



March 8, 2013

Joe Cerniglia
The International Group for Historic Aircraft Recovery (TIGHAR)

Subject: ICP-MS Report
Job Number: S0CHG696

Dear Joe:

Please find enclosed the procedure report for the analysis of your samples.

Thank you for using the analytical services of the Evans Analytical Group - NY. We appreciate your business and welcome any suggestions you may have for improving the quality and efficiency of our service. Please do not hesitate to call us if you have any questions regarding this report.

Sincerely,

A handwritten signature in black ink, appearing to read "Paul K. Ansee".

Manager ICP, IGA and TG Services
(Tel. 315-431-9900; risensee@eaglabs.com)

Enclosures:



**ICP-MS REPORT
JOB NUMBER: S0CHG696**

for

Joe Cerniglia
The International Group for Historic Aircraft Recovery (TIGHAR)

Analyzed by:

A handwritten signature in black ink, appearing to read "G. Infantino", written over a horizontal line.

Gabriel Infantino
Lead Analyst
(Tel. 315-431-9900; ginfantino@eaglabs.com)

Reviewed by:

A handwritten signature in black ink, appearing to read "Robert K. Isensee", written over a horizontal line.

Robert K Isensee
Manager ICP, IGA and TG Services
(Tel. 315-431-9900; risensee@eaglabs.com)

Evans Analytical Group
6707 Brooklawn Parkway
Syracuse, NY 13211, USA

Purpose:

To determine the amount of mercury leachable from the interior and exterior of one glass fragment sample (coke bottle).

ICP-MS Method:

Aqueous samples are aspirated and converted to an aerosol through a nebulizer and directed into an argon based plasma. Here the sample is dried, vaporized, atomized and ionized in the argon plasma. The resulting ions are then directed into a quadrupole mass analyzer where they are then separated and measured according to their mass to charge ratios. The constituents of an unknown sample can then be identified and quantified. ICP-MS offers extremely high sensitivity to a wide range of elements.

Analytical Set-up: ICPMS

Instrument: Perkin Elmer Elan DRC II equipped with a Cetac ASX-520 auto sampler.

ICP-MS conditions

Instrument	ELAN DRC II
Nebulizer	Quartz Meinhardt
Spray Chamber	Cyclonic
RF power	1350 W
Ar Flow	15.0 L/min
Auxillary Ar Flow	1.2 L/min
Nebulizer Gas Flow	0.88 L/min
Integration time	80 S
Scanning mode	Peak hopping
Replicates	3
RPq for Cerium as CeO (m/z 156)	< 2 %

Procedure:

For this test an acid leach was performed separately on the exterior and the interior surfaces of what appears to be a fragment from a glass coke bottle. For the leaching of the exterior 15ml of trace metals grade aqua regia was put into an acid cleaned Teflon container. The glass piece was then placed into the acid so only the exterior side was in contact with the aqua regia. The container was then sealed, to prevent evaporation or contamination, and allowed to leach for 4 hours in a trace metals hood at room temperature. Upon completion three different 1ml aliquots were transferred from the Teflon container to three different acid cleaned sample tubes. Each tube was then brought to a final volume of 50ml for analysis by ICPMS. To leach the interior the smaller opening end of the fragment was first sealed with acid cleaned parafilm. The interior was then filled with 10ml of aqua regia and the entire sample was placed inside an acid cleaned sample tube and sealed to prevent evaporation and contamination. The sample interior was then allowed to leach for 4 hours in a trace metals hood at room temperature. Upon completion three different 1ml aliquots were transferred from the glass sample interior to three different acid cleaned sample tubes. Each tube was then brought to a final volume of 50ml for analysis by ICPMS. An aqua regia acid blank was also run to correct for background and possible interferences.

Mercury was calibrated for using NIST traceable multielement standards keeping a minimum calibration coefficient criterion of 0.999. Quality control standards were run at the start and finish of the run with a minimum acceptance criterion of $\pm 10\%$.

Reagents:

- Nitric Acid - ARISTAR PLUS - trace metal grade - Lot number 1112074
- Hydrochloric Acid - ARISTAR PLUS - trace metal grade - Lot number 4112030
- Aqua Regia - mix of hydrochloric and nitric trace metal acids in a 3:1 ratio
- High Purity Water - 18.2M Ω *cm, deionized water

Results:

Table 1 shows the level of mercury found in the exterior and interior surfaces of the glass fragment sample (coke bottle). Table 2 show results of a similar experiment involving acid leaching of the exterior and interior surfaces of a glass jar sample (EAG job reference S0CGF653).

Table 1. Results of exterior and interior coke fragment leach.

Sample	Total Hg content	% RSD
2-8-S-55a Inside	< 0.001 mg/L	NA
2-8-S-55b Outside	< 0.001 mg/L	NA

Table 2. Results of exterior and interior glass jar leach (EAG job reference S0CGF653).

Sample	Total Hg content	% RSD
Inside Leach	0.004 mg/L	NA
Outside Leach	< 0.001 mg/L	NA