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Iron and Lead Corrosion in WIPP-Relevant Conditions: 24 Month Results

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DEFINITION OF ABBREVIATIONS, ACRONYMS AND INITIALISMS

Abbreviation or Acronym	Definition
ASTM	American Society for Testing and Materials
CH	contact handled
CO_2	carbon dioxide
ERDA-6	Energy Research and Development Administration (WIPP Well) 6. Synthetic Castile Formation brine
Fe	elemental (metallic) iron
GWB	Generic Weep Brine, a synthetic Salado Formation brine.
ISO	International Standards Organization
MFGCS	mixed-flow gas control system
MgO	magnesium oxide
N_2	nitrogen gas
NACE	National Association of Corrosion Engineers
Pb	elemental lead
RH	remote handled
SA	surface area
TP	test plan
WIPP	Waste Isolation Pilot Plant

1 INTRODUCTION

The experimental work reported in this document assesses the corrosion behavior of carbon steel and Pb alloys used to contain CH and RH waste under WIPP-relevant conditions. The objective of this work is to determine to what extent these alloys consume CO_2 through the formation of carbonates, potentially supporting MgO in its role of CO_2 sequestration. This work is being conducted under the test plan "Iron and Lead Corrosion in WIPP-Relevant Conditions, Test Plan TP 06-02" (Wall and Enos, 2006).

The following report documents the determination of the corrosion rates for the 24-month experimental work. This report is a follow up to Roselle (2009, 2010, 2011) in which the results from the six, twelve and eighteen month experiments were presented. A full report summarizing all experimental results for the entire two year project will be issued at a later date.

2 EXPERIMENTAL APPROACH AND METHODS

The purpose of these experiments is to assess the corrosion behavior of low carbon steel and Pb alloys used to contain CH and RH waste under WIPP-relevant conditions. Specifically, the experiments aim to determine the corrosion rates of these metals and the nature of the corrosion products that will form. The environmental conditions and samples used for this set of experiments are set up to be representative of the conditions that are expected in the WIPP following its closure. During these experiments steel and lead coupons will be immersed in different WIPP-relevant brines or hung in WIPP-relevant atmospheric conditions for a period of two years. A subset of samples will be removed from the experiments for analysis at six month intervals. The range of experimental variables is summarized in Table 2-1. This combination of experimental conditions, material types and time segments results in 288 unique experiments. In addition, three replicate coupons are used for each of the experimental conditions resulting in a total of 864 coupons (432 for lead and 432 for steel). A detailed discussion of the types of metal coupons used and the environmental conditions employed in the experiments is given in Roselle (2009).

Also shown in Table 2-1 are the matrix identifiers used in formulating unique sample numbers. The naming convention used follows this format: Aa-Bb-#### - X – Yz, where Aa is the material type, Bb the brine (or "Atm" for humid samples), #### the atmosphere, X the time segment, Y the replicate number (1 to 3) and z the sample position (left blank for humid position). Thus, sample number Fe-Go-1500-18-1f indicates the first replicate of a steel coupon fully inundated in GWB organic brine in a 1500 ppm CO_2 atmosphere for 18 months.

Previous corrosion experiments (e.g., Telander and Westerman, 1993; 1997) have been conducted in closed systems in which the atmosphere in the experiments changes as a function of corrosion. This method uses measurements of the head gas composition to estimate the amount and type of corrosion occurring in the experiments. However, such experiments result in head space gas compositions that change over time and may not reflect the expected conditions in the WIPP after closure. Therefore, the current Fe/Pb corrosion experiments are being conducted in a continuous flow setup that allows the atmospheric composition to be fixed at constant values. The specific details of the experimental setup and methods can be found in the six month experimental report (Roselle, 2009).

Table 2-1 Experimental Test Matrix

Condition	Variable	Matrix Identifier
Material Type	ASTM A1008 Steel	Fe
	QQ-L-171e Grade C Lead	Pb
Brine	GWB	G
	GWB with organics	Go
	ERDA-6	E
	ERDA-6 with organics	Eo
Sample Positioning	Fully Submerged	f
	Partially Submerged	p
	Humid Atmosphere	Atm
Atmosphere	0 ppm CO_2 (balance N_2)	0000
	350 ppm CO_2 (balance N_2)	0350
	1500 ppm CO_2 (balance N_2)	1500
	3500 ppm CO_2 (balance N_2)	3500
Time Segment	6 months	6
	12 months	12
	18 months	18
	24 months	24
Fixed Properties (constant for all experiments)	Temperature – 26 °C	--
	Relative Humidity – 75% ± 10%	--
	O_2 concentration < 5 ppm	--

Note: [2 Material types × 4 Brines × 2 Positions (wet) × 4 Atmospheres × 4 Time segments] + [2 Material type × 1 Position (humid) × 4 Atmospheres × 4 Time segments] = 288 experiments

3 EXPERIMENTAL RESULTS

After 24 months of exposure in the various brines and atmospheres most of the coupons show clear signs of corrosion. This report will not discuss in detail the post-experimental appearance of the 24 month coupons. However, it can be stated that the general trends reported in Roselle (2009, 2010, 2011) are similar for the 24 month experiments. A full report summarizing all experimental observations and results for the entire two year project will be issued at a later date.

3.1 Determination of Mass-Loss and Corrosion Rates

After the corrosion tests have been completed, two of the three replicate coupons for each test condition were chemically cleaned in order to remove all of the corrosion products. The mass of the coupons after cleaning is compared to the initial mass and the difference represents the loss of material to corrosion. The mass loss can then be used to calculate a corrosion rate.

There are numerous standard procedures that outline requirements for the cleaning of corrosion samples: ISO 8407:1991, NACE Standard TM0169-2000 and ASTM G 1 – 03. For the most part, each of these standard procedures outlines nearly identical requirements and all coupons were cleaned per the requirements outlined in these standards. Where there are differences between the standards, the source for a particular requirement that was used is noted. The cleaning process included multiple cycles of chemical etching, brushing with a nonmetallic soft bristle brush followed by rinsing with deionized water. Following each cleaning cycle the coupons were dried and weighed with the weight for each cycle being recorded in the scientific notebook. A minimum of five cleaning cycles was performed for each coupon. The details of the chemical cleaning process for each material type are given in detail in Roselle (2009).

Because the above cleaning procedures remove some amount of base metal in addition to the corrosion products a procedure needs to be employed that corrects the weight loss measurements for the base metal loss. This study uses a procedure of graphical analysis based on multiple cleaning cycles in order to extrapolate the actual weight loss due to corrosion from the total measured weight loss. The graphical analysis method is outlined in ISO 8407:1991 and discussed in Roselle (2009). Corrosion rates are calculated from the mass loss data according to the following formula (NACE, 2000):

$$rate = \frac{W \times 87.6}{SA \times t \times \rho} \times 1000 \tag{3}$$

where *rate* is the corrosion rate in μm/yr, W the mass loss (mg), SA the exposed surface area of the coupon (cm^2), t the exposure duration (hours), ρ the metal density (g/cm^3) and 1,000 converts the rate from mm/yr to μm/yr. The details of the surface area determination for each coupon are described in Appendix A. Metal densities of 7.872 g/cm^3 and 11.340 g/cm^3 were used for steel and lead, respectively (MatWeb, 2009). A summary of the weight loss data for each coupon is

given in Appendix B. The raw cleaning cycle data and graphical analysis results for each coupon are given in Appendix C (steel) and Appendix D (lead).

Table 3-1 gives the steel coupon average corrosion rates calculated from the weight-loss and surface area measurements for each brine type and the humid samples for the 24 month experiments. The average corrosion rates for the different brine types are calculated using the results for both the fully immersed and partially submerged coupons for each brine type. This was done because the calculated corrosion rates do not seem to be dependent on the coupon placement. The average steel corrosion rates are plotted as a function of CO_2 concentration in Figure 3-1. From this plot it can be seen that for both brine types the corrosion rate appears to be a function of the CO_2 concentration, regardless of the presence or absence of organic ligands. However, there are differences in the corrosion rates between the different brine types. The ERDA-6 brines appear to be more corrosive than the GWB brines by a factor of nearly 3 at the higher CO_2 concentrations. It also appears that the addition of organic ligands to the ERDA-6 brines results in slightly reduced corrosion rates as compared to ERDA-6 brines without organics. The addition of organic ligands to GWB brines does not result in significantly different corrosion rates. The humid samples show no corrosion regardless of the CO_2 concentration. These trends seen in the 24 month experiments are generally consistent with the results obtained in the six, twelve and eighteen month experiments. However, there is an unexplained spike in the corrosion rate for samples in ERDA-6 brines without organics at 350 ppm CO_2.

Table 3-1 Average Corrosion Rate (μm/yr) for 24 Month Steel Samples

Brine	CO_2 Concentration (ppm)			
	0	350	1500	3500
GWB	0.20 ± 0.02	0.23 ± 0.05	0.29 ± 0.08	0.32 ± 0.05
GWB org	0.15 ± 0.03	0.13 ± 0.01	0.22 ± 0.06	0.27 ± 0.03
ERDA-6	0.48 ± 0.04	0.99 ± 0..20	0.50 ± 0.08	0.95 ± 0.28
ERDA-6 org	0.48 ± 0.07	0.44 ± 0.16	0.43 ± 0.12	0.79 ± 0.17
Humid	0.01 ± 0.01	0.00 ± 0.00	0.01 ± 0.00	0.00 ± 0.01

Source: Averages calculated from data in Appendix B. Note that negative corrosion rates given in Appendix B are considered as 0.0 for calculation of averages.

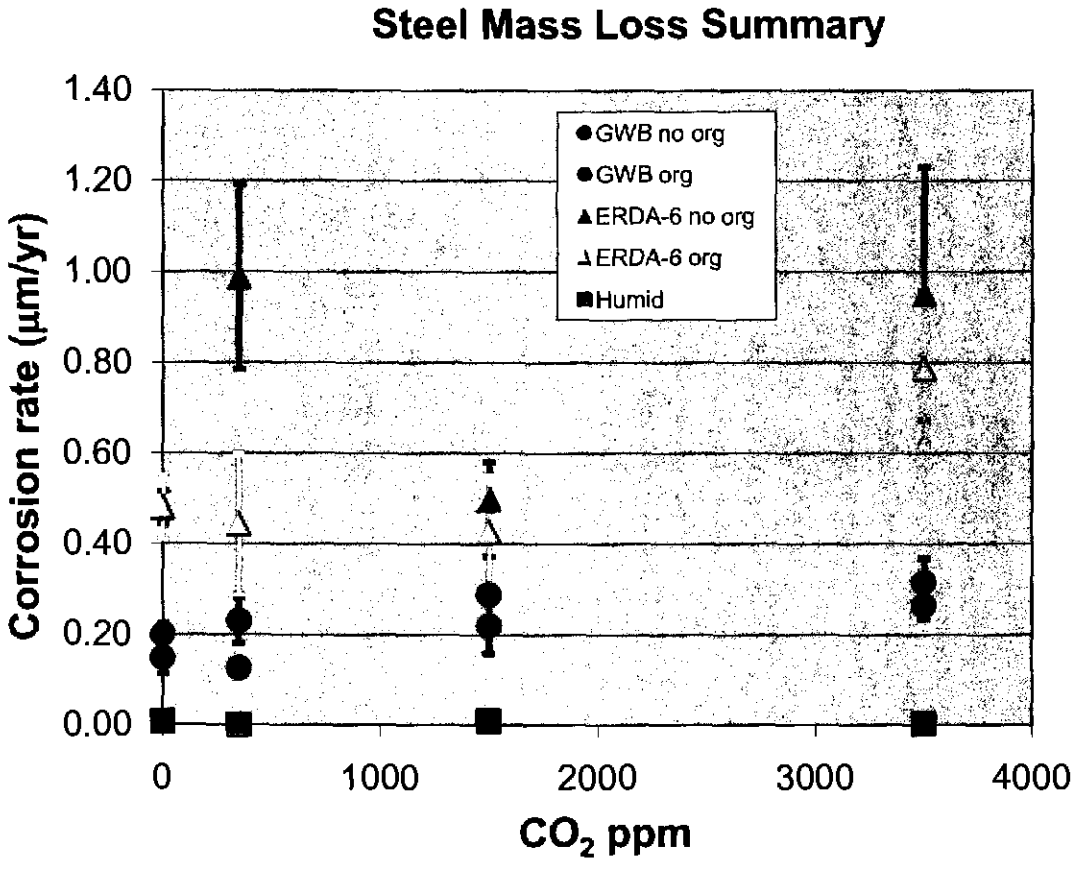

Figure 3-1 Average corrosion rates for steel coupons in the various brines plotted as a function of the atmospheric CO_2 concentration. Bars indicate one standard deviation for the average corrosion rates.

Table 3-2 gives the Pb coupon average corrosion rates calculated from the weight-loss and surface area measurements for each brine type and the humid samples. As with the steel coupons, the average Pb corrosion rates are calculated using the results for both the fully immersed and partially submerged coupons for each brine type. The average lead corrosion rates are plotted as a function of CO_2 concentration in Figure 3-2. From this plot it can be seen that the data for the lead coupons does not present as clear a picture as for the steel coupons. There may be a dependence on corrosion rates with the CO_2 concentration. Although, given the relatively large standard deviation in the averages it is difficult to determine if there is an actual dependence on CO_2 concentration. As with the six, twelve and 18 month Pb experiments, there does not appear to be significant differences in the corrosion rates between the different brine types. However, there may be some indication that GWB, especially without organics, may be more corrosive than the other brines especially at CO_2 concentrations greater than 350 ppm. The humid samples show measureable mass loss regardless of the CO_2 concentration but, it is not

certain if the magnitude of the mass loss is within the measurement uncertainty of the graphical analysis method (Appendix B).

Table 3-2 Average Corrosion Rate (μm/yr) for 24 Month Lead Samples

Brine	CO_2 Concentration (ppm)			
	0	350	1500	3500
GWB	0.15 ± 0.02	0.18 ± 0.03	0.11 ± 0.03	0.20 ± 0.10
GWB org	0.08 ± 0.01	0.10 ± 0.05	0.12 ± 0.03	0.26 ± 0.16
ERDA-6	0.07 ± 0.04	0.11 ± 0.05	0.12 ± 0.07	0.06 ± 0.05
ERDA-6 org	0.07 ± 0.01	0.10 ± 0.06	0.12 ± 0.05	0.09 ± 0.06
Humid	0.01 ± n.d.	0.03 ± 0.00	0.05 ± 0.01	0.05 ± 0.03

Source: Averages calculated from data in Appendix B. Note that negative corrosion rates given in Appendix B are considered as 0.0 for calculation of averages. Abbreviation n.d. means no data available.

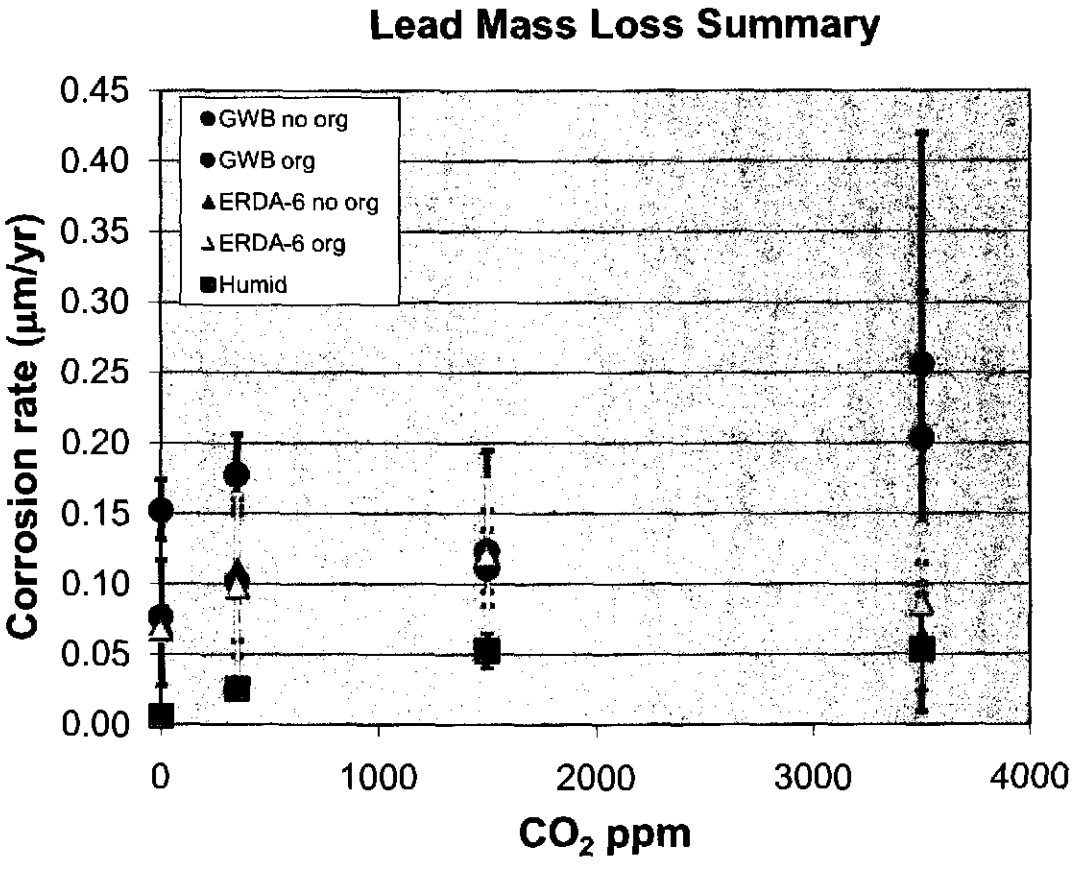

Figure 3-2 Average corrosion rates for lead coupons in the various brines plotted as a function of the atmospheric CO_2 concentration. Bars indicate one standard deviation for the average corrosion rates.

4 CONCLUSIONS

This report describes the 24 month results of a two year study on the corrosion of steel and lead under WIPP-relevant conditions. Analysis of the results from this set of experiments allows the following conclusions to be drawn.

- The corrosion rate of ASTM A1008 low-carbon steel immersed in brine is a strong function of the CO_2 concentration for all brine types. ERDA-6 brines (with and without organics) are more corrosive than the GWB brines by a factor of nearly 3 at higher CO_2 concentrations. The addition of organic ligands to the ERDA-6 brine results in less corrosion than the organic free ERDA-6. Corrosion rates for GWB appear to be independent of the presence or absence of organic ligands.

- The corrosion rate of chemical Pb may show a slight dependence of corrosion rates on the CO_2 concentration. However, given the relatively large standard deviation in the averages it is difficult to determine if there is an actual dependence on CO_2 concentration. There does not appear to be any difference in the corrosion rates between the different brine types at CO_2 concentrations of 350 ppm or less. At CO_2 concentrations greater than 350 ppm it appears that GWB may be more corrosive.

- Steel samples subjected only to humid conditions show no corrosion regardless of the CO_2 concentration. Whereas, humid Pb samples show measureable mass loss regardless of the CO_2 concentration. However, the magnitude of the mass loss may be within the measurement uncertainty of the graphical analysis method.

5 ACKNOWLEDGEMENTS

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APPENDIX A

Table A-1 lists the length, width and thickness measurements for each steel coupon, as well as, the average value of these measurements used to calculate the surface area. The equivalent data for the lead coupons is given in Table A-2. Additionally, for each of the coupons that were partially submerged the length of the portion of the coupon that was submerged is also given. In this case two measurements are made because the coupon may not have been submerged exactly parallel to the water surface.

For coupons that were fully submerged or exposed only to the atmosphere the following formula is used to calculate surface area:

$$SA = 2(L_{avg} \times W_{avg}) + 2(L_{avg} \times T_{avg}) + 2(W_{avg} \times T_{avg}) - 2\pi R^2 + 2\pi R \times T_{avg} \quad (A1)$$

where L_{avg} is the average measured length, W_{avg} the average width, T_{avg} the average thickness and R the radius of the hole, which is assumed constant for each coupon at 0.235 cm for steel coupons and 0.296 cm for lead coupons. The surface area for coupons that were partially submerged is calculated as follows:

$$SA = 2(L_1 \times W_{avg}) + (L_1 \times T_{avg}) + (L_2 \times T_{avg}) + (W_{avg} \times T_{avg}) + (W_{avg} \times (L_2 - L_1)) \quad (A2)$$

where L_1 is the smallest measured partial submersion length, L_2 the largest measured length and all other symbols are the same as for equation A1.

Table A-1 Measured Steel Coupon Dimensions and Calculated Surface Areas

Coupon		1 (mm)	2 (mm)	3 (mm)	Average (mm)	Average (cm)	L_1 (cm)	L_2 (cm)	SA (cm^2)
001	Length	51.22	51.24	51.20	51.22	5.122	N/A	N/A	41.776
	Width	38.56	38.56	38.41	38.51	3.851			
	Thickness	1.38	1.37	1.38	1.38	0.138			
002	Length	51.14	51.21	51.17	51.17	5.117	N/A	N/A	41.703
	Width	38.51	38.50	38.38	38.46	3.846			
	Thickness	1.38	1.38	1.39	1.38	0.138			
009	Length	51.45	51.33	51.40	51.39	5.139	3.086	3.246	25.782
	Width	38.47	38.57	38.44	38.49	3.849			
	Thickness	1.40	1.36	1.39	1.38	0.138			
010	Length	51.29	51.66	51.35	51.43	5.143	3.168	3.168	25.798
	Width	38.49	38.56	38.49	38.51	3.851			
	Thickness	1.39	1.37	1.35	1.37	0.137			
012	Length	51.23	51.32	51.23	51.26	5.126	N/A	N/A	41.804
	Width	38.42	38.61	38.56	38.53	3.853			
	Thickness	1.37	1.38	1.34	1.36	0.136			
013	Length	51.06	51.25	51.32	51.21	5.121	N/A	N/A	41.830
	Width	38.56	38.66	38.56	38.59	3.859			
	Thickness	1.37	1.37	1.35	1.36	0.136			
015	Length	51.27	51.29	51.36	51.31	5.131	2.771	2.890	23.093
	Width	38.48	38.60	38.46	38.51	3.851			
	Thickness	1.34	1.35	1.38	1.36	0.136			
016	Length	51.18	51.22	51.21	51.20	5.120	2.656	2.656	21.650
	Width	38.48	38.49	38.54	38.50	3.850			
	Thickness	1.29	1.30	1.33	1.31	0.131			
018	Length	50.97	51.32	51.12	51.14	5.114	N/A	N/A	41.593
	Width	38.42	38.61	38.48	38.50	3.850			
	Thickness	1.30	1.33	1.33	1.32	0.132			
019	Length	51.10	51.28	51.24	51.21	5.121	N/A	N/A	41.553
	Width	38.42	38.47	38.31	38.40	3.840			
	Thickness	1.36	1.32	1.30	1.33	0.133			
021	Length	50.99	51.54	51.18	51.24	5.124	3.415	3.472	27.898
	Width	38.31	38.51	38.35	38.39	3.839			
	Thickness	1.37	1.36	1.35	1.36	0.136			
022	Length	51.22	51.36	51.34	51.31	5.131	3.427	3.577	28.443
	Width	38.35	38.60	38.48	38.48	3.848			
	Thickness	1.35	1.33	1.45	1.38	0.138			
024	Length	51.13	51.41	51.43	51.32	5.132	N/A	N/A	41.775
	Width	38.37	38.66	38.50	38.51	3.851			
	Thickness	1.32	1.34	1.34	1.33	0.133			
025	Length	51.05	51.22	51.18	51.15	5.115	N/A	N/A	41.598
	Width	38.46	38.57	38.39	38.47	3.847			
	Thickness	1.31	1.33	1.36	1.33	0.133			

Table A-1 continued.

