	0.0
% of total collected	%	7.85	5.18	53.22	6.62	27.15
Total Hg collected	mg	0.0				

DRY GAS SAMPLE: Gas Volume cu ft 31.20

MERCURY CONCENTRATION MEASURED AT FAVC INLET:

		@-25°C	@ 0°C	
Hg concentration	µg/ft3	1.56	1.70	µg/std ft3
Hg concentration	g/m3	0.0001	0.0001	g/std m3
Hg concentration	mg/m3	0.0550	0.0600	mg/std m3
Saturation temp	°C		-31.51	(by changing)

MERCURY CONCENTRATION AT SRATC EXIT CALCULATED FROM MEASURED FAVC INLET:

		@-25°C	@ 0°C	
Hg concentration	µg/ft3	1.97	2.15	µg/std ft3
Hg concentration	g/m3	0.0001	0.0001	g/std m3
Hg concentration	mg/m3	0.0695	0.0758	mg/std m3

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, SRATC EXIT) :

Average SRATC Exit Temperature °C 19.70

		@avg temp	@ 0°C	
Hg concentration	µg/ft3	363.2	389.4	µg/std ft3
Hg concentration	g/m3	0.0128	0.0138	g/std m3
Hg concentration	mg/m3	12.8256	13.7506	mg/std m3

MERCURY CONCENTRATION AT FAVC INLET CALCULATED FROM SATURATION:

SRAT/FAVC flow ratio 0.792
 FAVC Inlet Temperature °C 16.50

		@FAVC In T	@ 0°C	
Hg concentration	µg/ft3	290.8	308.4	µg/std ft3
Hg concentration	g/m3	0.0103	0.0109	g/std m3
Hg concentration	mg/m3	10.2701	10.8904	mg/std m3

MEASURED / EXPECTED @ SATURATION

0.006

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9159-9163 Outlet

DATE: 12/9-10/1994
 TIME: 19:05-20:15, 21:30-22:00, 04:50-07:50

WASHED SAMPLE:

		IDMS # ID-RUN-IMPL-				
		9159	9160	9161	9162	9163
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.95	38.58	37.96	37.98	38.53
Sample + wash water	g	269.46	205.43	255.02	254.27	267.55
Weight of sample	g	230.51	166.85	217.06	216.29	229.02
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	209.6	151.7	197.3	196.6	208.2
Conc of Hg	mg/liter (ppm)	0.3	0.0	0.0	0.0	0.0
Hg collected	mg	0.1	0.0	0.0	0.0	0.0
% of total collected	%	78.32	2.70	7.02	5.11	6.84
Total Hg collected	mg	0.1				

DRY GAS SAMPLE: Gas Volume cu ft 34.40

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	2.12	2.32	µg/std ft3
Hg concentration	g/m3	0.0001	0.0001	g/std m3
Hg concentration	mg/m3	0.0750	0.0818	mg/std m3
Saturation temp	°C		-29.09	(by changing)

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 6.90

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	118.3	121.3	µg/std ft3
Hg concentration	g/m3	0.0042	0.0043	g/std m3
Hg concentration	mg/m3	4.1766	4.2821	mg/std m3

MEASURED / EXPECTED @ SATURATION

0.019

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9164-9168 Outlet

DATE: 12/10/94
 TIME: 08:15-15:15

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		9164	9165	9166	9167	9168
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.15	38.32	38.62	38.12	37.88
Sample + wash water	g	253.69	251.05	262.74	274.28	277.15
Weight of sample	g	215.54	212.73	224.12	236.16	239.27
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	195.9	193.4	203.7	214.7	217.5
Conc of Hg	mg/liter (ppm)	1.8	0.6	25.3	4.0	1.6
Hg collected	mg	0.4	0.1	5.2	0.8	0.4
% of total collected	%	5.28	1.65	75.47	12.42	5.19
Total Hg collected	mg	6.8				

DRY GAS SAMPLE: Gas Volume cu ft 37.10

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	184.11	200.96	µg/std ft3
Hg concentration	g/m3	0.0065	0.0071	g/std m3
Hg concentration	mg/m3	6.5019	7.0970	mg/std m3
Saturation temp	°C		12.30	(by changing)