Coupon		1 (mm)	2 (mm)	3 (mm)	Average (mm)	Average (cm)	L_1 (cm)	L_2 (cm)	SA (cm^2)
027	Length	51.09	51.28	51.23	51.20	5.120	3.620	3.822	30.197
	Width	38.45	38.57	38.49	38.50	3.850			
	Thickness	1.36	1.38	1.36	1.37	0.137			
028	Length	51.20	51.30	51.26	51.25	5.125	3.314	3.314	26.818
	Width	38.28	38.44	38.29	38.34	3.834			
	Thickness	1.32	1.34	1.38	1.35	0.135			
030	Length	51.17	51.25	51.07	51.16	5.116	N/A	N/A	41.512
	Width	38.13	38.51	38.43	38.36	3.836			
	Thickness	1.36	1.35	1.33	1.35	0.135			
031	Length	51.02	51.21	51.17	51.13	5.113	N/A	N/A	41.450
	Width	38.28	38.53	38.39	38.40	3.840			
	Thickness	1.27	1.34	1.30	1.30	0.130			
142	Length	51.02	51.27	51.21	51.17	5.117	N/A	N/A	41.538
	Width	38.24	38.46	38.38	38.36	3.836			
	Thickness	1.36	1.36	1.35	1.36	0.136			
143	Length	51.16	51.24	51.11	51.17	5.117	N/A	N/A	41.514
	Width	38.31	38.48	38.29	38.36	3.836			
	Thickness	1.35	1.33	1.35	1.34	0.134			
145	Length	51.01	51.25	51.23	51.16	5.116	3.079	3.079	24.981
	Width	38.34	38.46	38.28	38.36	3.836			
	Thickness	1.37	1.36	1.35	1.36	0.136			
146	Length	51.19	51.21	51.10	51.17	5.117	3.163	3.163	25.644
	Width	38.33	38.48	38.36	38.39	3.839			
	Thickness	1.36	1.34	1.31	1.34	0.134			
148	Length	51.01	51.26	51.33	51.20	5.120	N/A	N/A	41.674
	Width	38.51	38.47	38.34	38.44	3.844			
	Thickness	1.40	1.36	1.35	1.37	0.137			
149	Length	51.10	51.24	51.38	51.24	5.124	N/A	N/A	41.561
	Width	38.30	38.46	38.35	38.37	3.837			
	Thickness	1.32	1.33	1.35	1.33	0.133			
151	Length	51.26	51.53	51.13	51.31	5.131	2.931	3.112	24.496
	Width	38.49	38.47	38.19	38.38	3.838			
	Thickness	1.31	1.32	1.32	1.32	0.132			
152	Length	51.25	51.28	51.18	51.17	5.117	2.885	3.098	24.325
	Width	38.59	38.55	38.34	38.49	3.849			
	Thickness	1.34	1.31	1.30	1.32	0.132			
154	Length	50.98	51.22	51.05	51.08	5.108	N/A	N/A	41.430
	Width	38.39	38.40	38.30	38.36	3.836			
	Thickness	1.32	1.33	1.35	1.33	0.133			
155	Length	51.14	51.21	51.22	51.19	5.119	N/A	N/A	41.513
	Width	38.30	38.42	38.31	38.34	3.834			
	Thickness	1.36	1.34	1.33	1.34	0.134			
157	Length	50.99	50.97	50.98	50.98	5.098	2.587	2.587	21.084
	Width	38.67	38.35	38.65	38.56	3.856			
	Thickness	1.23	1.26	1.28	1.26	0.126			

Table A-1 continued.

Coupon		1 (mm)	2 (mm)	3 (mm)	Average (mm)	Average (cm)	L_1 (cm)	L_2 (cm)	SA (cm^2)
158	Length	51.05	51.05	51.02	51.04	5.104	2.596	2.810	21.861
	Width	38.35	38.44	38.35	38.38	3.838			
	Thickness	1.25	1.27	1.09	1.20	0.120			
160	Length	51.34	51.32	51.22	51.29	5.129	N/A	N/A	41.698
	Width	38.42	38.52	38.57	38.50	3.850			
	Thickness	1.29	1.31	1.33	1.31	0.131			
161	Length	51.12	51.22	51.14	51.16	5.116	N/A	N/A	41.597
	Width	38.30	38.62	38.18	38.37	3.837			
	Thickness	1.39	1.39	1.38	1.39	0.139			
163	Length	51.17	51.23	51.05	51.15	5.115	3.060	3.060	24.924
	Width	38.38	38.59	38.45	38.47	3.847			
	Thickness	1.38	1.36	1.41	1.38	0.138			
164	Length	51.03	51.28	51.05	51.12	5.112	3.060	3.060	24.842
	Width	38.41	38.45	38.23	38.36	3.836			
	Thickness	1.36	1.38	1.37	1.37	0.137			
166	Length	51.12	51.39	51.03	51.18	5.118	N/A	N/A	41.629
	Width	38.28	38.52	38.40	38.40	3.840			
	Thickness	1.40	1.37	1.36	1.38	0.138			
167	Length	51.18	51.14	51.21	51.18	5.118	N/A	N/A	41.557
	Width	38.35	38.43	38.26	38.35	3.835			
	Thickness	1.36	1.37	1.38	1.37	0.137			
226	Length	51.18	51.22	50.93	51.11	5.111	N/A	N/A	41.205
	Width	38.33	38.48	38.28	38.36	3.836			
	Thickness	1.26	1.25	1.11	1.21	0.121			
227	Length	50.98	51.15	50.96	51.03	5.103	N/A	N/A	41.414
	Width	38.35	38.48	38.41	38.41	3.841			
	Thickness	1.40	1.28	1.28	1.32	0.132			
229	Length	50.98	51.18	51.17	51.11	5.111	3.020	3.265	25.421
	Width	38.37	38.53	38.27	38.39	3.839			
	Thickness	1.28	1.29	1.26	1.28	0.128			
230	Length	51.21	51.19	51.10	51.17	5.117	3.135	3.291	25.965
	Width	38.35	38.46	38.37	38.39	3.839			
	Thickness	1.30	1.28	1.20	1.26	0.126			
232	Length	51.23	51.19	51.03	51.15	5.115	N/A	N/A	41.579
	Width	38.50	38.66	38.28	38.48	3.848			
	Thickness	1.32	1.32	1.32	1.32	0.132			
233	Length	51.06	51.24	51.18	51.16	5.116	N/A	N/A	41.523
	Width	38.37	38.40	38.45	38.41	3.841			
	Thickness	1.34	1.33	1.31	1.33	0.133			
235	Length	51.14	51.26	51.22	51.21	5.121	3.121	3.207	25.633
	Width	38.36	38.44	38.39	38.40	3.840			
	Thickness	1.32	1.31	1.31	1.31	0.131			
236	Length	51.24	51.12	51.07	51.14	5.114	3.155	3.244	25.944
	Width	38.46	38.51	38.34	38.44	3.844			
	Thickness	1.32	1.30	1.33	1.32	0.132			

Table A-1 continued.

Coupon		1 (mm)	2 (mm)	3 (mm)	Average (mm)	Average (cm)	L_1 (cm)	L_2 (cm)	SA (cm^2)
238	Length	51.22	51.26	51.06	51.18	5.118	N/A	N/A	41.521
	Width	38.37	38.51	38.38	38.42	3.842			
	Thickness	1.33	1.31	1.29	1.31	0.131			
239	Length	51.13	51.28	51.10	51.17	5.117	N/A	N/A	41.612
	Width	38.49	38.55	38.32	38.45	3.845			
	Thickness	1.33	1.33	1.37	1.34	0.134			
241	Length	50.93	51.20	51.11	51.08	5.108	2.974	3.020	24.266
	Width	38.38	38.36	38.33	38.36	3.836			
	Thickness	1.29	1.31	1.29	1.30	0.130			
242	Length	51.30	51.29	51.08	51.22	5.122	2.939	3.068	24.399
	Width	38.51	38.50	38.41	38.47	3.847			
	Thickness	1.31	1.31	1.30	1.31	0.131			
244	Length	51.11	51.24	51.13	51.16	5.116	N/A	N/A	41.567
	Width	38.38	38.67	38.37	38.47	3.847			
	Thickness	1.31	1.32	1.31	1.31	0.131			
245	Length	51.10	51.21	51.31	51.21	5.121	N/A	N/A	41.664
	Width	38.46	38.53	38.38	38.46	3.846			
	Thickness	1.30	1.38	1.38	1.35	0.135			
247	Length	51.18	51.15	50.94	51.09	5.109	2.980	3.116	24.766
	Width	38.37	38.68	38.53	38.53	3.853			
	Thickness	1.28	1.28	1.30	1.29	0.129			
248	Length	51.04	51.26	51.19	51.16	5.116	2.985	3.196	25.026
	Width	38.38	38.49	38.37	38.41	3.841			
	Thickness	1.27	1.30	1.27	1.28	0.128			
250	Length	51.28	51.18	51.10	51.19	5.119	N/A	N/A	41.518
	Width	38.41	38.53	38.39	38.44	3.844			
	Thickness	1.29	1.31	1.28	1.29	0.129			
251	Length	50.95	51.19	51.26	51.13	5.113	N/A	N/A	41.308
	Width	38.31	38.48	38.32	38.37	3.837			
	Thickness	1.22	1.23	1.29	1.25	0.125			
334	Length	51.19	51.32	51.10	51.20	5.120	N/A	N/A	41.591
	Width	38.31	38.51	38.33	38.38	3.838			
	Thickness	1.37	1.35	1.35	1.36	0.136			
335	Length	51.12	51.29	51.21	51.21	5.121	N/A	N/A	41.619
	Width	38.32	38.49	38.30	38.37	3.837			
	Thickness	1.37	1.40	1.36	1.38	0.138			
337	Length	51.12	51.24	51.24	51.20	5.120	3.025	3.264	25.609
	Width	38.36	38.56	38.36	38.43	3.843			
	Thickness	1.42	1.41	1.44	1.42	0.142			
338	Length	51.03	51.27	51.19	51.16	5.116	3.255	3.436	27.120
	Width	38.37	38.51	38.42	38.43	3.843			
	Thickness	1.34	1.33	1.33	1.33	0.133			
340	Length	51.04	51.34	51.16	51.18	5.118	N/A	N/A	41.764
	Width	38.40	38.55	38.36	38.44	3.844			
	Thickness	1.39	1.39	1.50	1.43	0.143			

Table A-1 continued.

Coupon		1 (mm)	2 (mm)	3 (mm)	Average (mm)	Average (cm)	L_1 (cm)	L_2 (cm)	SA (cm^2)
341	Length	51.17	51.27	50.96	51.13	5.113	N/A	N/A	41.423
	Width	38.37	38.51	38.30	38.39	3.839			
	Thickness	1.28	1.30	1.30	1.29	0.129			
343	Length	51.07	51.28	51.17	51.17	5.117	2.896	3.171	24.688
	Width	38.46	38.58	38.48	38.51	3.851			
	Thickness	1.37	1.33	1.31	1.34	0.134			
345	Length	51.23	51.25	51.05	51.18	5.118	2.923	3.225	24.956
	Width	38.33	38.52	38.33	38.39	3.839			
	Thickness	1.34	1.37	1.35	1.35	0.135			
347	Length	51.17	51.22	51.05	51.15	5.115	N/A	N/A	41.348
	Width	38.31	38.47	38.32	38.37	3.837			
	Thickness	1.28	1.27	1.24	1.26	0.126			
348	Length	51.12	51.24	51.21	51.19	5.119	N/A	N/A	41.548
	Width	38.39	38.56	38.42	38.46	3.846			
	Thickness	1.31	1.31	1.28	1.30	0.130			
350	Length	51.18	51.27	51.15	51.20	5.120	2.916	3.029	24.136
	Width	38.37	38.48	38.33	38.39	3.839			
	Thickness	1.35	1.33	1.34	1.34	0.134			
351	Length	51.03	51.09	50.90	51.01	5.101	2.907	3.034	24.066
	Width	38.22	38.35	38.20	38.26	3.826			
	Thickness	1.36	1.37	1.38	1.37	0.137			
353	Length	51.23	51.23	51.04	51.17	5.117	N/A	N/A	41.558
	Width	38.35	38.54	38.34	38.41	3.841			
	Thickness	1.28	1.38	1.36	1.34	0.134			
354	Length	51.08	51.25	51.15	51.16	5.116	N/A	N/A	41.579
	Width	38.36	38.54	38.35	38.42	3.842			
	Thickness	1.34	1.36	1.35	1.35	0.135			
356	Length	51.10	51.20	51.11	51.14	5.114	2.728	2.808	22.496
	Width	38.35	38.48	38.19	38.34	3.834			
	Thickness	1.36	1.34	1.37	1.36	0.136			
357	Length	51.10	51.31	51.09	51.17	5.117	2.672	2.703	21.919
	Width	38.35	38.50	38.29	38.38	3.838			
	Thickness	1.45	1.37	1.38	1.40	0.140			
359	Length	51.15	51.62	51.22	51.33	5.133	N/A	N/A	41.747
	Width	38.35	38.51	38.41	38.42	3.842			
	Thickness	1.36	1.38	1.35	1.36	0.136			
360	Length	51.07	51.32	51.22	51.20	5.120	N/A	N/A	41.649
	Width	38.29	38.55	38.29	38.38	3.838			
	Thickness	1.40	1.40	1.37	1.39	0.139			

Source: Individual data sheets for each coupon in *WIPP-FePb-3 Supplemental Binder C (ERMS 546084)*

Table A-2 Measured Lead Coupon Dimensions and Calculated Surface Areas

Coupon		1 (mm)	2 (mm)	3 (mm)	Average (mm)	Average (cm)	L_1 (cm)	L_2 (cm)	SA (cm^2)
L002	Length	51.61	51.79	51.84	51.75	5.175	N/A	N/A	42.915
	Width	38.48	38.74	39.22	38.81	3.881			
	Thickness	1.70	1.68	1.57	1.65	0.165			
L003	Length	51.69	51.77	51.51	51.66	5.166	N/A	N/A	42.780
	Width	38.79	38.74	38.51	38.68	3.868			
	Thickness	1.70	1.68	1.70	1.69	0.169			
L005	Length	51.66	51.64	51.51	51.60	5.160	2.938	2.938	24.421
	Width	38.71	38.81	38.81	38.78	3.878			
	Thickness	1.70	1.65	1.68	1.68	0.168			
L006	Length	51.41	51.64	51.94	51.66	5.166	2.355	2.355	19.716
	Width	39.24	38.76	38.58	38.86	3.886			
	Thickness	1.65	1.65	1.63	1.64	0.164			
L008	Length	51.56	51.97	51.59	51.71	5.171	N/A	N/A	42.875
	Width	38.61	38.81	38.76	38.73	3.873			
	Thickness	1.70	1.70	1.68	1.69	0.169			
L009	Length	51.94	51.82	51.51	51.76	5.176	N/A	N/A	43.017
	Width	38.76	38.89	38.86	38.84	3.884			
	Thickness	1.75	1.65	1.65	1.68	0.168			
L011	Length	51.87	51.84	51.64	51.78	5.178	3.046	3.046	25.280
	Width	38.74	38.91	38.94	38.86	3.886			
	Thickness	1.65	1.63	1.55	1.61	0.161			
L012	Length	51.69	51.54	51.38	51.54	5.154	2.920	2.920	24.119
	Width	38.71	38.61	38.48	38.60	3.860			
	Thickness	1.65	1.63	1.60	1.63	0.163			
L014	Length	51.28	51.51	51.46	51.42	5.142	N/A	N/A	42.415
	Width	38.48	38.74	38.61	38.61	3.861			
	Thickness	1.65	1.68	1.60	1.64	0.164			
L015	Length	51.18	51.46	51.51	51.38	5.138	N/A	N/A	42.534
	Width	38.63	38.84	38.86	38.78	3.878			
	Thickness	1.65	1.63	1.60	1.63	0.163			
L017	Length	51.69	51.56	52.04	51.77	5.177	2.833	2.833	23.570
	Width	38.61	38.79	39.14	38.85	3.885			
	Thickness	1.65	1.68	1.57	1.63	0.163			
L018	Length	51.28	51.41	51.41	51.37	5.137	3.082	3.082	25.444
	Width	38.61	38.74	38.56	38.63	3.863			
	Thickness	1.60	1.65	1.63	1.63	0.163			
L020	Length	51.41	51.66	52.02	51.70	5.170	N/A	N/A	43.034
	Width	38.68	38.79	39.32	38.93	3.893			
	Thickness	1.73	1.70	1.57	1.67	0.167			
L021	Length	51.41	51.51	51.38	51.44	5.144	N/A	N/A	42.388
	Width	38.66	38.68	38.51	38.62	3.862			
	Thickness	1.60	1.65	1.60	1.62	0.162			

Table A-2 continued.

Coupon		1 (mm)	2 (mm)	3 (mm)	Average (mm)	Average (cm)	L_1 (cm)	L_2 (cm)	SA (cm^2)
L023	Length	51.51	51.36	51.10	51.32	5.132	3.464	3.464	28.616
	Width	38.63	38.74	38.71	38.69	3.869			
	Thickness	1.65	1.65	1.73	1.68	0.168			
L024	Length	51.03	51.13	51.10	51.09	5.109	3.193	3.193	26.205
	Width	38.40	38.43	38.38	38.40	3.840			
	Thickness	1.65	1.63	1.65	1.64	0.164			
L026	Length	51.00	51.05	50.95	51.00	5.100	N/A	N/A	41.718
	Width	38.18	38.40	38.30	38.29	3.829			
	Thickness	1.65	1.63	1.60	1.63	0.163			
L027	Length	51.16	51.28	51.13	51.19	5.119	N/A	N/A	41.633
	Width	37.62	38.30	38.25	38.06	3.806			
	Thickness	1.63	1.65	1.63	1.63	0.163			
L137	Length	51.17	51.55	51.61	51.44	5.144	N/A	N/A	42.615
	Width	38.73	38.60	38.64	38.66	3.866			
	Thickness	1.73	1.70	1.69	1.71	0.171			
L138	Length	51.54	51.49	51.35	51.46	5.146	N/A	N/A	42.626
	Width	38.39	38.65	38.85	38.63	3.863			
	Thickness	1.73	1.71	1.72	1.72	0.172			
L140	Length	51.49	51.66	51.39	51.51	5.151	3.330	3.330	27.529
	Width	38.68	38.68	38.77	38.71	3.871			
	Thickness	1.67	1.66	1.65	1.66	0.166			
L141	Length	51.73	51.61	51.69	51.68	5.168	2.700	2.700	22.499
	Width	38.75	38.74	38.83	38.77	3.877			
	Thickness	1.62	1.73	1.70	1.68	0.168			
L143	Length	51.38	51.43	51.43	51.41	5.141	N/A	N/A	42.558
	Width	38.68	38.62	38.54	38.61	3.861			
	Thickness	1.71	1.72	1.71	1.71	0.171			
L144	Length	51.82	51.67	51.50	51.66	5.166	N/A	N/A	43.021
	Width	38.92	38.90	38.83	38.88	3.888			
	Thickness	1.72	1.69	1.69	1.70	0.170			
L146	Length	51.30	51.48	51.61	51.46	5.146	3.169	3.296	26.833
	Width	38.69	38.73	38.75	38.72	3.872			
	Thickness	1.77	1.71	1.74	1.74	0.174			
L147	Length	51.61	51.54	51.42	51.52	5.152	3.316	3.316	27.495
	Width	38.53	38.80	38.81	38.71	3.871			
	Thickness	1.69	1.75	1.76	1.73	0.173			
L149	Length	51.39	51.41	51.40	51.40	5.140	N/A	N/A	42.355
	Width	38.48	38.55	38.53	38.52	3.852			
	Thickness	1.63	1.72	1.65	1.67	0.167			
L150	Length	51.54	51.66	51.44	51.55	5.155	N/A	N/A	42.671
	Width	38.61	38.60	38.72	38.64	3.864			
	Thickness	1.69	1.68	1.73	1.70	0.170			
L152	Length	51.46	51.45	51.46	51.46	5.146	3.216	3.473	27.162
	Width	38.69	38.60	38.63	38.64	3.864			
	Thickness	1.25	1.26	1.23	1.25	0.125			

Table A-2 continued.

Coupon		1 (mm)	2 (mm)	3 (mm)	Average (mm)	Average (cm)	L_1 (cm)	L_2 (cm)	SA (cm^2)
L153	Length	51.12	50.99	50.94	51.02	5.102	3.173	3.426	26.465
	Width	38.20	38.12	38.06	38.13	3.813			
	Thickness	1.29	1.26	1.21	1.25	0.125			
L155	Length	51.43	51.52	51.46	51.47	5.147	N/A	N/A	42.521
	Width	38.55	38.70	38.60	38.62	3.862			
	Thickness	1.68	1.66	1.67	1.67	0.167			
L156	Length	51.28	51.44	51.43	51.38	5.138	N/A	N/A	42.476
	Width	38.69	38.59	38.66	38.65	3.865			
	Thickness	1.66	1.66	1.68	1.67	0.167			
L158	Length	51.52	51.57	51.55	51.55	5.155	3.573	3.573	29.356
	Width	38.76	38.68	38.33	38.59	3.859			
	Thickness	1.61	1.67	1.57	1.62	0.162			
L159	Length	51.65	51.47	51.50	51.54	5.154	3.718	3.718	30.568
	Width	38.52	38.66	38.67	38.62	3.862			
	Thickness	1.66	1.62	1.64	1.64	0.164			
L161	Length	51.46	51.74	51.96	51.72	5.172	N/A	N/A	42.829
	Width	39.33	38.58	38.67	38.86	3.886			
	Thickness	1.63	1.63	1.52	1.59	0.159			
L162	Length	51.62	51.57	51.33	51.51	5.151	N/A	N/A	42.694
	Width	38.72	38.74	38.59	38.68	3.868			
	Thickness	1.71	1.67	1.74	1.71	0.171			
L218	Length	51.30	51.18	51.18	51.22	5.122	N/A	N/A	42.269
	Width	38.56	38.49	38.60	38.55	3.855			
	Thickness	1.67	1.68	1.69	1.68	0.168			
L219	Length	51.37	51.43	51.37	51.39	5.139	N/A	N/A	42.357
	Width	38.62	38.61	38.19	38.47	3.847			
	Thickness	1.72	1.73	1.64	1.70	0.170			
L221	Length	51.38	51.18	51.16	51.24	5.124	3.279	3.279	27.009
	Width	38.55	38.56	38.52	38.54	3.854			
	Thickness	1.64	1.69	1.66	1.66	0.166			
L222	Length	51.41	51.41	51.45	51.42	5.142	3.343	3.343	27.526
	Width	38.60	38.65	38.59	38.61	3.861			
	Thickness	1.63	1.62	1.61	1.62	0.162			
L224	Length	51.05	51.23	51.39	51.22	5.122	N/A	N/A	42.405
	Width	38.79	38.42	38.78	38.66	3.866			
	Thickness	1.74	1.63	1.69	1.69	0.169			
L225	Length	51.41	51.54	51.34	51.43	5.143	N/A	N/A	42.230
	Width	38.66	38.61	37.83	38.37	3.837			
	Thickness	1.69	1.61	1.72	1.67	0.167			
L227	Length	51.39	51.24	51.22	51.28	5.128	3.180	3.180	26.263
	Width	38.46	38.60	38.60	38.55	3.855			
	Thickness	1.69	1.67	1.76	1.71	0.171			
L228	Length	51.44	51.44	51.45	51.44	5.144	3.311	3.311	27.289
	Width	38.61	38.63	38.46	38.57	3.857			
	Thickness	1.69	1.66	1.66	1.67	0.167			

Table A-2 continued.

Coupon		1 (mm)	2 (mm)	3 (mm)	Average (mm)	Average (cm)	L_1 (cm)	L_2 (cm)	SA (cm^2)
L230	Length	51.45	51.34	51.41	51.40	5.140	N/A	N/A	42.447
	Width	38.38	38.62	38.67	38.56	3.856			
	Thickness	1.68	1.69	1.71	1.69	0.169			
L231	Length	51.59	51.61	51.62	51.61	5.161	N/A	N/A	42.788
	Width	38.70	38.79	38.67	38.72	3.872			
	Thickness	1.68	1.74	1.66	1.69	0.169			
L233	Length	51.47	51.38	51.29	51.38	5.138	3.083	3.083	25.386
	Width	38.60	38.59	38.41	38.53	3.853			
	Thickness	1.59	1.64	1.64	1.62	0.162			
L234	Length	51.61	51.47	51.32	51.47	5.147	2.930	2.930	24.221
	Width	38.54	38.60	38.60	38.58	3.858			
	Thickness	1.65	1.68	1.65	1.66	0.166			
L236	Length	51.45	51.38	51.42	51.42	5.142	N/A	N/A	42.529
	Width	38.58	38.46	38.60	38.55	3.855			
	Thickness	1.74	1.72	1.74	1.73	0.173			
L237	Length	51.17	51.18	51.09	51.15	5.115	N/A	N/A	42.077
	Width	38.37	38.54	38.57	38.49	3.849			
	Thickness	1.71	1.65	1.57	1.64	0.164			
L239	Length	51.25	51.28	51.27	51.27	5.127	3.076	3.076	25.452
	Width	38.63	38.61	38.37	38.54	3.854			
	Thickness	1.71	1.76	1.76	1.74	0.174			
L240	Length	51.11	51.09	50.99	51.06	5.106	3.064	3.064	25.230
	Width	38.42	38.38	38.37	38.39	3.839			
	Thickness	1.71	1.71	1.71	1.71	0.171			
L242	Length	51.73	51.69	51.58	51.67	5.167	N/A	N/A	42.819
	Width	38.90	38.71	38.67	38.76	3.876			
	Thickness	1.67	1.73	1.59	1.66	0.166			
L243	Length	51.64	51.37	51.37	51.46	5.146	N/A	N/A	42.698
	Width	38.61	38.75	38.77	38.71	3.871			
	Thickness	1.70	1.71	1.73	1.71	0.171			
L327	Length	51.65	51.68	51.49	51.61	5.161	N/A	N/A	42.644
	Width	38.83	38.58	38.57	38.66	3.866			
	Thickness	1.70	1.67	1.59	1.65	0.165			
L328	Length	51.22	51.26	51.28	51.25	5.125	N/A	N/A	42.119
	Width	38.57	38.48	38.51	38.52	3.852			
	Thickness	1.61	1.58	1.63	1.61	0.161			
L330	Length	51.41	51.16	51.08	51.22	5.122	3.026	3.026	25.005
	Width	38.54	38.67	38.65	38.62	3.862			
	Thickness	1.68	1.62	1.64	1.65	0.165			
L331	Length	51.26	51.38	51.35	51.33	5.133	2.916	2.916	24.143
	Width	38.67	38.63	38.63	38.64	3.864			
	Thickness	1.64	1.65	1.68	1.66	0.166			
L333	Length	51.35	51.36	51.48	51.40	5.140	N/A	N/A	42.425
	Width	38.56	38.54	38.42	38.51	3.851			
	Thickness	1.73	1.68	1.72	1.71	0.171			

Table A-2 continued.

Coupon		1 (mm)	2 (mm)	3 (mm)	Average (mm)	Average (cm)	L_1 (cm)	L_2 (cm)	SA (cm^2)
L334	Length	51.31	51.32	51.25	51.29	5.129	N/A	N/A	42.312
	Width	38.39	38.49	38.52	38.47	3.847			
	Thickness	1.68	1.76	1.71	1.72	0.172			
L337	Length	51.80	51.57	51.39	51.59	5.159	3.126	3.126	26.375
	Width	38.74	38.94	38.67	38.78	3.878			
	Thickness	2.29	2.18	1.83	2.10	0.210			
L339	Length	51.39	51.38	51.18	51.32	5.132	2.955	2.955	24.763
	Width	38.50	38.55	38.81	38.62	3.862			
	Thickness	1.76	2.25	1.94	1.98	0.198			
L341	Length	51.18	51.35	51.30	51.28	5.128	N/A	N/A	42.932
	Width	38.72	38.61	38.57	38.63	3.863			
	Thickness	2.00	2.08	1.76	1.95	0.195			
L342	Length	51.15	51.49	51.41	51.35	5.135	N/A	N/A	42.855
	Width	38.53	38.96	38.79	38.76	3.876			
	Thickness	1.74	1.86	1.83	1.81	0.181			
L344	Length	51.28	51.26	51.38	51.31	5.131	3.048	3.048	25.264
	Width	38.49	38.66	38.75	38.63	3.863			
	Thickness	1.67	1.72	1.77	1.72	0.172			
L345	Length	51.65	51.71	51.40	51.59	5.159	2.937	2.937	24.471
	Width	38.67	38.81	39.03	38.84	3.884			
	Thickness	1.64	1.76	1.70	1.70	0.170			
L347	Length	51.70	51.54	51.72	51.65	5.165	N/A	N/A	43.027
	Width	38.85	38.81	38.88	38.85	3.885			
	Thickness	1.75	1.74	1.69	1.73	0.173			
L348	Length	51.52	51.60	51.73	51.62	5.162	N/A	N/A	42.970
	Width	39.15	38.76	38.59	38.83	3.883			
	Thickness	1.72	1.72	1.72	1.72	0.172			
L350	Length	51.69	51.70	51.68	51.69	5.169	3.002	3.002	24.972
	Width	38.68	38.92	38.88	38.83	3.883			
	Thickness	1.59	1.65	1.80	1.68	0.168			
L353	Length	51.38	51.72	51.41	51.50	5.150	3.203	3.203	26.539
	Width	38.60	38.64	38.66	38.63	3.863			
	Thickness	1.74	1.72	1.77	1.74	0.174			
L356	Length	51.53	51.53	51.61	51.56	5.156	N/A	N/A	42.970
	Width	38.76	38.81	39.03	38.87	3.887			
	Thickness	1.71	1.71	1.76	1.73	0.173			
L357	Length	51.66	51.43	51.56	51.55	5.155	N/A	N/A	42.935
	Width	38.80	39.00	38.83	38.88	3.888			
	Thickness	1.66	1.69	1.77	1.71	0.171			

Source: Individual data sheets for each coupon in *WIPP-FePb-3 Supplemental Binder C (ERMS 546084)*

APPENDIX B

Table B-1 lists the exposure duration, initial weight, final weight, weight loss, surface area and calculated corrosion rate for each steel coupon. The equivalent data for the lead coupons is given in Table B-2. The reported surface areas are taken from Tables A-1 and A-2 for steel and lead, respectively. The final weight is determined from the cleaning cycle data and graphical analysis, which is presented in Appendix C for the steel coupons and Appendix D for the lead coupons (see Section 4.4 in Roselle (2009) for details).

Corrosion rates are calculated according to Equation (3) given in Section 3.1.

Table B-1 Summary of Steel Coupon Corrosion Rate Data

Test ID	Coupon	Duration (days)	Initial Wt (g)	Final Wt (g) (Calculated)	Weight Loss (mg)	Surface Area (cm^2)	Corrosion Rate (μm/yr)
Fe-G-0000-24-1f	001	777	20.6240	20.6087	15.3	41.776	0.219
Fe-G-0000-24-2f	002	777	20.5841	20.5714	12.7	41.703	0.182
Fe-G-0000-24-1p	009	777	20.4679	20.4582	9.7	25.782	0.225
Fe-G-0000-24-2p	010	777	20.5272	20.5195	7.7	25.798	0.178
Fe-Go-0000-24-1f	012	777	20.2285	20.2192	9.3	41.804	0.133
Fe-Go-0000-24-2f	013	777	20.2769	20.2694	7.5	41.830	0.107
Fe-Go-0000-24-1p	015	777	20.3798	20.3729	6.9	23.093	0.178
Fe-Go-0000-24-2p	016	777	19.5429	19.5365	6.4	21.650	0.176
Fe-E-0000-24-1f	018	777	19.6337	19.6031	30.6	41.593	0.439
Fe-E-0000-24-2f	019	777	19.7774	19.7450	32.4	41.553	0.465
Fe-E-0000-24-1p	021	777	20.2797	20.2568	22.9	27.898	0.490
Fe-E-0000-24-2p	022	777	20.1809	20.1559	25.0	28.443	0.525
Fe-Eo-0000-24-1f	024	777	19.8657	19.8324	33.3	41.775	0.476
Fe-Eo-0000-24-2f	025	777	19.8175	19.7891	28.4	41.598	0.407
Fe-Eo-0000-24-1p	027	777	20.1286	20.1052	23.4	30.197	0.462
Fe-Eo-0000-24-2p	028	777	20.0979	20.0719	26.0	26.818	0.579
Fe-Atm-0000-24-1	030	777	20.0973	20.0963	1.0	41.512	0.014
Fe-Atm-0000-24-2	031	777	19.3834	19.3833	0.1	41.450	0.001
Fe-G-0350-24-2f	142	764	20.3932	20.3805	12.7	41.538	0.186
Fe-G-0350-24-3f	143	764	20.1383	20.1251	13.2	41.514	0.193
Fe-G-0350-24-2p	145	764	20.2947	20.2843	10.4	24.981	0.253
Fe-G-0350-24-3p	146	764	20.1988	20.1865	12.3	25.644	0.291
Fe-Go-0350-24-2f	148	764	20.1712	20.1632	8.0	41.674	0.117
Fe-Go-0350-24-3f	149	764	20.0060	19.9978	8.2	41.561	0.120
Fe-Go-0350-24-2p	151	764	19.4084	19.4029	5.5	24.496	0.136
Fe-Go-0350-24-3p	152	764	19.5225	19.5172	5.3	24.325	0.132
Fe-E-0350-24-2f	154	764	19.5756	19.5226	53.0	41.430	0.776
Fe-E-0350-24-3f	155	764	19.8205	19.7595	61.0	41.513	0.892
Fe-E-0350-24-2p	157	764	18.3299	18.2938	36.1	21.084	1.039
Fe-E-0350-24-3p	158	764	18.5795	18.5345	45.0	21.861	1.249
Fe-Eo-0350-24-2f	160	764	19.1297	19.0906	39.1	41.698	0.569
Fe-Eo-0350-24-3f	161	764	20.4086	20.3683	40.3	41.597	0.588
Fe-Eo-0350-24-2p	163	764	20.2446	20.2320	12.6	24.924	0.307
Fe-Eo-0350-24-3p	164	764	20.2056	20.1929	12.7	24.842	0.310
Fe-Atm-0350-24-2	166	764	20.2371	20.2373	-0.2	41.629	-0.003
Fe-Atm-0350-24-3	167	764	20.2530	20.2531	-0.1	41.557	-0.001
Fe-G-1500-24-2f	226	786	18.6941	18.6785	15.6	41.205	0.223
Fe-G-1500-24-3f	227	786	19.2821	19.2658	16.3	41.414	0.232

Table B-1 continued.

Test ID	Coupon	Duration (days)	Initial Wt (g)	Final Wt (g) (Calculated)	Weight Loss (mg)	Surface Area (cm^2)	Corrosion Rate (μm/yr)
Fe-G-1500-24-2p	229	786	19.0517	19.0343	17.4	25.421	0.404
Fe-G-1500-24-3p	230	786	19.0467	19.0337	13.0	25.965	0.295
Fe-Go-1500-24-2f	232	786	19.9854	19.9734	12.0	41.579	0.170
Fe-Go-1500-24-3f	233	786	19.8149	19.8035	11.4	41.523	0.162
Fe-Go-1500-24-2p	235	786	20.0636	20.0516	12.0	25.633	0.276
Fe-Go-1500-24-3p	236	786	19.8832	19.8712	12.0	25.944	0.273
Fe-E-1500-24-2f	238	786	19.9648	19.9353	29.5	41.521	0.419
Fe-E-1500-24-3f	239	786	20.0428	20.0118	31.0	41.612	0.439
Fe-E-1500-24-2p	241	786	19.3937	19.3707	23.0	24.266	0.559
Fe-E-1500-24-3p	242	786	19.6989	19.6750	23.9	24.399	0.578
Fe-Eo-1500-24-2f	244	786	19.7472	19.7086	38.6	41.567	0.548
Fe-Eo-1500-24-3f	245	786	19.9761	19.9400	36.1	41.664	0.511
Fe-Eo-1500-24-2p	247	786	19.0860	19.0706	15.4	24.766	0.367
Fe-Eo-1500-24-3p	248	786	18.9766	18.9647	11.9	25.026	0.281
Fe-Atm-1500-24-2	250	786	19.5200	19.5192	0.8	41.518	0.011
Fe-Atm-1500-24-3	251	786	18.5320	18.5315	0.5	41.308	0.007
Fe-G-3500-24-2f	334	773	20.5720	20.5448	27.2	41.591	0.392
Fe-G-3500-24-3f	335	773	20.6391	20.6188	20.3	41.619	0.293
Fe-G-3500-24-2p	337	773	20.2438	20.2309	12.9	25.609	0.302
Fe-G-3500-24-3p	338	773	20.2790	20.2665	12.5	27.120	0.276
Fe-Go-3500-24-2f	340	773	20.6052	20.5893	15.9	41.764	0.228
Fe-Go-3500-24-3f	341	773	19.5010	19.4832	17.8	41.423	0.258
Fe-Go-3500-24-2p	343	773	19.8981	19.8869	11.2	24.688	0.272
Fe-Go-3500-24-3p	345	773	20.4076	20.3950	12.6	24.956	0.303
Fe-E-3500-24-2f	347	773	18.9234	18.8484	75.0	41.348	1.088
Fe-E-3500-24-3f	348	773	19.1652	19.1028	62.4	41.548	0.901
Fe-E-3500-24-2p	350	773	19.9314	19.8818	49.6	24.136	1.233
Fe-E-3500-24-3p	351	773	20.2387	20.2152	23.5	24.066	0.586
Fe-Eo-3500-24-2f	353	773	19.9447	19.8893	55.4	41.558	0.800
Fe-Eo-3500-24-3f	354	773	19.9449	19.9060	38.9	41.579	0.561
Fe-Eo-3500-24-2p	356	773	20.4940	20.4578	36.2	22.496	0.965
Fe-Eo-3500-24-3p	357	773	20.5446	20.5144	30.2	21.919	0.826
Fe-Atm-3500-24-2	359	773	20.6528	20.6531	-0.3	41.747	-0.004
Fe-Atm-3500-24-3	360	773	20.6299	20.6294	0.5	41.649	0.007

Source: WIPP-FePb-3 Supplemental Binder C (ERMS 546084)

Table B-2 Summary of Lead Coupon Corrosion Rate Data

Test ID	Coupon	Duration (days)	Initial Wt (g)	Final Wt (g) (Calculated)	Weight Loss (mg)	Surface Area (cm^2)	Corrosion Rate (μm/yr)
Pb-G-0000-24-2f	L002	772	35.5556	35.5431	12.5	42.915	0.121
Pb-G-0000-24-3f	L003	772	35.6341	35.6168	17.3	42.780	0.169
Pb-G-0000-24-2p	L005	772	35.1444	35.1352	9.2	24.421	0.157
Pb-G-0000-24-3p	L006	772	35.3700	35.3623	7.7	19.716	0.163
Pb-Go-0000-24-2f	L008	772	35.3503	35.3417	8.6	42.875	0.084
Pb-Go-0000-24-3f	L009	772	35.2176	35.2103	7.3	43.017	0.071
Pb-Go-0000-24-2p	L011	772	35.2259	35.2213	4.6	25.280	0.076
Pb-Go-0000-24-3p	L012	772	35.9487	35.9541	-5.4	24.119	-0.093
Pb-E-0000-24-2f	L014	772	35.1179	35.1134	4.5	42.415	0.044
Pb-E-0000-24-3f	L015	772	35.0627	35.0565	6.2	42.534	0.061
Pb-E-0000-24-2p	L017	772	35.3128	35.3050	7.8	23.570	0.138
Pb-E-0000-24-3p	L018	772	34.7897	34.7869	2.8	25.444	0.046
Pb-Eo-0000-24-2f	L020	772	35.7989	35.8024	-3.5	43.034	-0.034
Pb-Eo-0000-24-3f	L021	772	35.0101	35.0111	-1.0	42.388	-0.010
Pb-Eo-0000-24-2p	L023	772	35.5732	35.5681	5.1	28.616	0.074
Pb-Eo-0000-24-3p	L024	772	34.7456	34.7417	3.9	26.205	0.062
Pb-Atm-0000-24-2	L026	772	34.7043	34.7037	0.6	41.718	0.006
Pb-Atm-0000-24-3	L027	772	34.5269	34.5281	-1.2	41.633	-0.012
Pb-G-0350-24-2f	L137	762	35.4022	35.3882	14.0	42.615	0.139
Pb-G-0350-24-3f	L138	762	35.8065	35.7882	18.3	42.626	0.181
Pb-G-0350-24-2p	L140	762	35.1586	35.1452	13.4	27.529	0.206
Pb-G-0350-24-3p	L141	762	36.0541	36.0442	9.9	22.499	0.186
Pb-Go-0350-24-2f	L143	762	35.8544	35.8433	11.1	42.558	0.110
Pb-Go-0350-24-3f	L144	762	35.2684	35.2659	2.5	43.021	0.025
Pb-Go-0350-24-2p	L146	762	35.8863	35.8775	8.8	26.833	0.139
Pb-Go-0350-24-3p	L147	762	35.9994	35.9907	8.7	27.495	0.134
Pb-E-0350-24-2f	L149	762	34.5729	34.5637	9.2	42.355	0.092
Pb-E-0350-24-3f	L150	762	34.5257	34.5143	11.4	42.671	0.113
Pb-E-0350-24-2p	L152	762	35.8550	35.8436	11.4	27.162	0.177
Pb-E-0350-24-3p	L153	762	35.8579	35.8543	3.6	26.465	0.057
Pb-Eo-0350-24-2f	L155	762	36.0256	36.0172	8.4	42.521	0.083
Pb-Eo-0350-24-3f	L156	762	35.8608	35.8585	2.3	42.476	0.023
Pb-Eo-0350-24-2p	L158	762	35.9581	35.9456	12.5	29.356	0.180
Pb-Eo-0350-24-3p	L159	762	34.7519	34.7441	7.8	30.568	0.108
Pb-Atm-0350-24-2	L161	762	34.7789	34.7763	2.6	42.829	0.026
Pb-Atm-0350-24-3	L162	762	35.9799	35.9808	-0.9	42.694	-0.009
Pb-G-1500-24-2f	L218	785	34.4518	34.4385	13.3	42.269	0.129
Pb-G-1500-24-3f	L219	785	36.1254	36.1125	12.9	42.357	0.125

Table B-2 *continued.*

Test ID	*Coupon*	Duration (days)	Initial Wt (g)	Final Wt (g) (Calculated)	Weight Loss (mg)	Surface Area (cm^2)	Corrosion Rate (μm/yr)
Pb-G-1500-24-2p	L221	785	34.5919	34.5866	5.3	27.009	0.080
Pb-G-1500-24-3p	L222	785	34.2593	34.2597	-0.4	27.526	-0.006
Pb-Go-1500-24-2f	L224	785	35.6093	35.5980	11.3	42.405	0.109
Pb-Go-1500-24-3f	L225	785	35.5335	35.5240	9.5	42.230	0.092
Pb-Go-1500-24-2p	L227	785	35.1164	35.1079	8.5	26.263	0.133
Pb-Go-1500-24-3p	L228	785	35.8951	35.8845	10.6	27.289	0.159
Pb-E-1500-24-2f	L230	785	35.5537	35.5495	4.2	42.447	0.041
Pb-E-1500-24-3f	L231	785	35.1384	35.1230	15.4	42.788	0.148
Pb-E-1500-24-2p	L233	785	34.5084	34.5026	5.8	25.386	0.094
Pb-E-1500-24-3p	L234	785	34.5747	34.5624	12.3	24.221	0.208
Pb-Eo-1500-24-2f	L236	785	36.2002	36.1905	9.7	42.529	0.094
Pb-Eo-1500-24-3f	L237	785	35.8591	35.8532	5.9	42.077	0.057
Pb-Eo-1500-24-2p	L239	785	36.0527	36.0426	10.1	25.452	0.163
Pb-Eo-1500-24-3p	L240	785	35.9020	35.8917	10.3	25.230	0.167
Pb-Atm-1500-24-2	L242	785	34.4960	34.4914	4.6	42.819	0.044
Pb-Atm-1500-24-3	L243	785	36.0800	36.0736	6.4	42.698	0.061
Pb-G-3500-24-2f	L327	773	35.5565	35.5452	11.3	42.644	0.110
Pb-G-3500-24-3f	L328	773	35.0274	35.0155	11.9	42.119	0.118
Pb-G-3500-24-2p	L330	773	35.4251	35.4078	17.3	25.005	0.288
Pb-G-3500-24-3p	L331	773	35.3204	35.3031	17.3	24.143	0.298
Pb-Go-3500-24-2f	L333	773	35.9784	35.9663	12.1	42.425	0.119
Pb-Go-3500-24-3f	L334	773	36.1270	36.1143	12.7	42.312	0.125
Pb-Go-3500-24-2p	L337	773	35.0805	35.0598	20.7	26.375	0.327
Pb-Go-3500-24-3p	L339	773	35.0693	35.0423	27.0	24.763	0.454
Pb-E-3500-24-2f	L341	773	35.8415	35.8398	1.7	42.932	0.016
Pb-E-3500-24-3f	L342	773	34.6500	34.6474	2.6	42.855	0.025
Pb-E-3500-24-2p	L344	773	34.4406	34.4327	7.9	25.264	0.130
Pb-E-3500-24-3p	L345	773	34.9862	34.9817	4.5	24.471	0.077
Pb-Eo-3500-24-2f	L347	773	34.7670	34.7620	5.0	43.027	0.048
Pb-Eo-3500-24-3f	L348	773	35.9570	35.9535	3.5	42.970	0.034
Pb-Eo-3500-24-2p	L350	773	34.7657	34.7591	6.6	24.972	0.110
Pb-Eo-3500-24-3p	L353	773	35.7837	35.7739	9.8	26.539	0.154
Pb-Atm-3500-24-2	L356	773	35.3392	35.3315	7.7	42.970	0.075
Pb-Atm-3500-24-3	L357	773	35.4526	35.4492	3.4	42.935	0.033

Source: WIPP-FcPb-3 Supplemental Binder C (ERMS 546084)

APPENDIX C

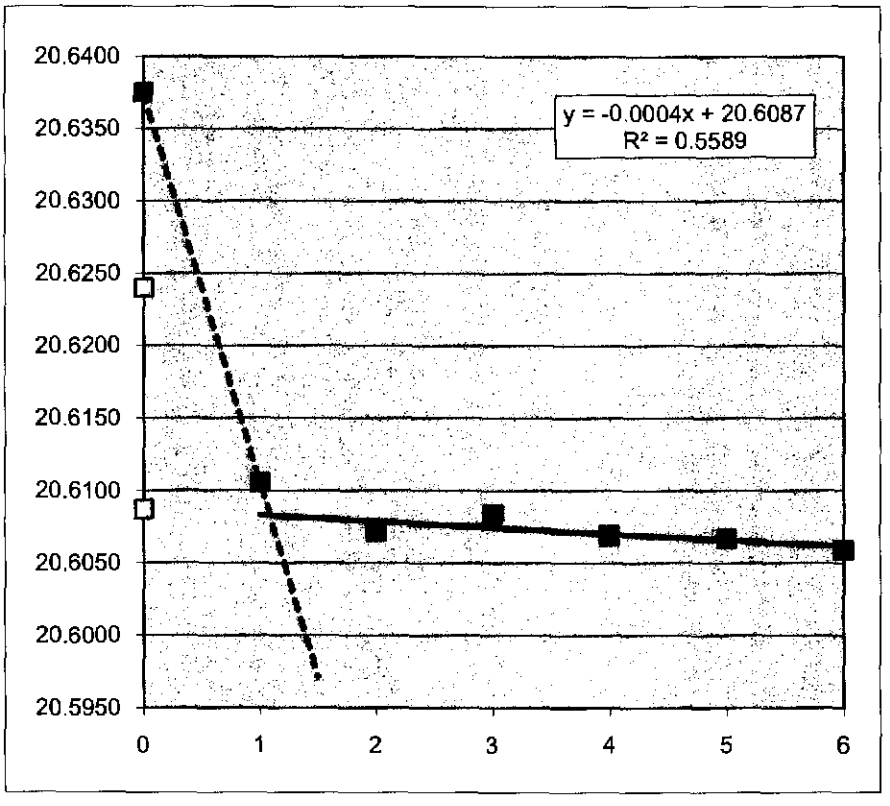
This appendix contains all of the weight loss cleaning cycle data, as well as the results of the graphical analysis of that data for each of the steel coupons (see individual data sheets for each coupon in WIPP-FePb-3 Supplemental Binder C). Each of the following pages lists the initial coupon weight, removal weight, cleaning cycle weights, calculated final weight and the resulting weight loss. The environmental conditions for each coupon can be read from the test matrix label that is given for each coupon. The meaning of the test matrix labels is discussed in Section 2.

For each coupon the graphical analysis is shown (see Section 3.1 for details of the process). The blue symbols indicate those parts of the cleaning cycle data used to determine the calculated final weight, which is the y-intercept of the line fit to the blue symbols. The red symbols show the cleaning cycle data not used in the linear regression. Yellow symbols indicate the initial coupon weight (prior to the experiment) and the final calculated weight.