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 7.20

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	121.6	124.8	µg/std ft3
Hg concentration	g/m3	0.0043	0.0044	g/std m3
Hg concentration	mg/m3	4.2932	4.4063	mg/std m3

MEASURED / EXPECTED @ SATURATION

1.611

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9169-9173 Outlet

DATE: 12/10-11/1994

TIME: 15:30-16:45, 03:45-06:45, 09:30-10:30

WASHED SAMPLE:

		IDMS # ID-RUN-IMP-				
		9169	9170	9171	9172	9173
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	37.85	38.36	38.08	38.80	38.24
Sample + wash water	g	371.70	132.42	324.77	282.12	155.19
Weight of sample	g	333.85	94.06	286.69	243.32	116.95
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	303.5	85.5	260.6	221.2	106.3
Conc of Hg	mg/liter (ppm)	1.0	1.4	3.2	0.2	0.2
Hg collected	mg	0.3	0.1	0.8	0.0	0.0
% of total collected	%	23.29	9.20	62.54	3.49	1.49
Total Hg collected	mg	1.3				

DRY GAS SAMPLE: Gas Volume cu ft 30.20

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	44.02	48.05	µg/std ft3
Hg concentration	g/m3	0.0016	0.0017	g/std m3
Hg concentration	mg/m3	1.5546	1.6969	mg/std m3
Saturation temp	°C		-2.47	(by changing)

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 7.10

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	120.5	123.6	µg/std ft3
Hg concentration	g/m3	0.0043	0.0044	g/std m3
Hg concentration	mg/m3	4.2540	4.3646	mg/std m3

MEASURED / EXPECTED @ SATURATION

0.389

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9174-9178 Outlet

DATE: 12/11/94
 TIME: 11:35-16:20

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		9174	9175	9176	9177	9178
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.40	38.00	38.50	37.90	38.10
Sample + wash water	g	310.20	332.30	521.80	366.50	216.70
Weight of sample	g	271.80	294.30	483.30	328.60	178.60
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	247.1	267.5	439.4	298.7	162.4
Conc of Hg	mg/liter (ppm)	0.2	1.4	0.4	0.2	0.2
Hg collected	mg	0.0	0.4	0.2	0.0	0.0
% of total collected	%	6.47	53.63	28.80	7.30	3.80
Total Hg collected	mg	0.7				

DRY GAS SAMPLE: Gas Volume cu ft 15.20

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	44.96	49.08	µg/std ft3
Hg concentration	g/m3	0.0016	0.0017	g/std m3
Hg concentration	mg/m3	1.5879	1.7333	mg/std m3
Saturation temp	°C		-2.26	(by changing)

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 6.80

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	117.2	120.1	µg/std ft3
Hg concentration	g/m3	0.0041	0.0042	g/std m3
Hg concentration	mg/m3	4.1384	4.2414	mg/std m3

MEASURED / EXPECTED @ SATURATION

0.409

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9179-9183 Outlet

DATE: 12/11/94
 TIME: 16:45-21:45

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		9179	9180	9181	9182	9183
		NaOH	NaOH	KMnO ₄	KMnO ₄	KMnO ₄
Empty bottle	g	38.20	37.90	38.80	38.50	38.60
Sample + wash water	g	293.80	297.30	303.50	419.40	233.00
Weight of sample	g	255.60	259.40	264.70	380.90	194.40
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	232.4	235.8	240.6	346.3	176.7
Conc of Hg	mg/liter (ppm)	0.7	0.1	0.9	0.4	1.3
Hg collected	mg	0.2	0.0	0.2	0.2	0.2
% of total collected	%	20.67	2.66	27.12	20.37	29.18
Total Hg collected	mg	0.8				

DRY GAS SAMPLE: Gas Volume cu ft 66.90

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft ³	11.41	12.45	µg/std ft ³
Hg concentration	g/m ³	0.0004	0.0004	g/std m ³
Hg concentration	mg/m ³	0.4028	0.4397	mg/std m ³
Saturation temp	°C		-15.03	(by changing)