Coupon:	001
Test Matrix:	Fe-G-0000-24-1f
Initial wt (g)	20.6240
Removal wt (g)	20.6375

Calculated final wt (g)	20.6087
Total wt loss (g)	0.0153
Total wt loss (mg)	15.3

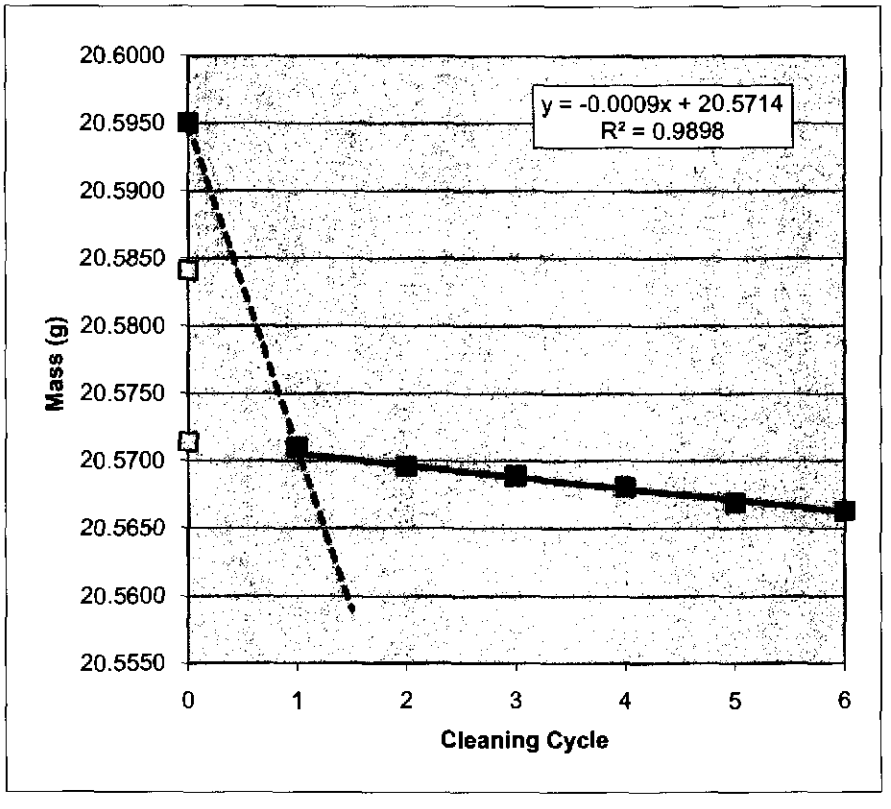
Cleaning Cycle	Wt (g)
0	20.6375
1	20.6106
2	20.6072
3	20.6084
4	20.6069
5	20.6067
6	20.6059



Coupon:	002
Test Matrix:	Fe-G-0000-24-2f
Initial wt (g)	20.5841
Removal wt (g)	20.5950

Calculated final wt (g)	20.5714
Total wt loss (g)	0.0127
Total wt loss (mg)	12.7

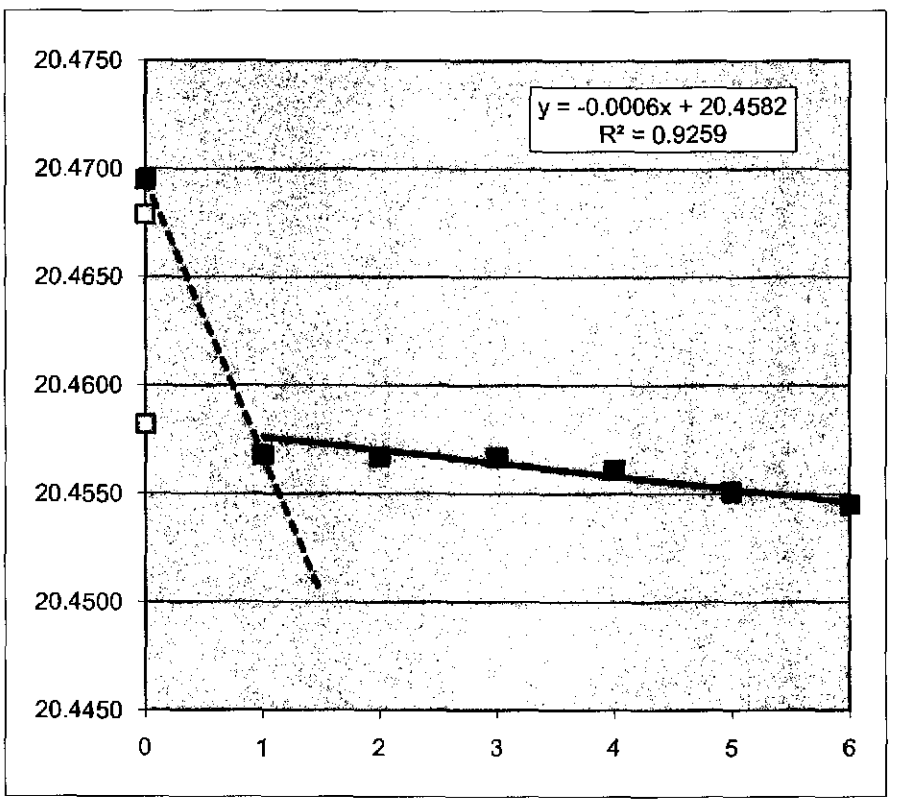
Cleaning Cycle	Wt (g)
0	20.5950
1	20.5710
2	20.5696
3	20.5689
4	20.5681
5	20.5669
6	20.5663



Coupon:	009
Test Matrix:	Fe-G-0000-24-1p
Initial wt (g)	20.4679
Removal wt (g)	20.4695

Calculated final wt (g)	20.4582
Total wt loss (g)	0.0097
Total wt loss (mg)	9.7

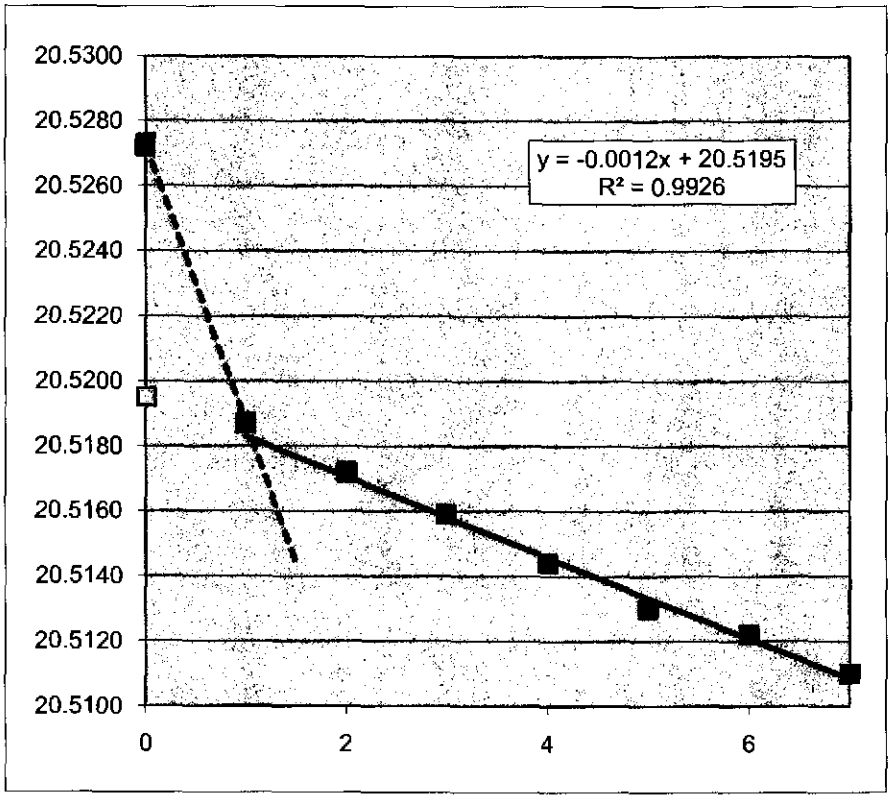
Cleaning Cycle	Wt (g)
0	20.4695
1	20.4568
2	20.4567
3	20.4567
4	20.4561
5	20.4551
6	20.4545



Coupon:	010
Test Matrix:	Fe-G-0000-24-2p
Initial wt (g)	20.5272
Removal wt (g)	20.5273

Calculated final wt (g)	20.5195
Total wt loss (g)	0.0077
Total wt loss (mg)	7.7

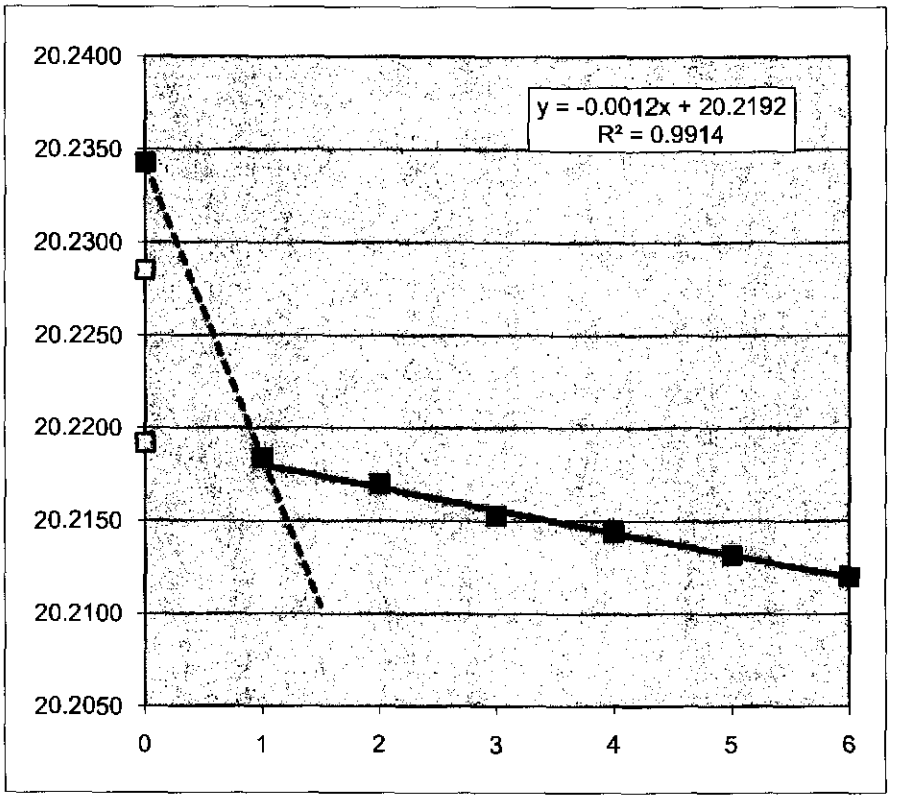
Cleaning Cycle	Wt (g)
0	20.5273
1	20.5187
2	20.5172
3	20.5159
4	20.5144
5	20.5130
6	20.5122
7	20.5110



Coupon:	012
Test Matrix:	Fe-Go-0000-24-1f
Initial wt (g)	20.2285
Removal wt (g)	20.2343

Calculated final wt (g)	20.2192
Total wt loss (g)	0.0093
Total wt loss (mg)	9.3

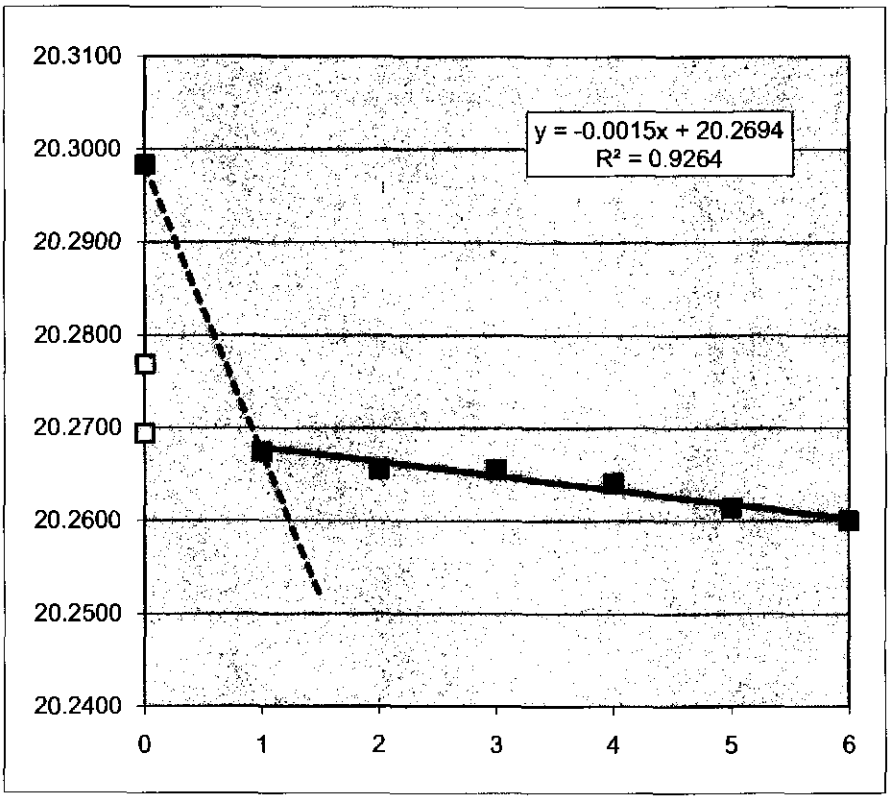
Cleaning Cycle	Wt (g)
0	20.2343
1	20.2184
2	20.2170
3	20.2153
4	20.2144
5	20.2132
6	20.2120



Coupon:	013
Test Matrix:	Fe-Go-0000-24-2f
Initial wt (g)	20.2769
Removal wt (g)	20.2983

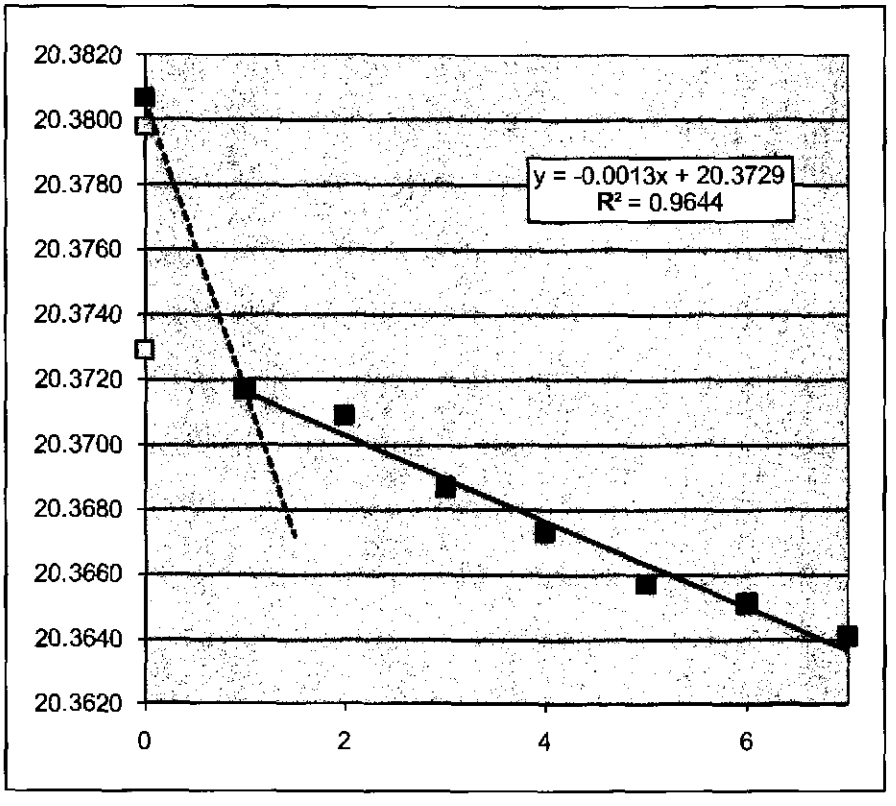
Calculated final wt (g)	20.2694
Total wt loss (g)	0.0075
Total wt loss (mg)	7.5

Cleaning Cycle	Wt (g)
0	20.2983
1	20.2674
2	20.2656
3	20.2655
4	20.2641
5	20.2614
6	20.2600



Coupon:	015		
Test Matrix:	*Fe-Go-0000-24-1p*		
Initial wt (g)	20.3798	**Calculated final wt (g)**	20.3729
Removal wt (g)	20.3807	**Total wt loss (g)**	0.0069
		Total wt loss (mg)	*6.9*

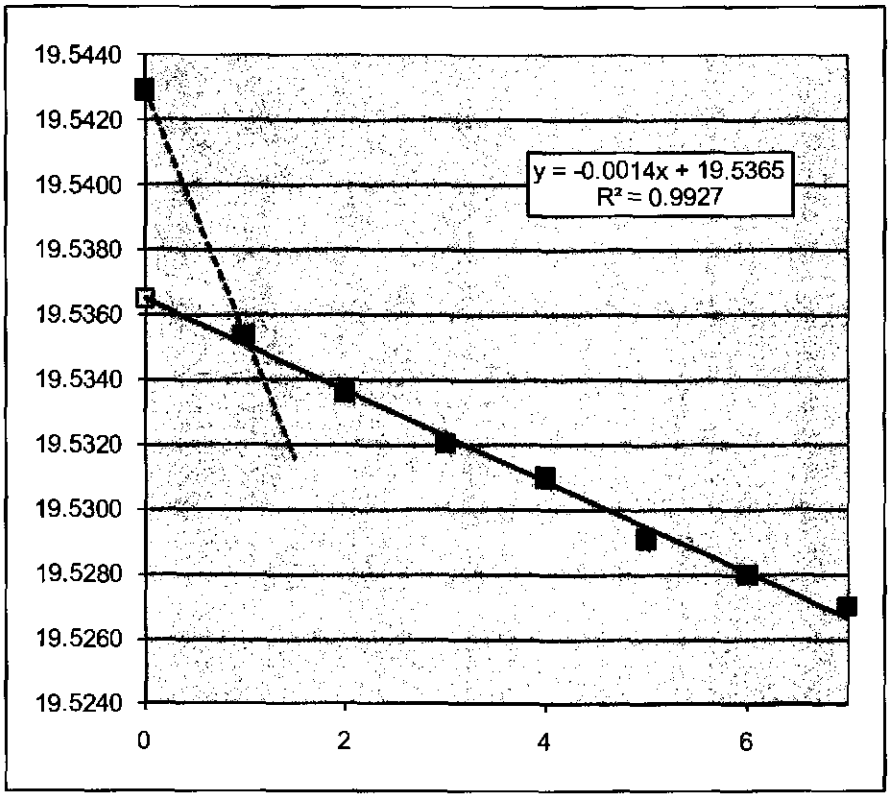
Cleaning Cycle	Wt (g)
0	20.3807
1	20.3717
2	20.3709
3	20.3687
4	20.3673
5	20.3657
6	20.3651
7	20.3641



Coupon:	016
Test Matrix:	Fe-Go-0000-24-2p
Initial wt (g)	19.5429
Removal wt (g)	19.5430

Calculated final wt (g)	19.5365
Total wt loss (g)	0.0064
Total wt loss (mg)	6.4

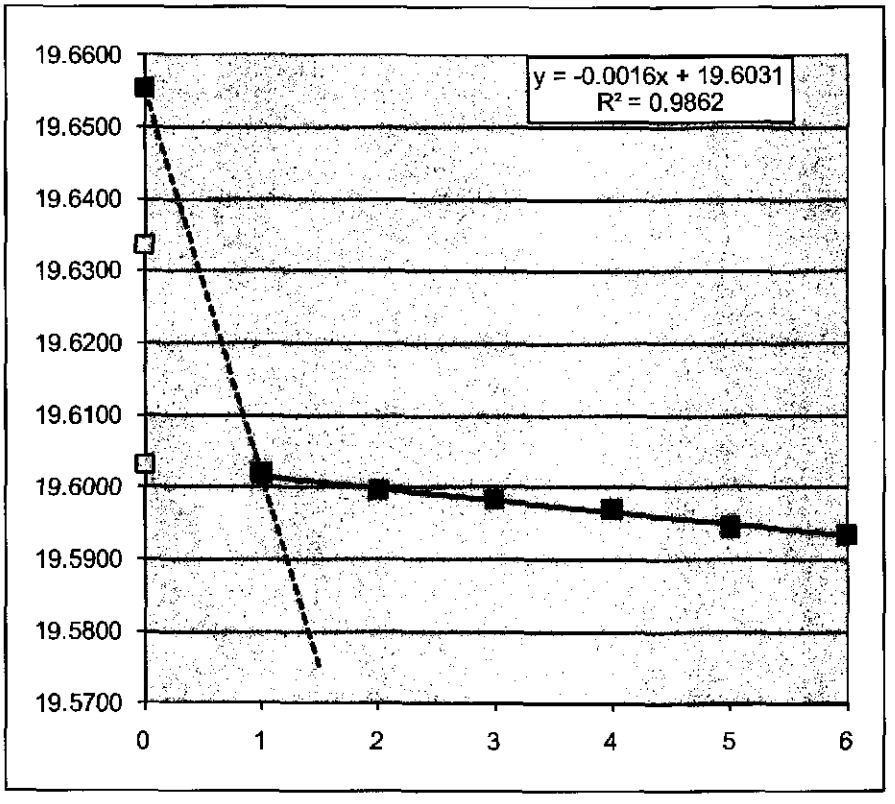
Cleaning Cycle	Wt (g)
0	19.5430
1	19.5354
2	19.5336
3	19.5321
4	19.5310
5	19.5291
6	19.5280
7	19.5270



Coupon:	018
Test Matrix:	Fe-E-0000-24-1f
Initial wt (g)	19.6337
Removal wt (g)	19.6555

Calculated final wt (g)	19.6031
Total wt loss (g)	0.0306
Total wt loss (mg)	30.6

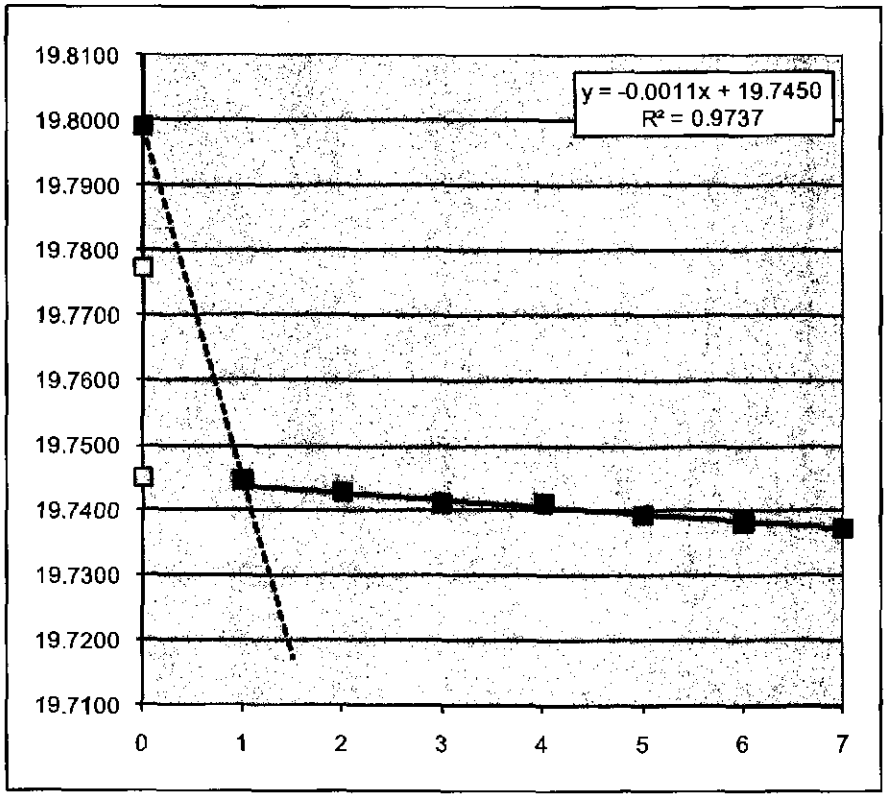
Cleaning Cycle	Wt (g)
0	19.6555
1	19.6020
2	19.5997
3	19.5984
4	19.5970
5	19.5946
6	19.5935



Coupon:	019
Test Matrix:	Fe-E-0000-24-2f
Initial wt (g)	19.7774
Removal wt (g)	19.7992

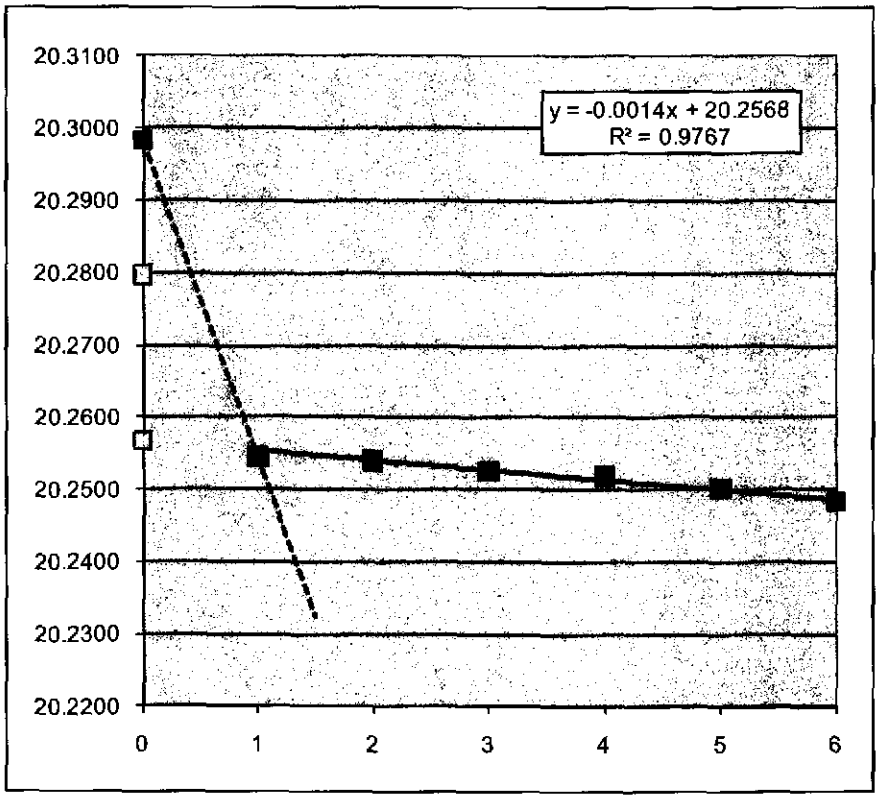
Calculated final wt (g)	19.7450
Total wt loss (g)	0.0324
Total wt loss (mg)	32.4