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 6.00

		@ avg temp	@ 0°C	
Hg concentration	µg/ft ³	108.9	111.2	µg/std ft ³
Hg concentration	g/m ³	0.0038	0.0039	g/std m ³
Hg concentration	mg/m ³	3.8441	3.9286	mg/std m ³

MEASURED / EXPECTED @ SATURATION

0.112

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9184-9188 Outlet
 DATE: 12/11-12/1994
 TIME: 23:00-04:00

WASHED SAMPLE:

		IDMS # ID-RUN-IMPL-				
		9184	9185	9186	9187	9188
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	37.76	38.26	37.96	38.68	37.92
Sample + wash water	g	243.58	248.97	294.49	430.97	92.95
Weight of sample	g	205.82	210.71	256.53	392.29	55.03
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	187.1	191.6	233.2	356.6	50.0
Conc of Hg	mg/liter (ppm)	1.6	0.3	1.5	0.2	0.2
Hg collected	mg	0.3	0.1	0.3	0.1	0.0
% of total collected	%	37.51	7.21	43.29	10.59	1.39
Total Hg collected	mg	0.8				

DRY GAS SAMPLE: Gas Volume cu ft 52.80

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@ 25°C		@ 0°C	
Hg concentration	µg/ft3	15.30	16.70	µg/std ft3	
Hg concentration	g/m3	0.0005	0.0006	g/std m3	
Hg concentration	mg/m3	0.5404	0.5899	mg/std m3	
Saturation temp	°C	-12.40 (by changing)			

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

- Average FAVC Exit Temperature °C 4.00

		@ avg temp		@ 0°C	
Hg concentration	µg/ft3	90.3	91.7	µg/std ft3	
Hg concentration	g/m3	0.0032	0.0032	g/std m3	
Hg concentration	mg/m3	3.1906	3.2373	mg/std m3	

MEASURED / EXPECTED @ SATURATION

0.182

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9189- Outlet

DATE: 12/12/94
 TIME: 04:15-09:45

WASHED SAMPLE:

		IDMS # ID-RUN-IMPL-				
		9189	9190	9192	9199	9200
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.20	38.17	37.93	38.96	38.24
Sample + wash water	g	182.48	237.37	273.10	276.72	280.26
Weight of sample	g	144.28	199.20	235.17	237.76	242.02
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	131.2	181.1	213.8	216.1	220.0
Conc of Hg	mg/liter (ppm)	0.0	0.0	0.0	0.5	0.2
Hg collected	mg	0.0	0.0	0.0	0.1	0.0
% of total collected	%	0.85	0.47	3.19	72.93	22.56
Total Hg collected	mg	0.2				

DRY GAS SAMPLE: Gas Volume cu ft 54.90

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	2.81	3.06	µg/std ft3
Hg concentration	g/m3	0.0001	0.0001	g/std m3
Hg concentration	mg/m3	0.0991	0.1082	mg/std m3
Saturation temp	°C	-26.87 (by changing)		

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 3.00

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	82.2	83.1	µg/std ft3
Hg concentration	g/m3	0.0029	0.0029	g/std m3
Hg concentration	mg/m3	2.9036	2.9355	mg/std m3

MEASURED / EXPECTED @ SATURATION

0.037

APPENDIX

IDMS RUN: PUREX 7
 COMMENTS: PX7 9201-9205 Outlet

DATE: 12/12/94
 TIME: 03:30-08:30

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		9201	9202	9203	9204	9205
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.20	37.90	38.70	38.60	38.30
Sample + wash water	g	269.60	280.70	319.70	335.60	335.70
Weight of sample	g	231.40	242.80	281.00	297.00	297.40
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	210.4	220.7	255.5	270.0	270.4
Conc of Hg	mg/liter (ppm)	0.4	0.3	0.2	0.1	0.1
Hg collected	mg	0.1	0.1	0.0	0.0	0.0
% of total collected	%	36.57	22.30	18.91	8.14	14.08
Total Hg collected	mg	0.3				

DRY GA Gas Volume cu ft 50.00

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@-25°C	@ 0°C	
Hg concentration	µg/ft3	5.11	5.58	µg/std ft3
Hg concentration	g/m3	0.0002	0.0002	g/std m3
Hg concentration	mg/m3	0.1804	0.1969	mg/std m3
Saturation temp	°C		-21.95	(by changing)

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 5.10

		@avg temp	@ 0°C	
Hg concentration	µg/ft3	100.1	102.0	µg/std ft3
Hg concentration	g/m3	0.0035	0.0036	g/std m3
Hg concentration	mg/m3	3.5361	3.6022	mg/std m3

MEASURED / EXPECTED @ SATURATION 0.055

APPENDIX

IDMS RUN: PUREX 6
 COMMENTS: Set 1

DATE: 12/7/93
 TIME: 13:55 PM - 19:00 PM

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		7420	7421	7422	7423	7424
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.76	39.13	38.10	38.24	39.05
Sample + wash water	g	413.28	498.34	178.25	112.01	88.95
Weight of sample	g	374.52	459.21	140.15	73.77	49.90
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	340.5	417.5	127.4	67.1	45.4
Conc of Hg	mg/liter (ppm)	132.0	125.0	100.0	71.4	75.2
Hg collected	mg	44.9	52.2	12.7	4.8	3.4
% of total collected	%	38.07	44.20	10.79	4.06	2.89
Total Hg collected	mg	118.1				

DRY GAS SAMPLE: Gas Volume cu ft 132.50

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@-25°C	@ 0°C	
Hg concentration	µg/ft3	891.06	972.62	µg/std ft3
Hg concentration	g/m3	0.0315	0.0343	g/std m3
Hg concentration	mg/m3	31.4676	34.3476	mg/std m3
Saturation temp	°C		30.62	(by changing)

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 13.55

		@avg temp	@ 0°C	
Hg concentration	µg/ft3	214.6	225.3	µg/std ft3
Hg concentration	g/m3	0.0076	0.0080	g/std m3
Hg concentration	mg/m3	7.5799	7.9559	mg/std m3

MEASURED / EXPECTED @ SATURATION

4.317

APPENDIX

IDMS RUN: PUREX 6
 COMMENTS: Set 2

DATE: 12/7/1993 - 12/8/93
 TIME: 19:10 PM - 00:15 AM

WASHED SAMPLE:

		IDMS # ID-RUN-HMPI-				
		7425	7426	7427	7428	7429
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.84	39.01	38.81	38.75	38.93
Sample + wash water	g	225.93	254.33	312.51	268.77	270.36
Weight of sample	g	187.09	215.32	273.70	230.02	231.43
Approx. density of sample	g/ml	1.1	1.1	1.1	1.1	1.1
Volume of sample	ml	170.1	195.7	248.8	209.1	210.4
Conc of Hg	mg/liter (ppm)	87.2	75.4	169.0	81.1	62.7
Hg collected	mg	14.83	14.76	42.05	16.96	13.19
% of total collected	%	14.57	14.50	41.31	16.66	12.96
Total Hg collected	mg	101.79				

DRY GAS SAMPLE: Gas Volume cu ft 163.20

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	623.72	680.80	µg/std ft3
Hg concentration	g/m3	0.0220	0.0240	g/std m3
Hg concentration	mg/m3	22.0264	24.0423	mg/std m3
Saturation temp	°C		26.27	(by changing)

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 9.62

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	151.5	156.8	µg/std ft3
Hg concentration	g/m3	0.0053	0.0055	g/std m3
Hg concentration	mg/m3	5.3486	5.5369	mg/std m3