Cleaning Cycle	*Wt (g)*
0	19.7992
1	19.7447
2	19.7430
3	19.7412
4	19.7411
5	19.7394
6	19.7383
7	19.7374



Coupon:	021		
Test Matrix:	Fe-E-0000-24-1p		
Initial wt (g)	20.2797	**Calculated final wt (g)**	20.2568
Removal wt (g)	20.2984	**Total wt loss (g)**	0.0229
		Total wt loss (mg)	22.9

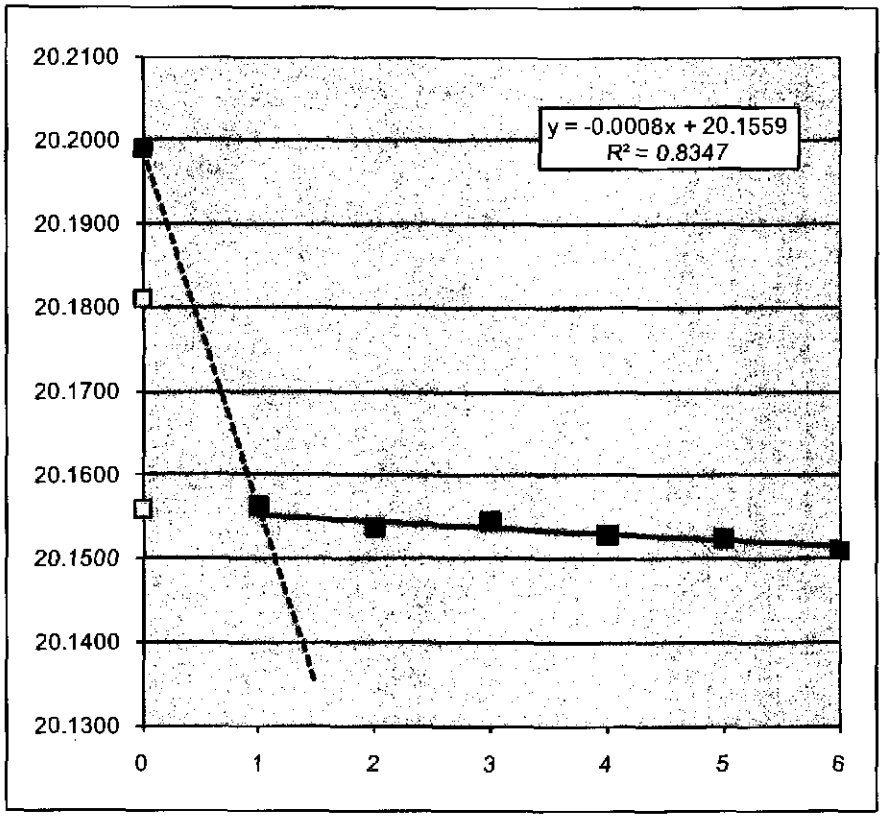
Cleaning Cycle	Wt (g)
0	20.2984
1	20.2545
2	20.2540
3	20.2525
4	20.2519
5	20.2502
6	20.2484



Coupon:	022
Test Matrix:	Fe-E-0000-24-2p
Initial wt (g)	20.1809
Removal wt (g)	20.1990

Calculated final wt (g)	20.1559
Total wt loss (g)	0.0250
Total wt loss (mg)	25.0

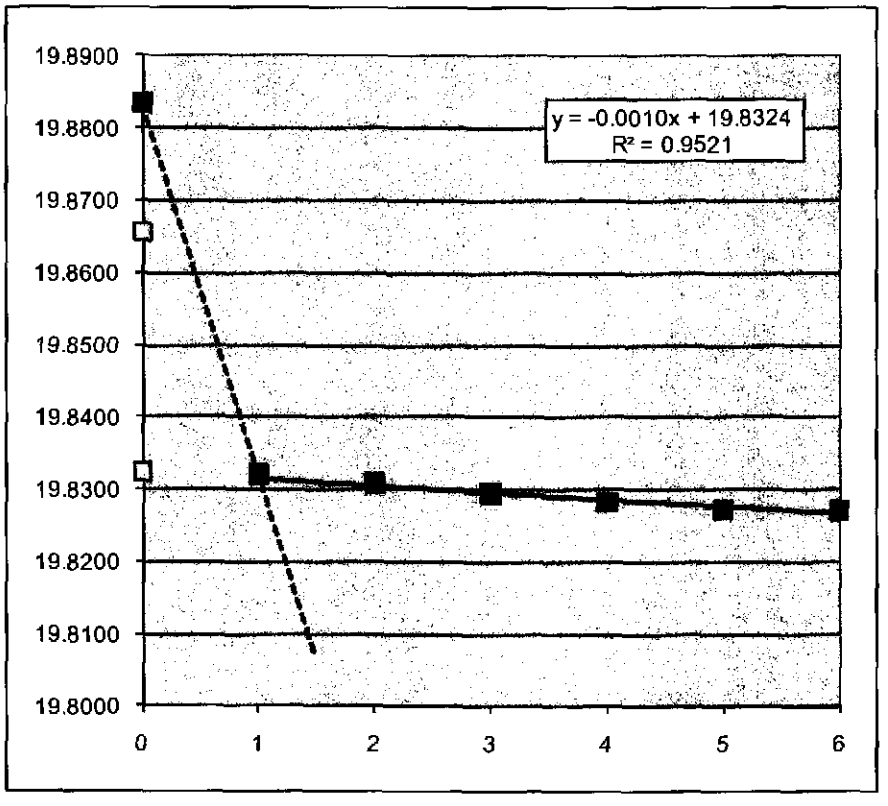
Cleaning Cycle	Wt (g)
0	20.1990
1	20.1563
2	20.1538
3	20.1544
4	20.1529
5	20.1524
6	20.1510



Coupon:	024
Test Matrix:	Fe-Eo-0000-24-1f
Initial wt (g)	19.8657
Removal wt (g)	19.8835

Calculated final wt (g)	19.8324
Total wt loss (g)	0.0333
Total wt loss (mg)	33.3

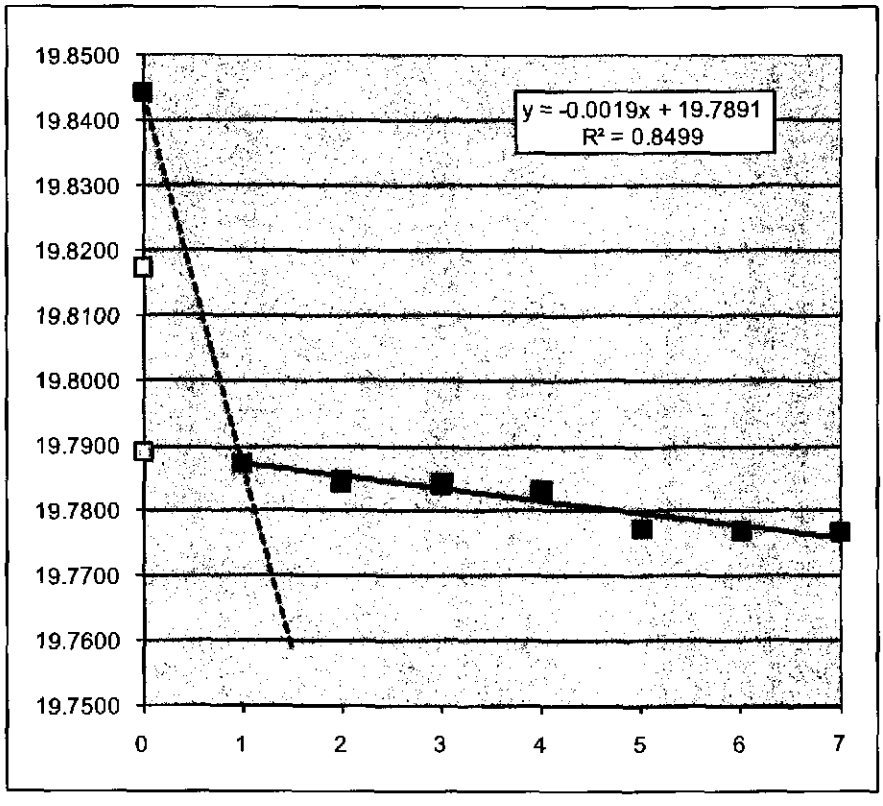
Cleaning Cycle	Wt (g)
0	19.8835
1	19.8322
2	19.8308
3	19.8295
4	19.8283
5	19.8273
6	19.8271



Coupon:	025
Test Matrix:	Fe-Eo-0000-24-2f
Initial wt (g)	19.8175
Removal wt (g)	19.8444

Calculated final wt (g)	19.7891
Total wt loss (g)	0.0284
Total wt loss (mg)	28.4

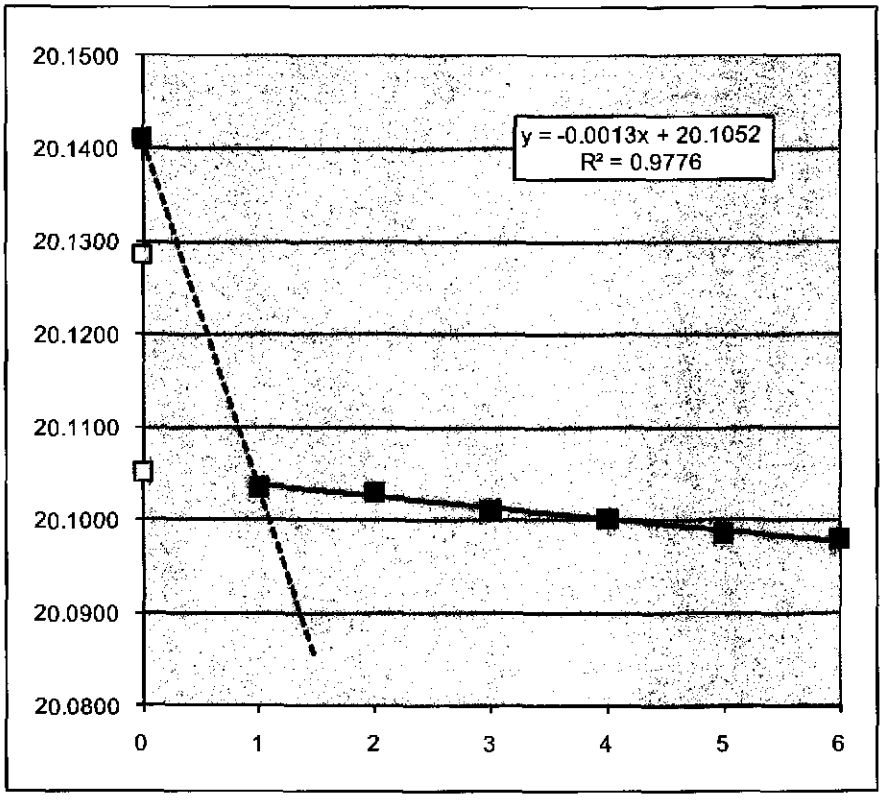
Cleaning Cycle	Wt (g)
0	19.8444
1	19.7873
2	19.7846
3	19.7843
4	19.7833
5	19.7773
6	19.7771
7	19.7768



Coupon:	027
Test Matrix:	Fe-Eo-0000-24-1p
Initial wt (g)	20.1286
Removal wt (g)	20.1411

Calculated final wt (g)	20.1052
Total wt loss (g)	0.0234
Total wt loss (mg)	23.4

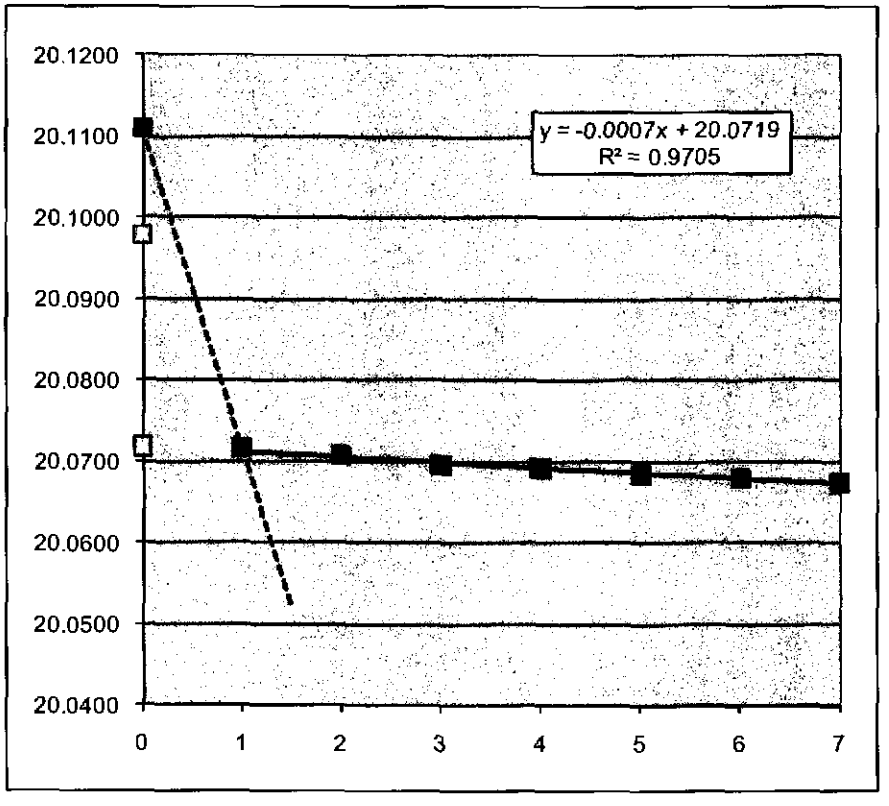
Cleaning Cycle	Wt (g)
0	20.1411
1	20.1036
2	20.1030
3	20.1012
4	20.1002
5	20.0986
6	20.0980



Coupon:	028
Test Matrix:	Fe-Eo-0000-24-2p
Initial wt (g)	20.0979
Removal wt (g)	20.1110

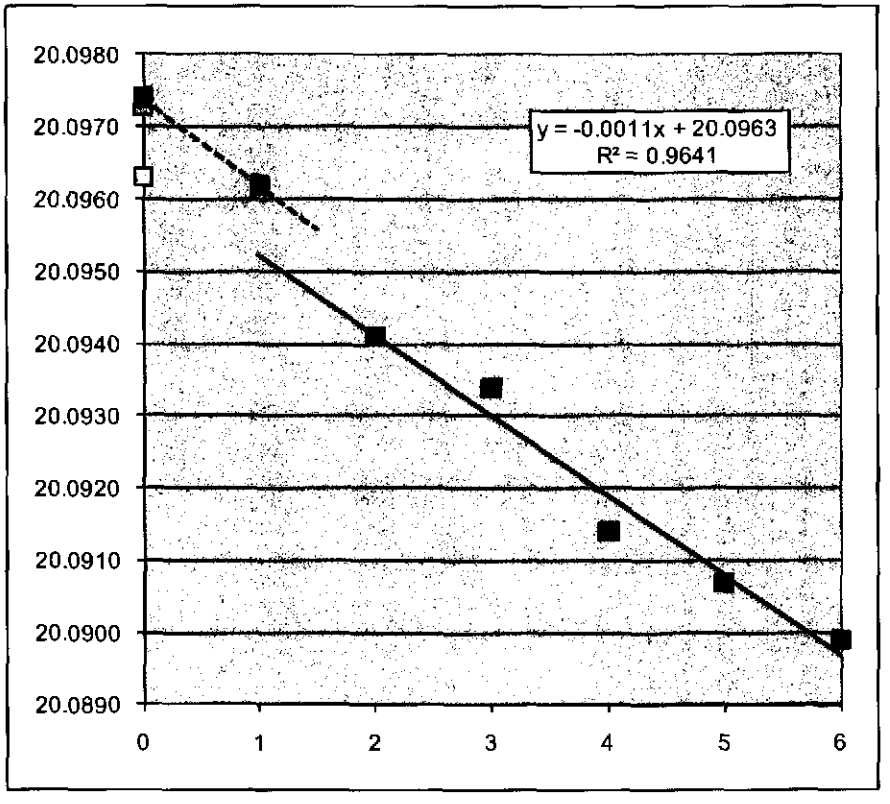
Calculated final wt (g)	20.0719
Total wt loss (g)	0.0260
Total wt loss (mg)	26.0

Cleaning Cycle	Wt (g)
0	20.1110
1	20.0718
2	20.0709
3	20.0696
4	20.0693
5	20.0685
6	20.0680
7	20.0674



Coupon:	030		
Test Matrix:	Fe-Atm-0000-24-1		
Initial wt (g)	20.0973	**Calculated final wt (g)**	20.0963
Removal wt (g)	20.0974	**Total wt loss (g)**	0.0010
		Total wt loss (mg)	1.0

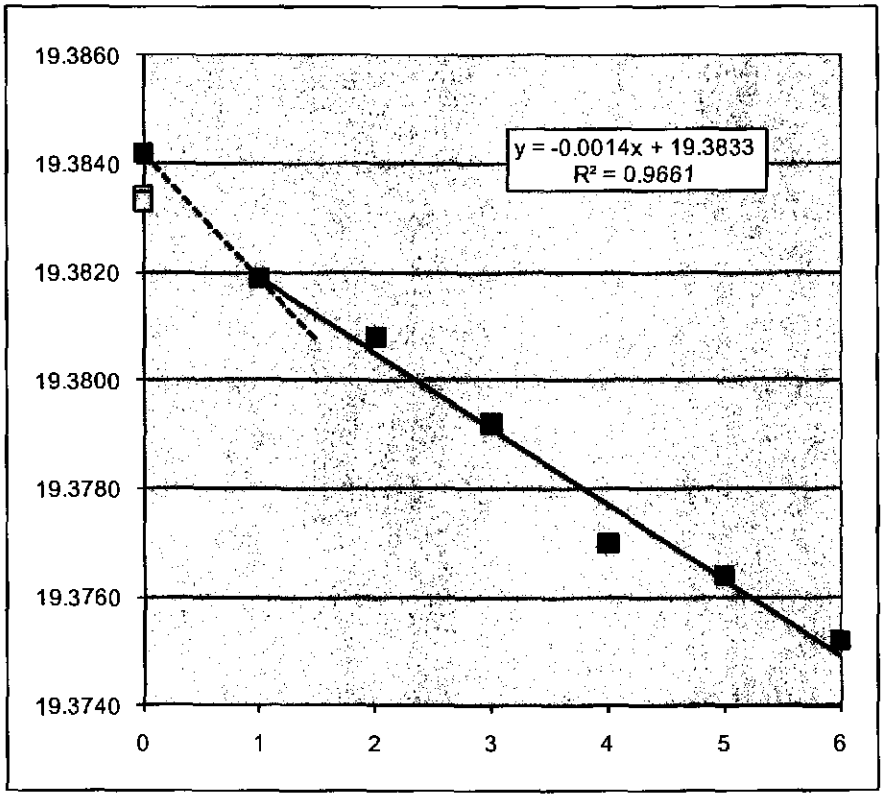
Cleaning Cycle	Wt (g)
0	20.0974
1	20.0962
2	20.0941
3	20.0934
4	20.0914
5	20.0907
6	20.0899



Coupon:	031
Test Matrix:	Fe-Atm-0000-24-2
Initial wt (g)	19.3834
Removal wt (g)	19.3842

Calculated final wt (g)	19.3833
Total wt loss (g)	0.0001
Total wt loss (mg)	0.1

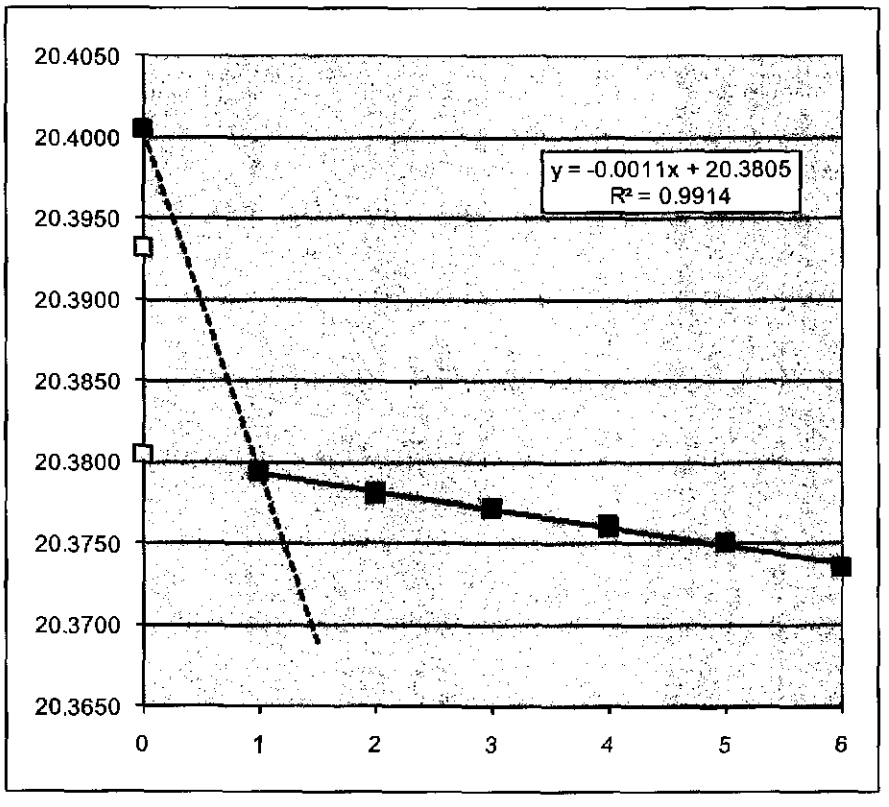
Cleaning Cycle	Wt (g)
0	19.3842
1	19.3819
2	19.3808
3	19.3792
4	19.3770
5	19.3764
6	19.3752



Coupon:	142
Test Matrix:	Fe-G-0350-24-2f
Initial wt (g)	20.3932
***Removal* wt (g)**	20.4005

Calculated final wt (g)	20.3805
Total wt loss (g)	0.0127
Total wt loss (mg)	12.7

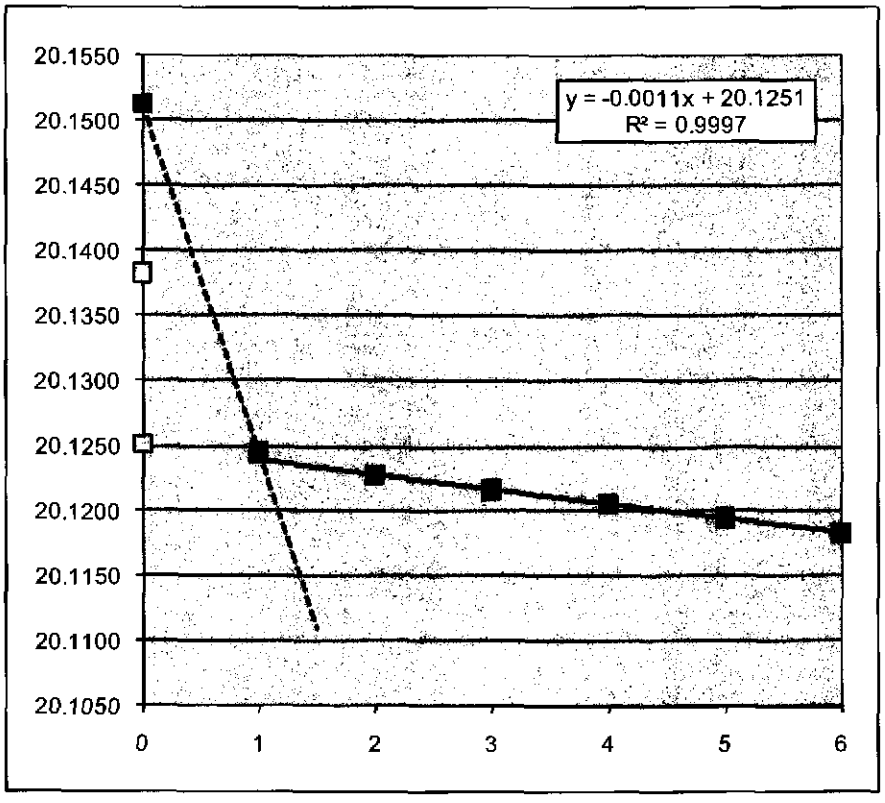
Cleaning Cycle	Wt (g)
0	20.4005
1	20.3795
2	20.3781
3	20.3772
4	20.3761
5	20.3751
6	20.3736



Coupon:	143
Test Matrix:	Fe-G-0350-24-3f
Initial wt (g)	20.1383
Removal wt (g)	20.1513