MEASURED / EXPECTED @ SATURATION

4.342

APPENDIX

IDMS RUN: PUREX 6
 COMMENTS: Set 3

DATE: 12/8/93
 TIME: 00:23 AM - 5:30 AM

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		7430	7431	7432	7433	7434
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.49	38.40	38.18	38.56	38.49
Sample + wash water	g	226.61	238.24	285.43	293.21	238.52
Weight of sample	g	188.12	199.84	247.25	254.65	200.03
Approx. density of sample	g/ml	1.1	1.1	1.1	1.1	1.1
Volume of sample	ml	171.0	181.7	224.8	231.5	181.8
Conc of Hg	mg/liter (ppm)	137.0	28.7	78.9	88.8	43.8
Hg collected	mg	23.43	5.21	17.73	20.56	7.96
% of total collected	%	31.28	6.96	23.68	27.45	10.63
Total Hg collected	mg	74.90				

DRY GAS SAMPLE: Gas Volume cu ft 215.60

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@ -25°C		@ 0°C
Hg concentration	µg/ft3	347.40	379.20	µg/std ft3
Hg concentration	g/m3	0.0123	0.0134	g/std m3
Hg concentration	mg/m3	12.2684	13.3912	mg/std m3
Saturation temp	°C	19.40 (by changing)		

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 7.42

		@ avg temp	@ 0°C
Hg concentration	µg/ft3	124.0	127.4
Hg concentration	g/m3	0.0044	0.0045
Hg concentration	mg/m3	4.3805	4.4995

MEASURED / EXPECTED @ SATURATION

2.976

APPENDIX

IDMS RUN: PUREX 6
 COMMENTS: Set 4

DATE: 12/8/93
 TIME: 06:15 AM - 11:20 AM

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		7435	7436	7437	7438	7441
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	39.08	38.46	38.20	38.65	38.15
Sample + wash water	g	220.04	276.65	264.13	337.97	218.54
Weight of sample	g	180.96	238.19	225.93	299.32	180.39
Approx. density of sample	g/ml	1.1	1.1	1.1	1.1	1.1
Volume of sample	ml	164.5	216.5	205.4	272.1	164.0
Conc of Hg	mg/liter (ppm)	86.2	32.5	467.0	301.0	82.0
Hg collected	mg	14.18	7.04	95.92	81.90	13.45
% of total collected	%	6.67	3.31	45.14	38.55	6.33
Total Hg collected	mg	212.49				

DRY GAS SAMPLE: Gas Volume cu ft 195.00

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	1089.68	1189.41	µg/std ft3
Hg concentration	g/m3	0.0385	0.0420	g/std m3
Hg concentration	mg/m3	38.4817	42.0036	mg/std m3
Saturation temp	°C		33.13	(by changing)

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 7.86

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	129.1	132.8	µg/std ft3
Hg concentration	g/m3	0.0046	0.0047	g/std m3
Hg concentration	mg/m3	4.5602	4.6914	mg/std m3

MEASURED / EXPECTED @ SATURATION

8.953

Set=0

0.000000

APPENDIX

IDMS RUN: PUREX 6
 COMMENTS: Set 5

DATE: 12/8/93
 TIME: 11:37 AM - 16:35 PM

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI- ----				
		7442	7443	7444	7445	7446
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	38.15	38.82	38.87	38.47	38.77
Sample + wash water	g	262.54	255.35	286.40	258.90	260.55
Weight of sample	g	224.39	216.53	247.53	220.43	221.78
Approx. density of sample	g/ml	1.1	1.1	1.1	1.1	1.1
Volume of sample	ml	204.0	196.8	225.0	200.4	201.6
Conc of Hg	mg/liter (ppm)	83.0	22.4	391.0	14.0	1.0
Hg collected	mg	16.931	4.409	87.986	2.805	0.204
% of total collected	%	15.07	3.93	78.32	2.50	0.18
Total Hg collected	mg	112.34				

DRY GAS SAMPLE: Gas Volume cu ft 163.50

MERCURY CONCENTRATION MEASURED AT FAVC EXIT:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	687.07	749.95	µg/std ft3
Hg concentration	g/m3	0.0243	0.0265	g/std m3
Hg concentration	mg/m3	24.2635	26.4842	mg/std m3
Saturation temp	°C		27.43	(by changing)

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, FAVC EXIT) :

Average FAVC Exit Temperature °C 10.95

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	170.6	177.5	µg/std ft3
Hg concentration	g/m3	0.0060	0.0063	g/std m3
Hg concentration	mg/m3	6.0252	6.2668	mg/std m3

MEASURED / EXPECTED @ SATURATION

4.226

Set=0

0.000000

APPENDIX

IDMS RUN: BL1
 COMMENTS: FORMIC ACID ADDITION FAVC IN

DATE: 6/20/90
 TIME: 16:10-17:15

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		3359	3360	3361	3362	3363
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	68.70	68.60	69.10	68.70	68.90
Sample + wash water	g	511.70	508.80	496.20	461.80	477.10
Weight of sample	g	427.3	414.1	545.3	480.7	358.9
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	388.5	376.5	495.7	437.0	326.3
Conc of Hg	mg/liter (ppm)	2.9	23.6	1.5	0.8	0.2
Hg collected	mg	1.1	8.9	0.7	0.3	0.1
Total Hg collected	mg	11.2				

DRY GAS SAMPLE: Gas Volume cu ft 6.80

MERCURY CONCENTRATION MEASURED AT FAVC INLET:

		@=25°C	@ 0°C	
Hg concentration	µg/ft3	1642.41	1792.73	µg/std ft3
Hg concentration	g/m3	0.0580	0.0633	g/std m3
Hg concentration	mg/m3	58.0012	63.3095	mg/std m3
Saturation temp	°C		38.39	(by changing)

MERCURY CONCENTRATION AT SRATC EXIT CALCULATED FROM MEASURED FAVC INLET:

		@=25°C	@ 0°C	
Hg concentration	µg/ft3	#DIV/0!	#DIV/0!	µg/std ft3
Hg concentration	g/m3	#DIV/0!	#DIV/0!	g/std m3
Hg concentration	mg/m3	#DIV/0!	#DIV/0!	mg/std m3

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, SRATC EXIT) :

Average SRATC Exit Temperature °C 43.97

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	2350.4	2728.7	µg/std ft3
Hg concentration	g/m3	0.0830	0.0964	g/std m3
Hg concentration	mg/m3	83.0029	96.3637	mg/std m3

MERCURY CONCENTRATION AT FAVC INLET CALCULATED FROM SATURATION:

SRAT/FAVC flow ratio
 FAVC Inlet Temperature °C

		@FAVC In T	@ 0°C	
Hg concentration	µg/ft3	0.0	0.0	µg/std ft3
Hg concentration	g/m3	0.0000	0.0000	g/std m3
Hg concentration	mg/m3	0.0000	0.0000	mg/std m3

MEASURED / EXPECTED @ SATURATION

#DIV/0!

APPENDIX

IDMS RUN: BL1
 COMMENTS: FORMIC ACID ADDITION FAVC OUT

DATE: 6/20/90
 TIME: 16:10-17:15

WASHED SAMPLE:

		IDMS # ID-RUN-IMPL-				
		3366	3367	3368	3369	3370
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	68.70	68.60	68.70	69.40	69.40
Sample + wash water	g	514.20	497.70	268.90	334.50	348.10
Weight of sample	g	427.3	414.1	545.3	480.7	358.9
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	388.5	376.5	495.7	437.0	326.3
Conc of Hg	mg/liter (ppm)	4.31	1.21	0.10	0.05	0.89
Hg collected	mg	1.7	0.5	0.0	0.0	0.3
Total Hg collected	mg	2.5				

DRY GAS SAMPLE:

Gas Volume cu ft 6.30

MEASURED MERCURY CONCENTRATION:

Hg concentration	ug/ft3	395.48
Hg concentration	g/m3	0.0140
Hg concentration	mg/m3	13.97
Hg concentration	ppm by vol	1.678 (assuming 1 atm pressure)
Saturation temp	°C	20.72
Subcooling of Hg	°C	0.21

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS) :

Average Temperature °C 20.51

Hg concentration	ug/ft3	388.6
Hg concentration	g/m3	0.0137
Hg concentration	mg/m3	13.72
Hg concentration	ppm by vol	1.648