Calculated final wt (g)	20.1251
Total wt loss (g)	0.0132
Total wt loss (mg)	13.2

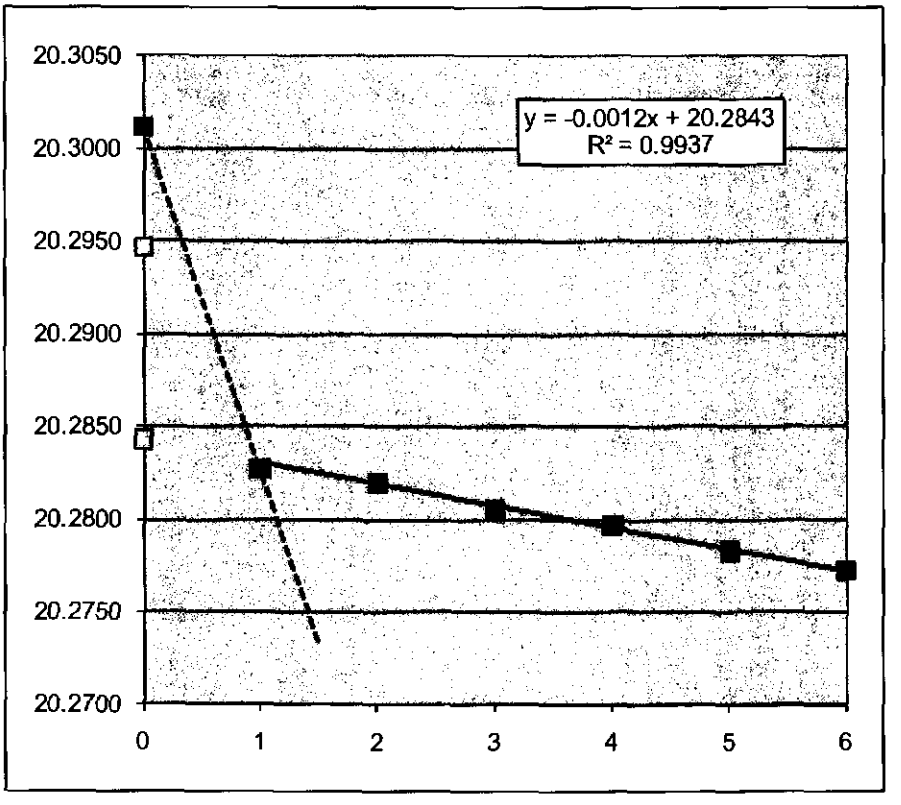
Cleaning Cycle	Wt (g)
0	20.1513
1	20.1245
2	20.1228
3	20.1217
4	20.1206
5	20.1195
6	20.1183



Coupon:	145
Test Matrix:	Fe-G-0350-24-2p
Initial wt (g)	20.2947
Removal wt (g)	20.3012

Calculated final wt (g)	20.2843
Total wt loss (g)	0.0104
Total wt loss (mg)	10.4

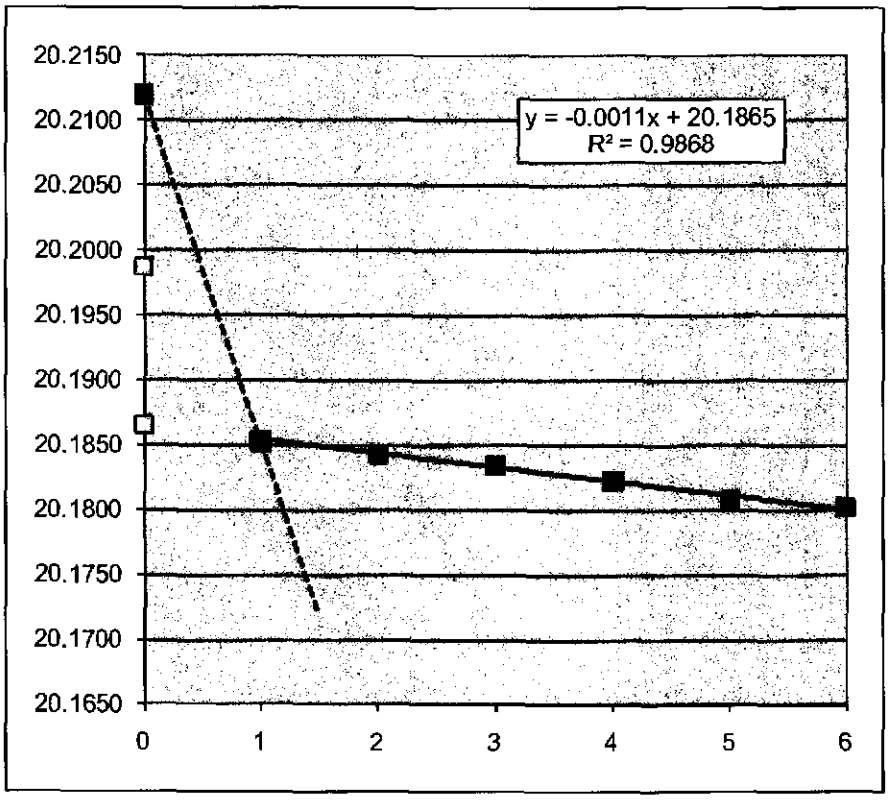
Cleaning Cycle	Wt (g)
0	20.3012
1	20.2827
2	20.2820
3	20.2805
4	20.2797
5	20.2783
6	20.2772



Coupon:	146
Test Matrix:	Fe-G-0350-24-3p
Initial wt (g)	20.1988
Removal wt (g)	20.2120

Calculated final wt (g)	20.1865
Total wt loss (g)	0.0123
Total wt loss (mg)	12.3

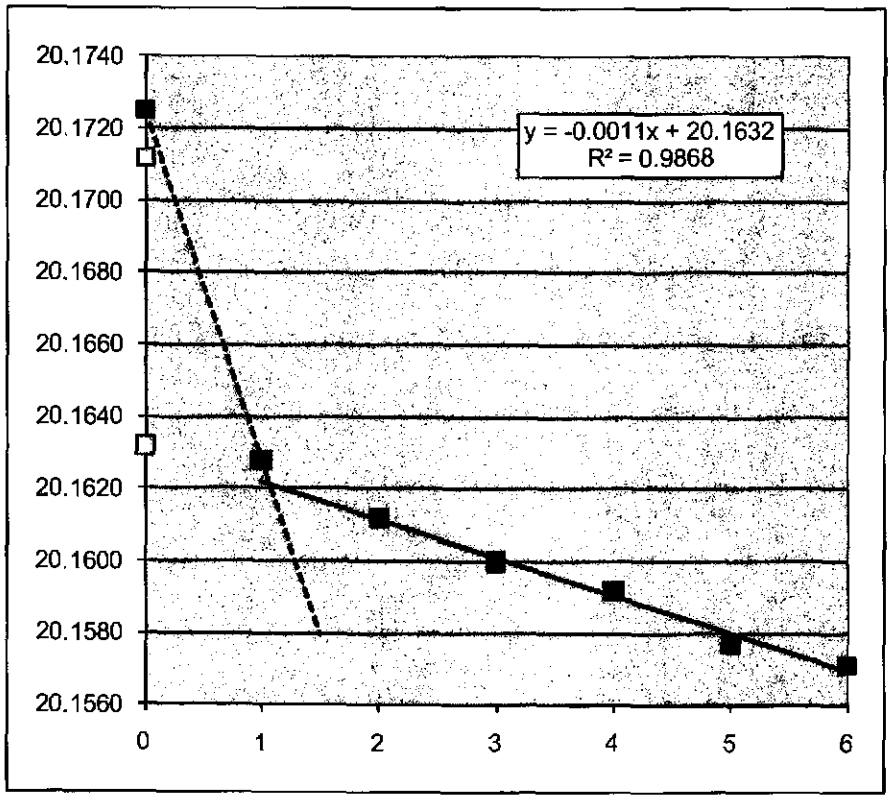
Cleaning Cycle	Wt (g)
0	20.2120
1	20.1853
2	20.1843
3	20.1834
4	20.1823
5	20.1808
6	20.1802



Coupon:	148
Test Matrix:	Fe-Go-0350-24-2f
Initial wt (g)	20.1712
Removal wt (g)	20.1725

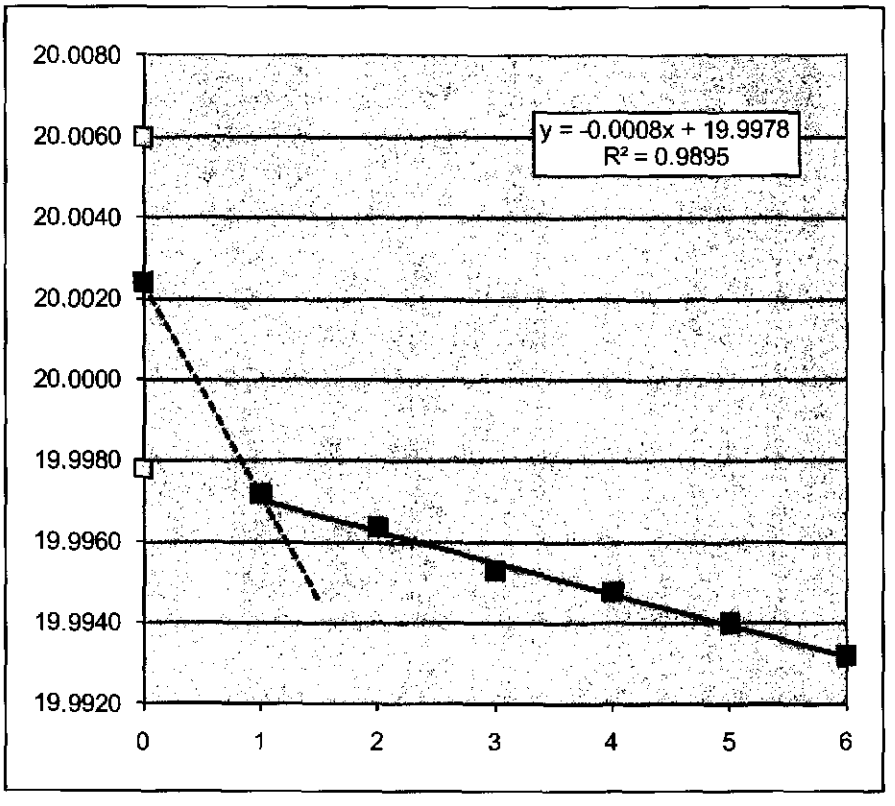
Calculated final wt (g)	20.1632
Total wt loss (g)	0.0080
Total wt loss (mg)	8.0

Cleaning Cycle	Wt (g)
0	20.1725
1	20.1628
2	20.1612
3	20.1600
4	20.1592
5	20.1577
6	20.1571



Coupon:	149		
Test Matrix:	Fe-Go-0350-24-3f		
Initial wt (g)	20.0060	**Calculated final wt (g)**	19.9978
Removal wt (g)	*20.0024*	***Total wt loss (g)***	0.0082
		Total wt loss (mg)	8.2

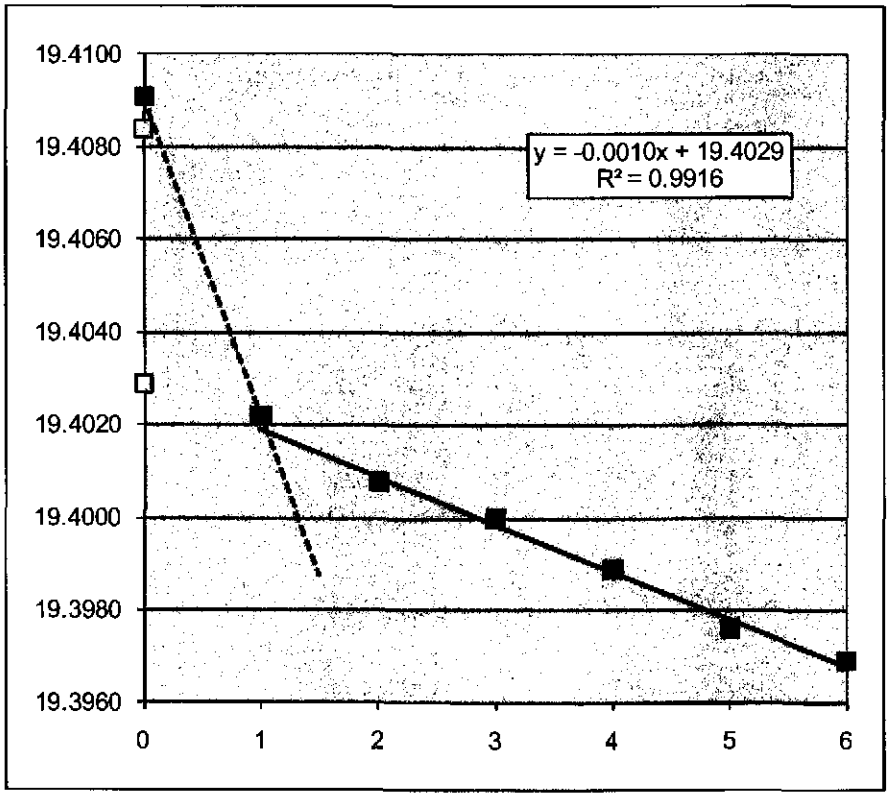
Cleaning Cycle	Wt (g)
0	20.0024
1	19.9972
2	19.9964
3	19.9953
4	19.9948
5	19.9940
6	19.9932



Coupon:	151
Test Matrix:	Fe-Go-0350-24-2p
Initial wt (g)	19.4084
Removal wt (g)	19.4091

Calculated final wt (g)	19.4029
Total wt loss (g)	0.0055
Total wt loss (mg)	5.5

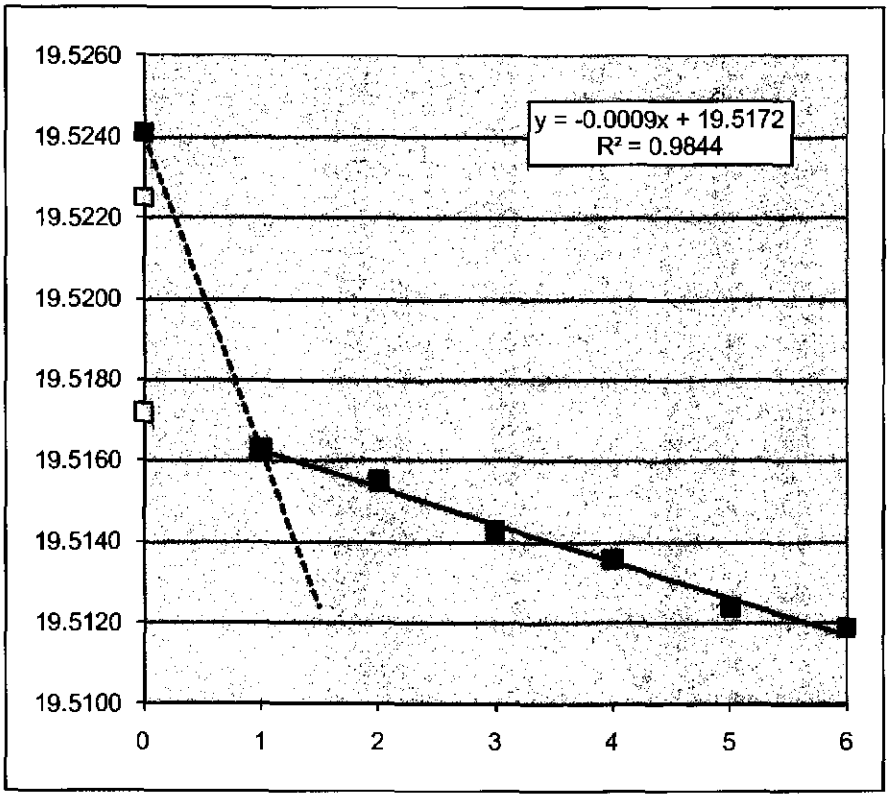
Cleaning Cycle	Wt (g)
0	19.4091
1	19.4022
2	19.4008
3	19.4000
4	19.3989
5	19.3976
6	19.3969



Coupon:	152
Test Matrix:	Fe-Go-0350-24-3p
Initial wt (g)	19.5225
Removal wt (g)	19.5241

Calculated final wt (g)	19.5172
Total wt loss (g)	0.0053
Total wt loss (mg)	5.3

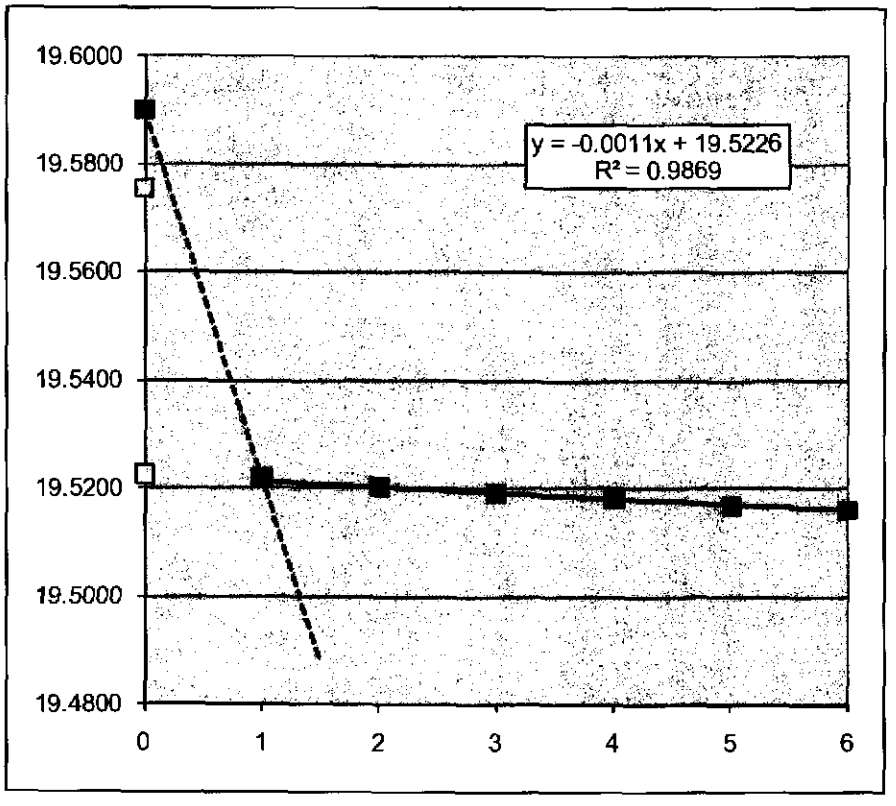
Cleaning Cycle	Wt (g)
0	19.5241
1	19.5163
2	19.5155
3	19.5143
4	19.5136
5	19.5124
6	19.5119



Coupon:	154
Test Matrix:	Fe-E-0350-24-2f
Initial wt (g)	19.5756
Removal wt (g)	19.5900

Calculated final wt (g)	19.5226
Total wt loss (g)	0.0530
Total wt loss (mg)	53.0

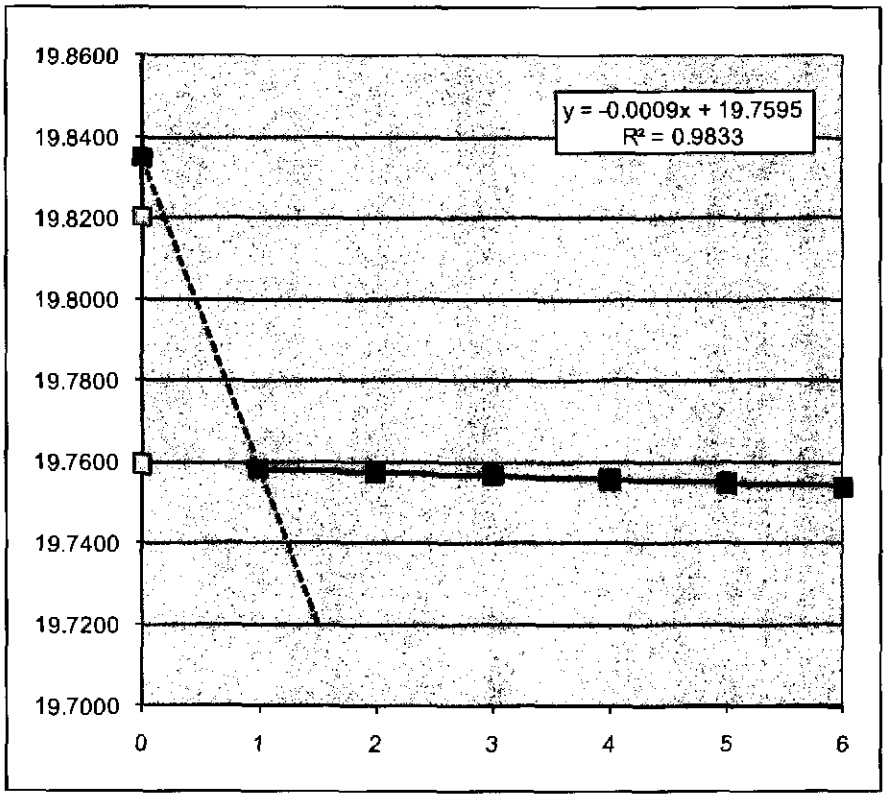
Cleaning Cycle	Wt (g)
0	19.5900
1	19.5220
2	19.5203
3	19.5194
4	19.5184
5	19.5168
6	19.5161



Coupon:	155
Test Matrix:	Fe-E-0350-24-3f
Initial wt (g)	19.8205
Removal wt (g)	19.8352

Calculated final wt (g)	19.7595
Total wt loss (g)	0.0610
Total wt loss (mg)	61.0

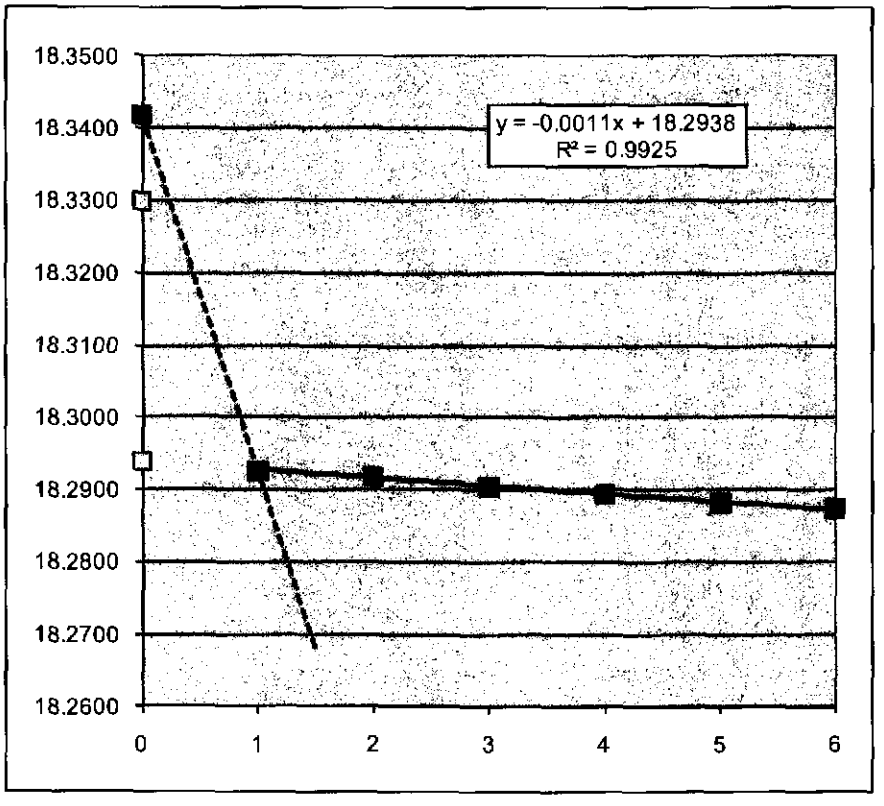
Cleaning Cycle	Wt (g)
0	19.8352
1	19.7585
2	19.7574
3	19.7570
4	19.7558
5	19.7548
6	19.7539



Coupon:	157
Test Matrix:	Fe-E-0350-24-2p
Initial wt (g)	18.3299
Removal wt (g)	18.3418

Calculated final wt (g)	18.2938
Total wt loss (g)	0.0361
Total wt loss (mg)	36.1

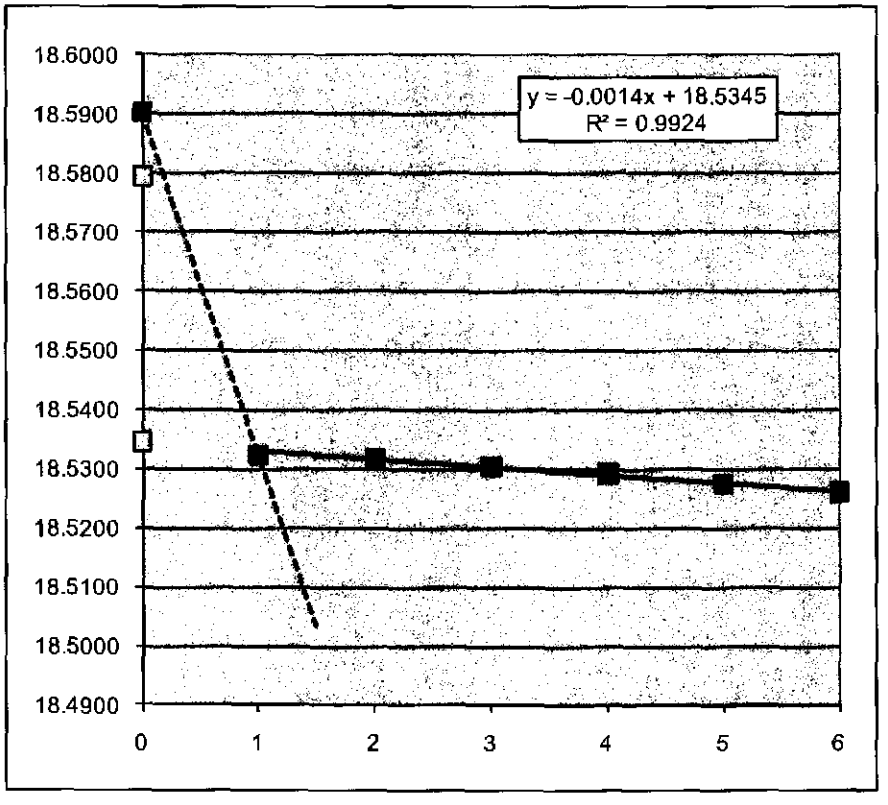
Cleaning Cycle	Wt (g)
0	18.3418
1	18.2926
2	18.2918
3	18.2904
4	18.2894
5	18.2882
6	18.2874



Coupon:	158
Test Matrix:	*Fe-E-0350-24-3p*
Initial wt (g)	18.5795
Removal wt (g)	18.5902

Calculated final wt (g)	18.5345
Total wt loss (g)	0.0450
Total wt loss (mg)	45.0

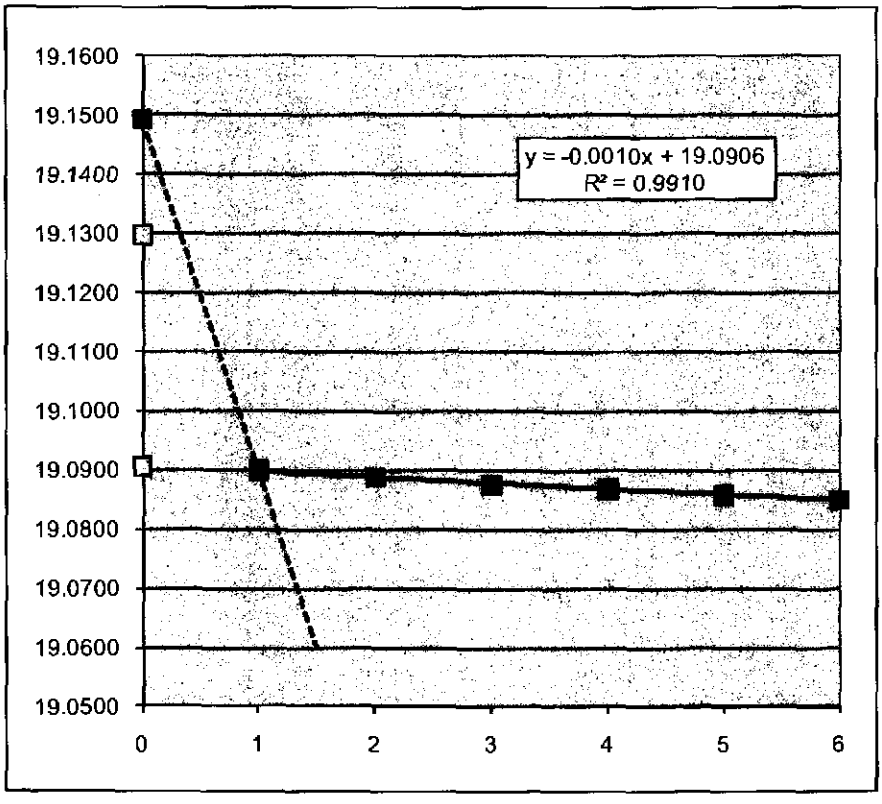
Cleaning Cycle	Wt (g)
0	18.5902
1	18.5324
2	18.5316
3	18.5304
4	18.5293
5	18.5275
6	18.5261



Coupon:	160
Test Matrix:	Fe-Eo-0350-24-2f
Initial wt (g)	19.1297
Removal wt (g)	19.1494

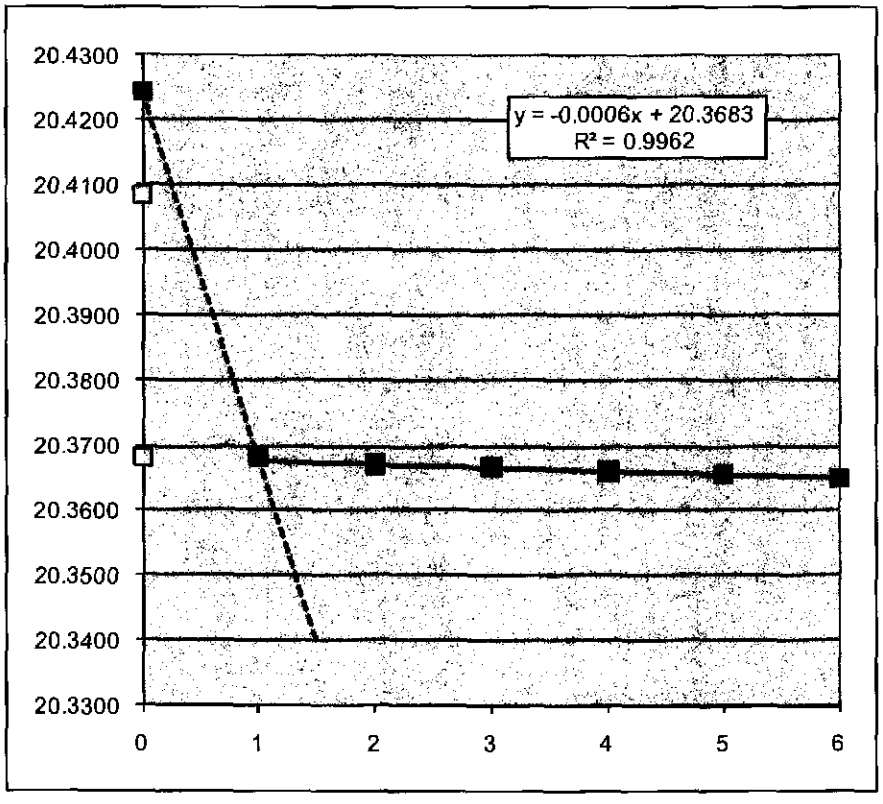
Calculated final wt (g)	19.0906
Total wt loss (g)	0.0391
Total wt loss (mg)	39.1

Cleaning Cycle	Wt (g)
0	19.1494
1	19.0900
2	19.0889
3	19.0876
4	19.0867
5	19.0858
6	19.0850



Coupon:	161		
Test Matrix:	Fe-Eo-0350-24-3f		
Initial wt (g)	20.4086	**Calculated final wt (g)**	20.3683
Removal wt (g)	20.4244	**Total wt loss (g)**	0.0403
		Total wt loss (mg)	40.3

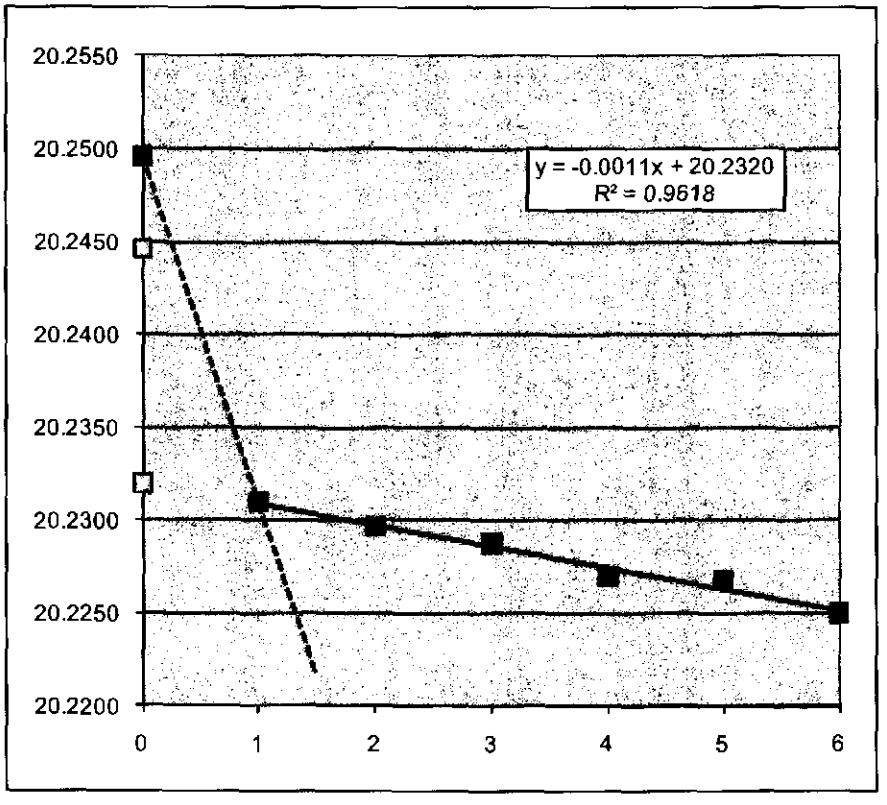
Cleaning Cycle	Wt (g)
0	20.4244
1	20.3682
2	20.3672
3	20.3667
4	20.3660
5	20.3655
6	20.3650



Coupon:	163
Test Matrix:	Fe-Eo-0350-24-2p
Initial wt (g)	20.2446
Removal wt (g)	20.2496

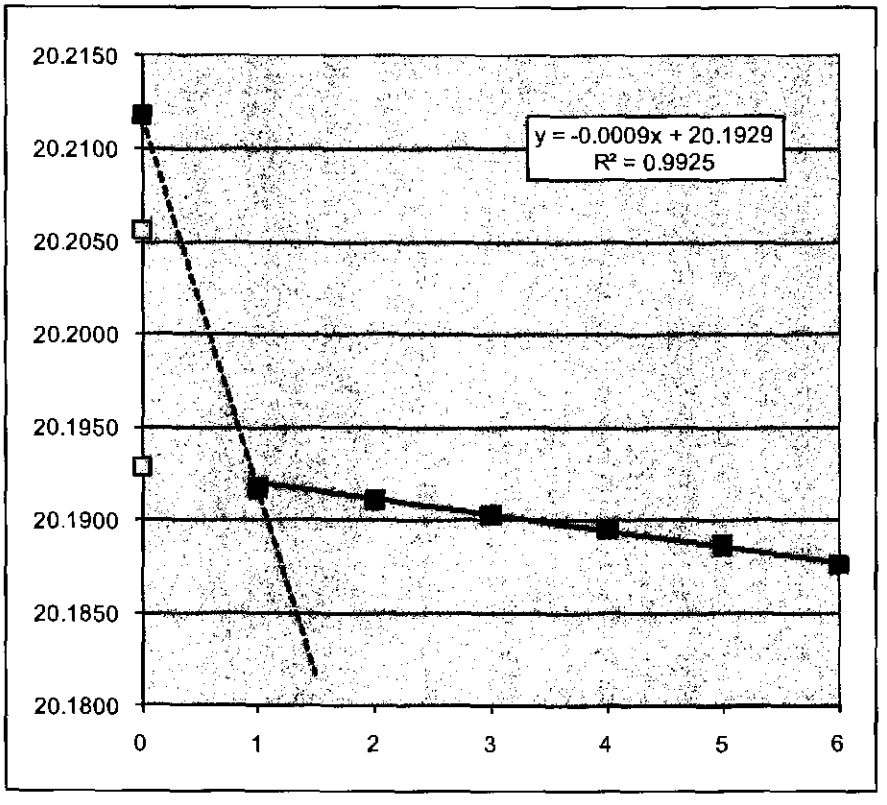
Calculated final wt (g)	20.2320
Total wt loss (g)	0.0126
Total wt loss (mg)	12.6

Cleaning Cycle	Wt (g)
0	20.2496
1	20.2310
2	20.2297
3	20.2288
4	20.2270
5	20.2268
6	20.2250



Coupon:	164		
Test Matrix:	Fe-Eo-0350-24-3p		
Initial wt (g)	20.2056	***Calculated final wt (g)***	20.1929
Removal wt (g)	20.2118	**Total wt loss (g)**	0.0127
		Total wt loss (mg)	12.7

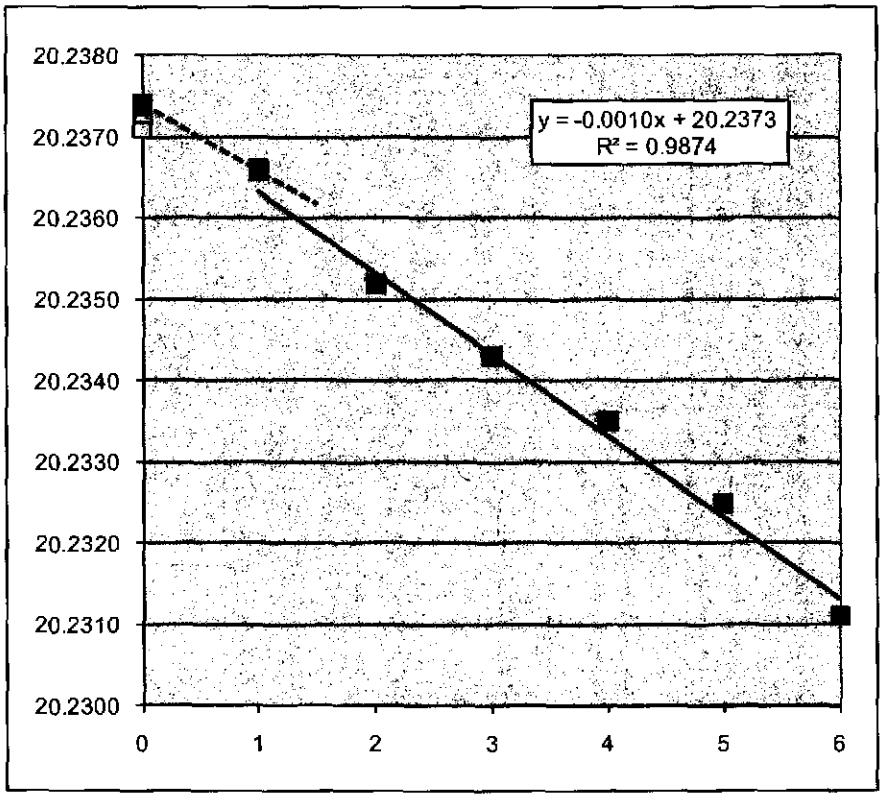
Cleaning Cycle	Wt (g)
0	20.2118
1	20.1918
2	20.1911
3	20.1903
4	20.1896
5	20.1887
6	20.1876



Coupon:	166
Test Matrix:	Fe-Atm-0350-24-2
Initial wt (g)	20.2371
Removal wt (g)	20.2374

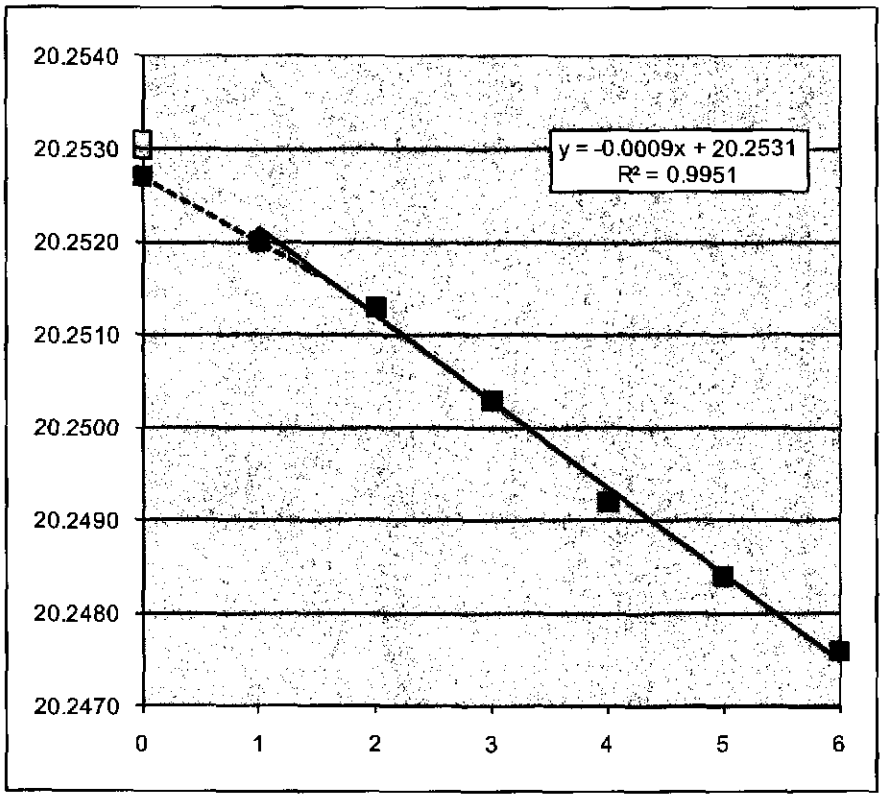
Calculated final wt (g)	20.2373
Total wt loss (g)	-0.0002
Total wt loss (mg)	-0.2

Cleaning Cycle	Wt (g)
0	20.2374
1	20.2366
2	20.2352
3	20.2343
4	20.2335
5	20.2325
6	20.2311



Coupon:	167		
Test Matrix:	Fe-Atm-0350-24-3		
Initial wt (g)	20.2530	**Calculated final wt (g)**	20.2531
Removal wt (g)	20.2527	**Total wt loss (g)**	-0.0001
		Total wt loss (mg)	-0.1

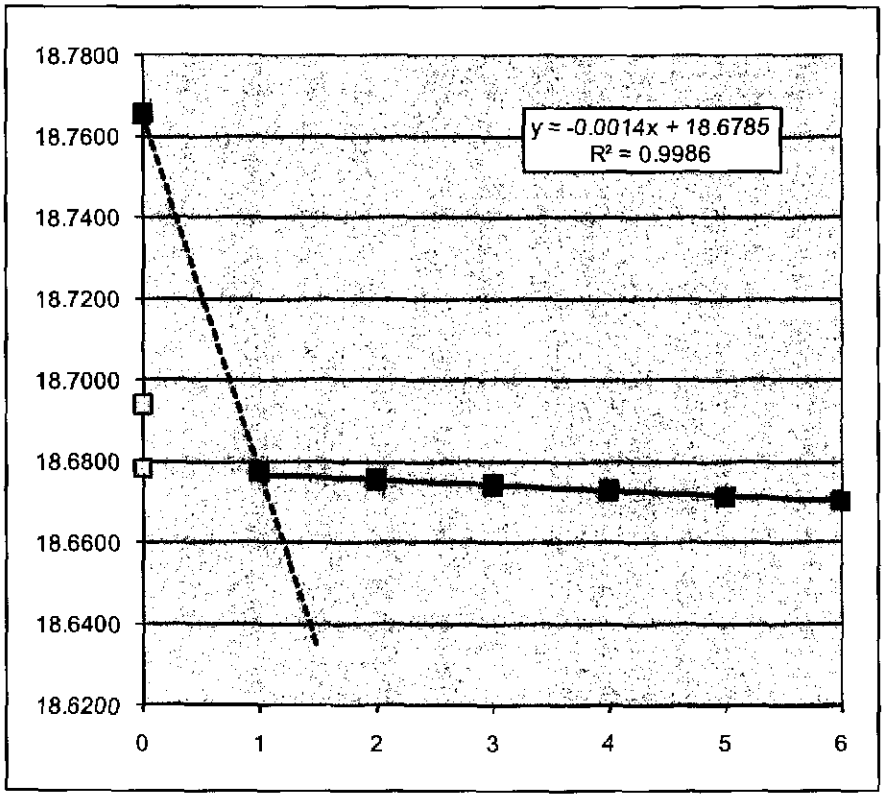
Cleaning Cycle	*Wt (g)*
0	20.2527
1	20.2520
2	20.2513
3	20.2503
4	20.2492
5	20.2484
6	20.2476



Coupon:	226
Test Matrix:	Fe-G-1500-24-2f
Initial wt (g)	18.6941
Removal wt (g)	18.7657

Calculated final wt (g)	18.6785
Total wt loss (g)	0.0156
Total wt loss (mg)	15.6

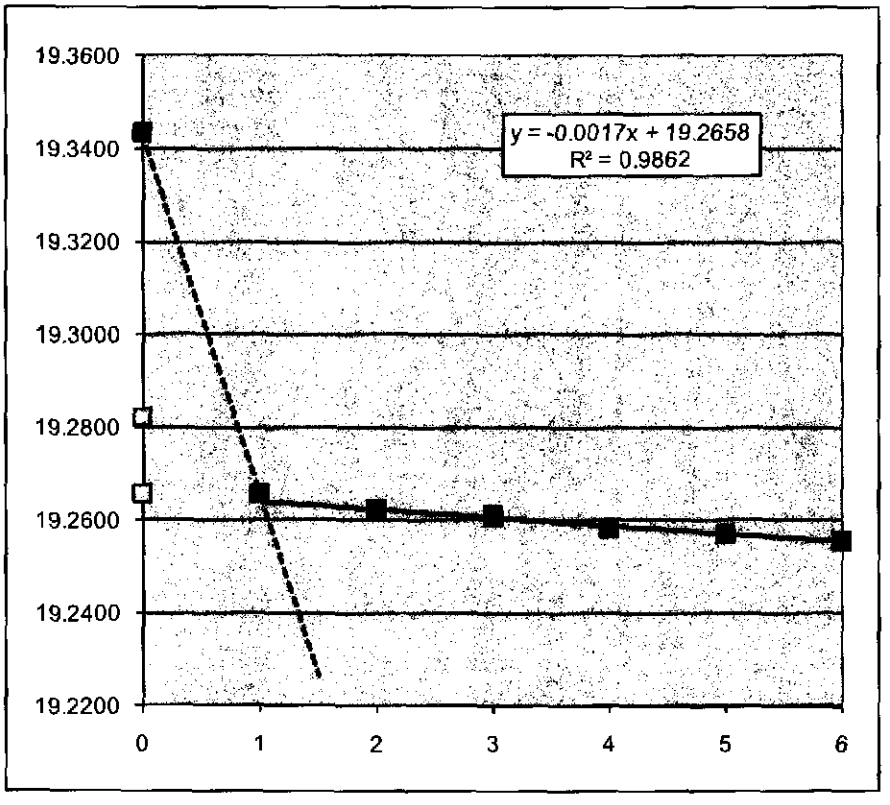
Cleaning Cycle	Wt (g)
0	18.7657
1	18.6777
2	18.6757
3	18.6744
4	18.6729
5	18.6714
6	18.6702



Coupon:	227
Test Matrix:	*Fe-G-1500-24-3f*
Initial wt (g)	19.2821
Removal wt (g)	19.3436

Calculated final wt (g)	19.2658
Total wt loss (g)	0.0163
Total wt loss (mg)	16.3

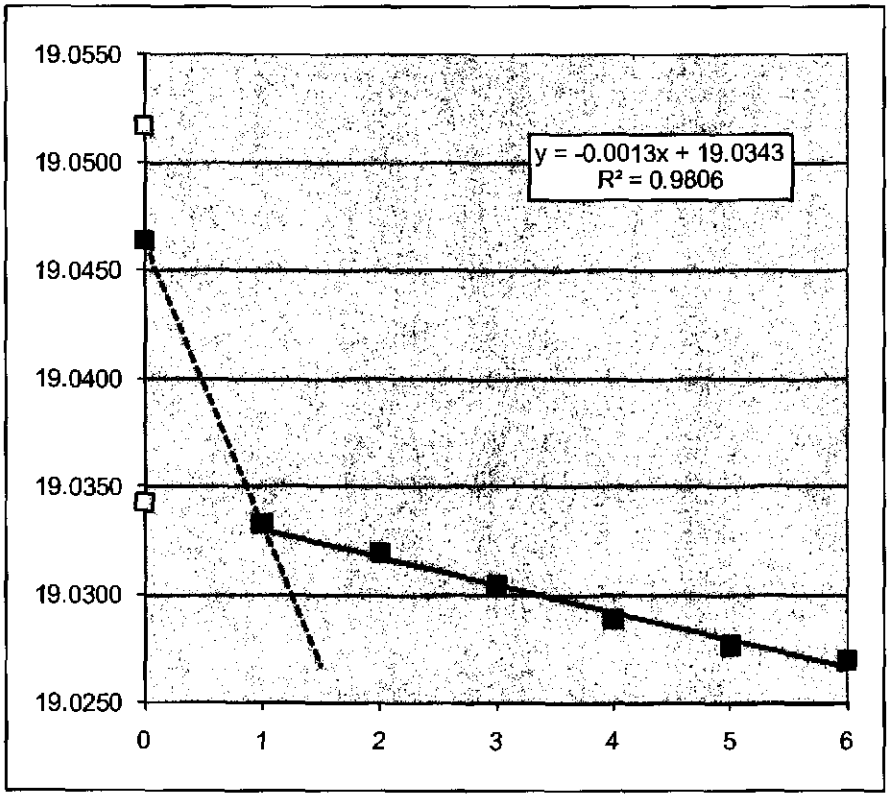
Cleaning Cycle	Wt (g)
0	19.3436
1	19.2656
2	19.2623
3	19.2610
4	19.2584
5	19.2571
6	19.2556