APPENDIX

IDMS RUN: BLT
 COMMENTS: FORMIC REFLUX 1 FAVC IN

DATE: 6/20/90
 TIME: 22:00-23:00

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		3378	3379	3380	3381	3382
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	68.80	68.40	69.80	69.00	68.60
Sample + wash water	g	662.70	438.60	303.00	538.20	404.30
Weight of sample	g	427.3	414.1	545.3	480.7	358.9
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	388.5	376.5	495.7	437.0	326.3
Conc of Hg	mg/liter (ppm)	31.30	4.30	39.00	0.26	0.05
Hg collected	mg	12.2	1.6	19.3	0.1	0.0
% of total collected	%	36.58	4.87	58.16	0.34	0.05
Total Hg collected	mg	33.2				

DRY GAS SAMPLE: Gas Volume cu ft 3.70

MERCURY CONCENTRATION MEASURED AT FAVC INLET:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	8983.97	9806.19	µg/std ft3
Hg concentration	g/m3	0.3173	0.3463	g/std m3
Hg concentration	mg/m3	317.2658	346.3024	mg/std m3
Saturation temp	°C		62.30	(by changing)

MERCURY CONCENTRATION AT SRATC EXIT CALCULATED FROM MEASURED FAVC INLET:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	#DIV/0!	#DIV/0!	µg/std ft3
Hg concentration	g/m3	#DIV/0!	#DIV/0!	g/std m3
Hg concentration	mg/m3	#DIV/0!	#DIV/0!	mg/std m3

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, SRATC EXIT) :

Average SRATC Exit Temperature °C 36.80

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	1397.6	1585.9	µg/std ft3
Hg concentration	g/m3	0.0494	0.0560	g/std m3
Hg concentration	mg/m3	49.3568	56.0061	mg/std m3

MERCURY CONCENTRATION AT FAVC INLET CALCULATED FROM SATURATION:

SRAT/FAVC flow ratio
 FAVC Inlet Temperature °C

		@ FAVC In T	@ 0°C	
Hg concentration	µg/ft3	0.0	0.0	µg/std ft3
Hg concentration	g/m3	0.0000	0.0000	g/std m3
Hg concentration	mg/m3	0.0000	0.0000	mg/std m3

MEASURED / EXPECTED @ SATURATION

#DIV/0!

APPENDIX

IDMS RUN: BL1
 COMMENTS: FORMIC REFLUX 1 FAVC OUT

DATE: 6/20/90
 TIME: 22:00-23:00

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		3385	3386	3387	3388	3389
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	69.00	68.70	69.30	68.90	68.90
Sample + wash water	g	490.90	492.10	565.80	533.60	301.20
Weight of sample	g	421.90	423.40	496.50	464.70	232.30
Approx. density of sample	g/ml	1.1	1.1	1.1	1.1	1.1
Volume of sample	ml	383.5	384.9	451.4	422.5	211.2
Conc of Hg	mg/liter (ppm)	13.59	2.20	17.10	0.11	0.04
Hg collected	mg	5.212	0.847	7.718	0.046	0.008
% of total collected	%	37.68	6.12	55.80	0.34	0.06
Total Hg collected	mg	13.8				

DRY GAS SAMPLE:

Gas Volume cu ft 6.30

MEASURED MERCURY CONCENTRATION:

Hg concentration	ug/ft3	2195.62
Hg concentration	g/m3	0.0775
Hg concentration	mg/m3	77.54
Hg concentration	ppm by vol	9.015 (assuming 1 atm pressure)
Saturation temp	°C	43.01
Subcooling of Hg	°C	31.94

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS) :

Average Temperature °C 11.07 estimated

Hg concentration	ug/ft3	172.4
Hg concentration	g/m3	0.0061
Hg concentration	mg/m3	6.09
Hg concentration	ppm by vol	0.708

APPENDIX

IDMS RUN: BLT
 COMMENTS: FORMIC REFLUX 2 FAVC IN

DATE: 6/21/90
 TIME: 01:00-02:00

WASHED SAMPLE:

		IDMS # ID-RUN-IMPL				
		3395	3396	3397	3398	3399
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	68.80	68.70	68.50	68.40	69.10
Sample + wash water	g	474.70	500.90	480.70	593.80	347.70
Weight of sample	g	427.3	414.1	545.3	480.7	358.9
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	388.5	376.5	495.7	437.0	326.3
Conc of Hg	mg/liter (ppm)	5.80	1.01	26.40	1.43	0.55
Hg collected	mg	2.3	0.4	13.1	0.6	0.2
% of total collected	%	13.63	2.30	79.20	3.78	1.09
Total Hg collected	mg	16.5				

DRY GAS SAMPLE: Gas Volume cu ft 5.10

MERCURY CONCENTRATION MEASURED AT FAVC INLET:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	3240.16	3536.70	µg/std ft3
Hg concentration	g/m3	0.1144	0.1249	g/std m3
Hg concentration	mg/m3	114.4252	124.8975	mg/std m3
Saturation temp	°C		47.52	(by changing)

MERCURY CONCENTRATION AT SRATC EXIT CALCULATED FROM MEASURED FAVC INLET:

		@ -25°C	@ 0°C	
Hg concentration	µg/ft3	#DIV/0!	#DIV/0!	µg/std ft3
Hg concentration	g/m3	#DIV/0!	#DIV/0!	g/std m3
Hg concentration	mg/m3	#DIV/0!	#DIV/0!	mg/std m3

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS, SRATC EXIT) :

Average SRATC Exit Temperature °C 30.77

		@ avg temp	@ 0°C	
Hg concentration	µg/ft3	884.9	984.6	µg/std ft3
Hg concentration	g/m3	0.0312	0.0348	g/std m3
Hg concentration	mg/m3	31.2493	34.7694	mg/std m3

MERCURY CONCENTRATION AT FAVC INLET CALCULATED FROM SATURATION:

SRAT/FAVC flow ratio
 FAVC Inlet Temperature °C

		@ FAVC In T	@ 0°C	
Hg concentration	µg/ft3	0.0	0.0	µg/std ft3
Hg concentration	g/m3	0.0000	0.0000	g/std m3
Hg concentration	mg/m3	0.0000	0.0000	mg/std m3

MEASURED / EXPECTED @ SATURATION

#DIV/0!

APPENDIX

IDMS RUN: BL1
 COMMENTS: FORMIC REFLUX 2 FAVC OUT

DATE: 6/21/90
 TIME: 01:00-02:00

WASHED SAMPLE:

		IDMS # ID-RUN-IMPI-				
		3402	3403	3404	3405	3406
		NaOH	NaOH	KMnO4	KMnO4	KMnO4
Empty bottle	g	68.90	68.40	68.60	68.20	68.60
Sample + wash water	g	496.20	482.50	613.90	548.90	427.50
Weight of sample	g	427.3	414.1	545.3	480.7	358.9
Approx. density of sample	g/ml	1.10	1.10	1.10	1.10	1.10
Volume of sample	ml	388.5	376.5	495.7	437.0	326.3
Conc of Hg	mg/liter (ppm)	1.99	2.74	4.46	3.16	5.03
Hg collected	mg	0.8	1.0	2.2	1.4	1.6
% of total collected	%	10.98	14.66	31.42	19.62	23.32
Total Hg collected	mg	7.0				

DRY GAS SAMPLE:

Gas Volume cu ft 6.90

MEASURED MERCURY CONCENTRATION:

Hg concentration	ug/ft3	1019.93
Hg concentration	g/m3	0.0360
Hg concentration	mg/m3	36.02
Hg concentration	ppm by vol	4.152 (assuming 1 atm pressure)
Saturation temp	°C	32.90
Subcooling of Hg	°C	24.25

MERCURY CONCENTRATION AT SATURATION (PROCESS BASIS) :

Average Temperature °C 8.65 estimated

Hg concentration	ug/ft3	138.7
Hg concentration	g/m3	0.0049
Hg concentration	mg/m3	4.90
Hg concentration	ppm by vol	0.565