Coupon:	229
Test Matrix:	Fe-G-1500-24-2p
Initial wt (g)	19.0517
Removal wt (g)	19.0464

Calculated final wt (g)	19.0343
Total wt loss (g)	0.0174
Total wt loss (mg)	17.4

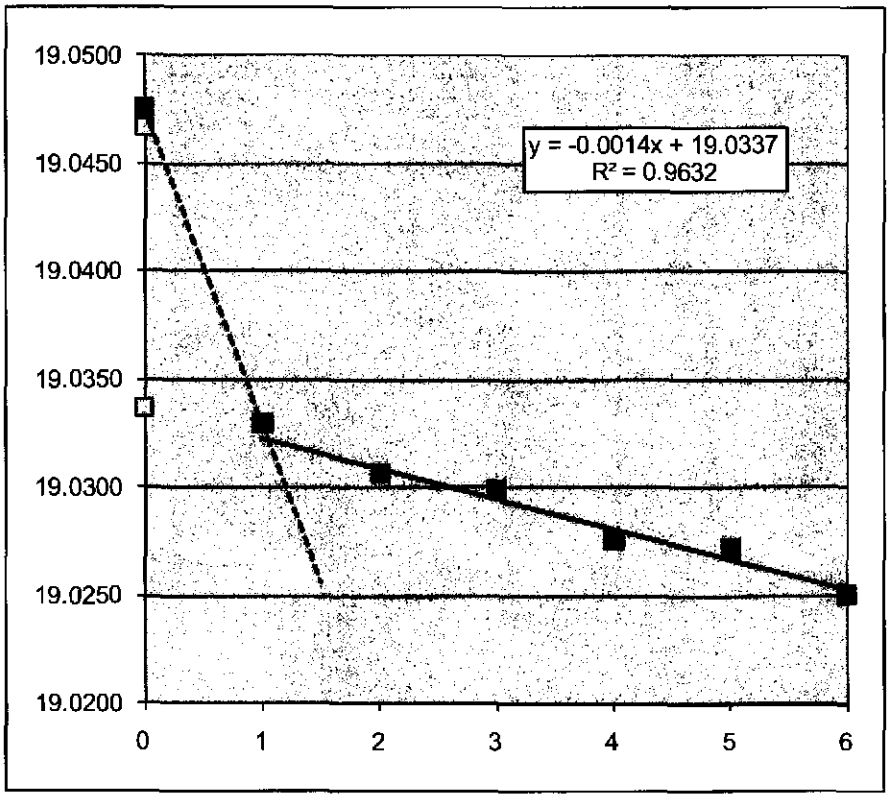
Cleaning Cycle	Wt (g)
0	19.0464
1	19.0333
2	19.0320
3	19.0305
4	19.0289
5	19.0277
6	19.0270



Coupon:	230
Test Matrix:	Fe-G-1500-24-3p
Initial wt (g)	19.0467
Removal wt (g)	19.0476

Calculated final wt (g)	19.0337
Total wt loss (g)	0.0130
Total wt loss (mg)	13.0

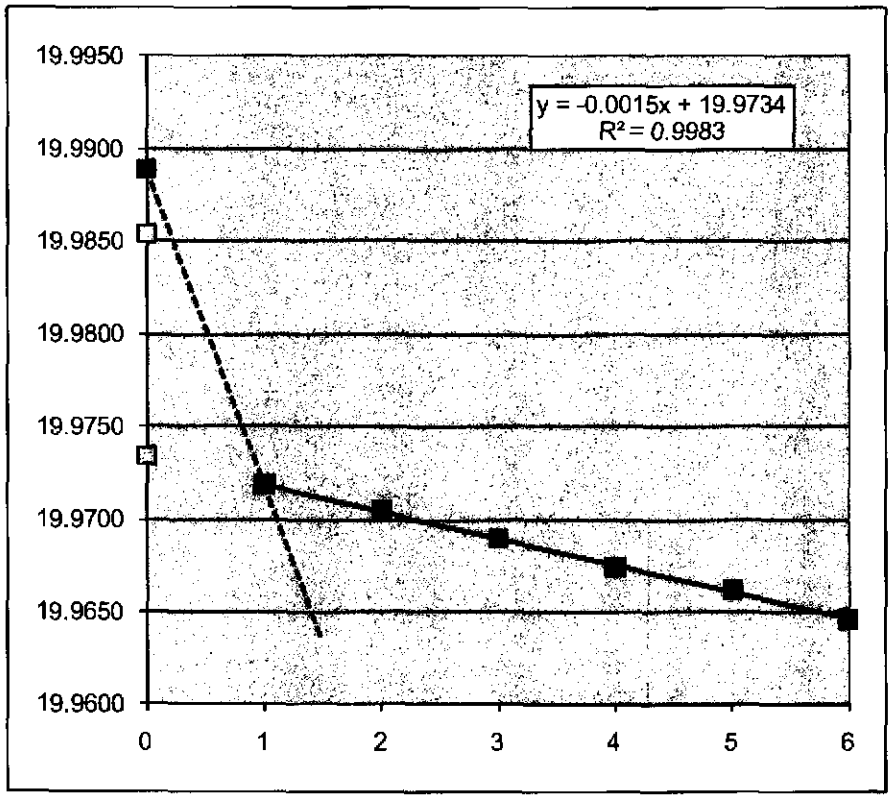
Cleaning Cycle	Wt (g)
0	19.0476
1	19.0330
2	19.0307
3	19.0299
4	19.0276
5	19.0272
6	19.0251



Coupon:	232
Test Matrix:	Fe-Go-1500-24-2f
Initial wt (g)	19.9854
Removal wt (g)	19.9889

Calculated final wt (g)	19.9734
Total wt loss (g)	0.0120
Total wt loss (mg)	12.0

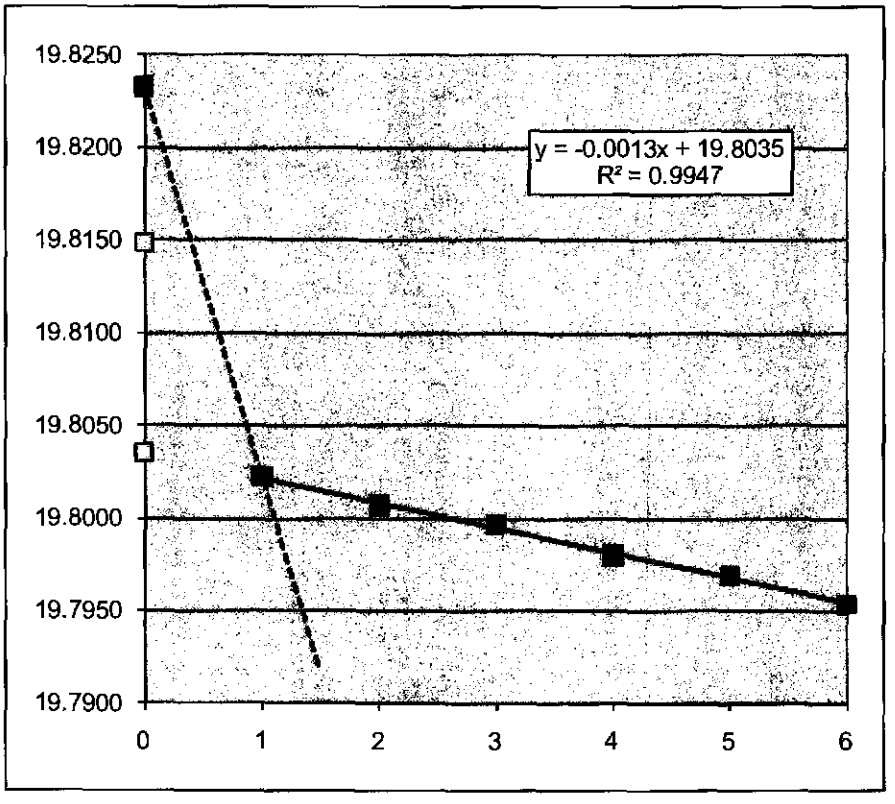
Cleaning Cycle	Wt (g)
0	19.9889
1	19.9719
2	19.9705
3	19.9690
4	19.9674
5	19.9662
6	19.9646



Coupon:	233
Test Matrix:	Fe-Go-1500-24-3f
Initial wt (g)	19.8149
Removal wt (g)	19.8233

Calculated final wt (g)	19.8035
Total wt loss (g)	0.0114
Total wt loss (mg)	11.4

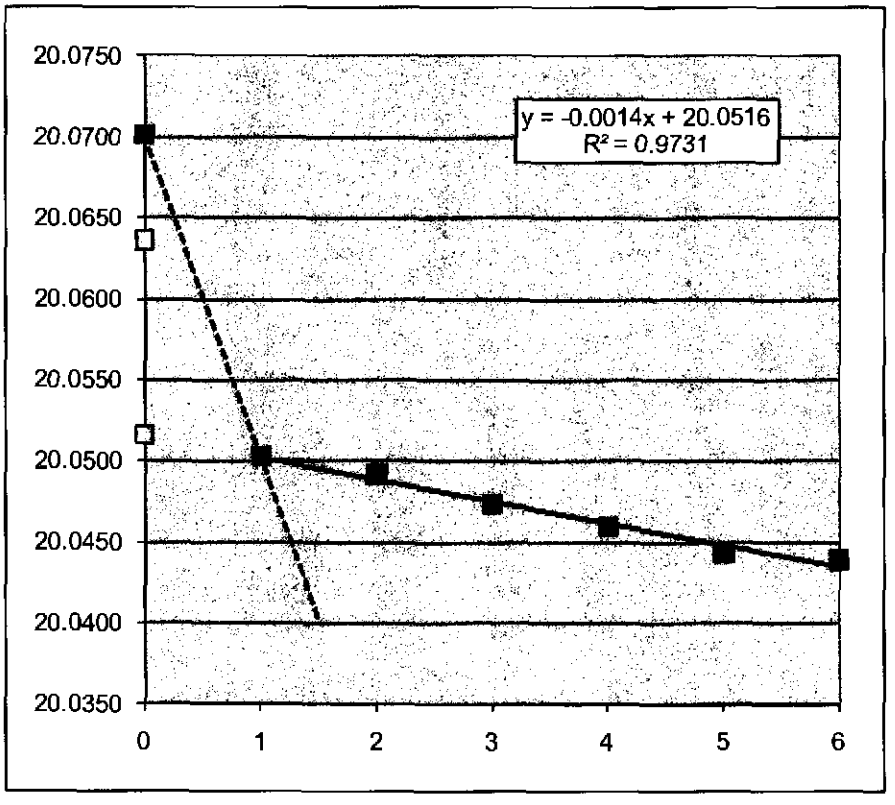
Cleaning Cycle	Wt (g)
0	19.8233
1	19.8023
2	19.8007
3	19.7997
4	19.7980
5	19.7969
6	19.7954



Coupon:	235
Test Matrix:	Fe-Go-1500-24-2p
Initial wt (g)	20.0636
Removal wt (g)	20.0702

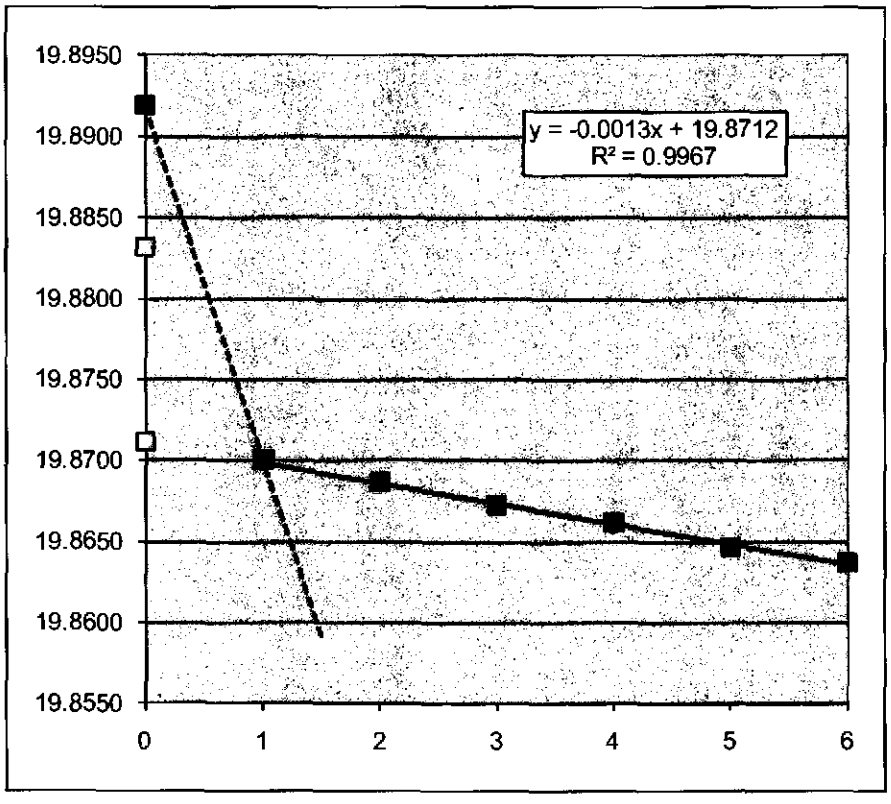
Calculated final wt (g)	20.0516
Total wt loss (g)	0.0120
Total wt loss (mg)	12.0

Cleaning Cycle	Wt (g)
0	20.0702
1	20.0503
2	20.0492
3	20.0474
4	20.0460
5	20.0444
6	20.0439



Coupon:	236		
Test Matrix:	Fe-Go-1500-24-3p		
Initial wt (g)	19.8832	**Calculated final wt (g)**	19.8712
Removal wt (g)	19.8919	**Total wt loss (g)**	0.0120
		Total wt loss (mg)	12.0

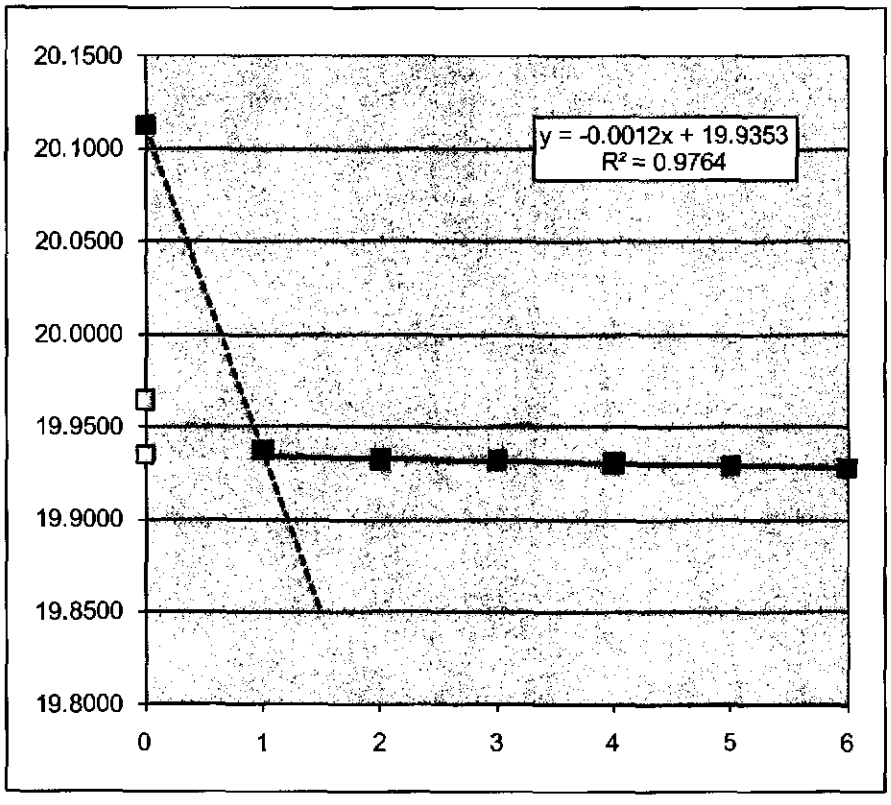
Cleaning Cycle	Wt (g)
0	19.8919
1	19.8701
2	19.8687
3	19.8673
4	19.8662
5	19.8647
6	19.8637



Coupon:	238
Test Matrix:	Fe-E-1500-24-2f
Initial wt (g)	19.9648
Removal wt (g)	20.1130

Calculated final wt (g)	19.9353
Total wt loss (g)	0.0295
Total wt loss (mg)	29.5

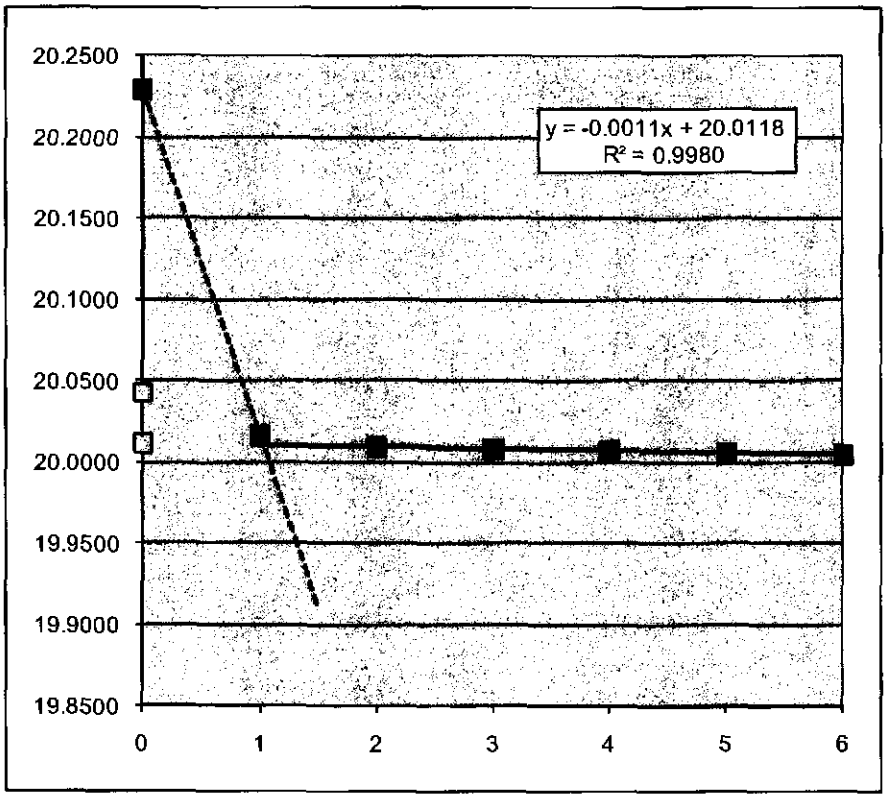
Cleaning Cycle	Wt (g)
0	20.1130
1	19.9375
2	19.9326
3	19.9322
4	19.9305
5	19.9292
6	19.9281



Coupon:	239
Test Matrix:	Fe-E-1500-24-3f
Initial wt (g)	20.0428
Removal wt (g)	20.2296

Calculated final wt (g)	20.0118
Total wt loss (g)	0.0310
Total wt loss (mg)	31.0

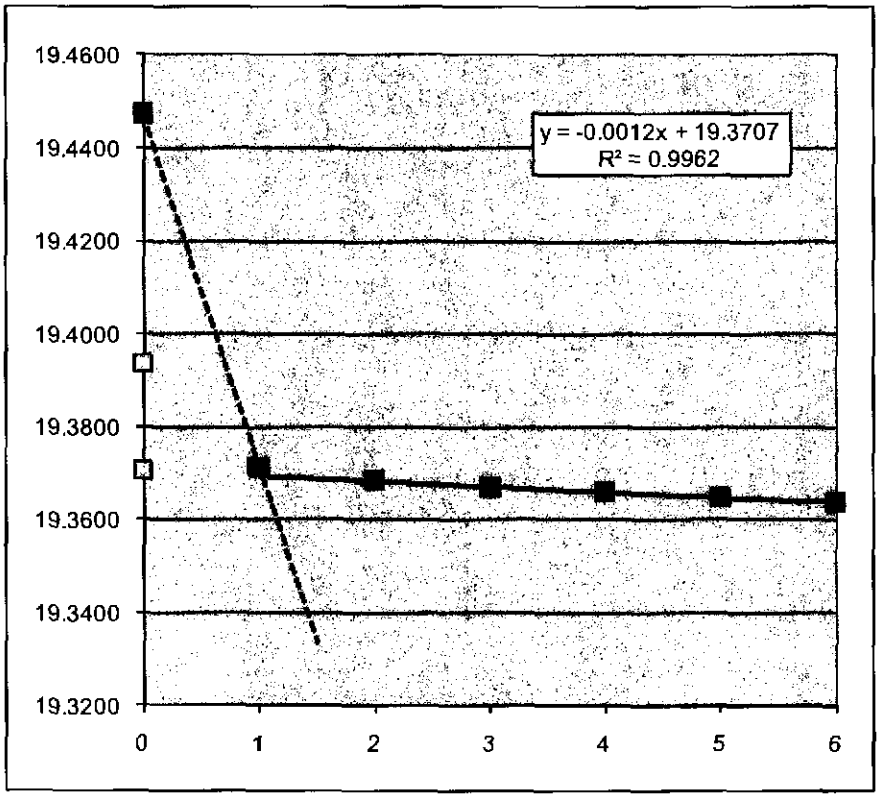
Cleaning Cycle	Wt (g)
0	20.2296
1	20.0163
2	20.0096
3	20.0083
4	20.0072
5	20.0062
6	20.0049



Coupon:	241
Test Matrix:	Fe-E-1500-24-2p
Initial wt (g)	19.3937
Removal wt (g)	19.4474

Calculated final wt (g)	19.3707
Total wt loss (g)	0.0230
Total wt loss (mg)	23.0

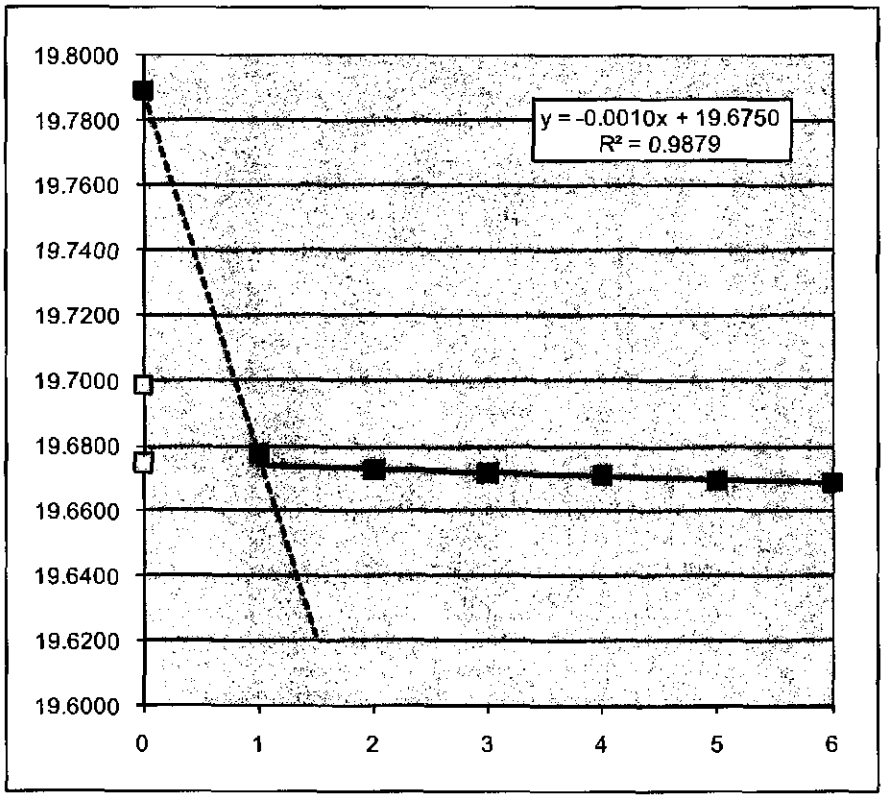
Cleaning Cycle	Wt (g)
0	19.4474
1	19.3715
2	19.3685
3	19.3672
4	19.3660
5	19.3648
6	19.3639



Coupon:	242
Test Matrix:	Fe-E-1500-24-3p
Initial wt (g)	19.6989
Removal wt (g)	19.7894

Calculated final wt (g)	19.6750
Total wt loss (g)	0.0239
Total wt loss (mg)	23.9

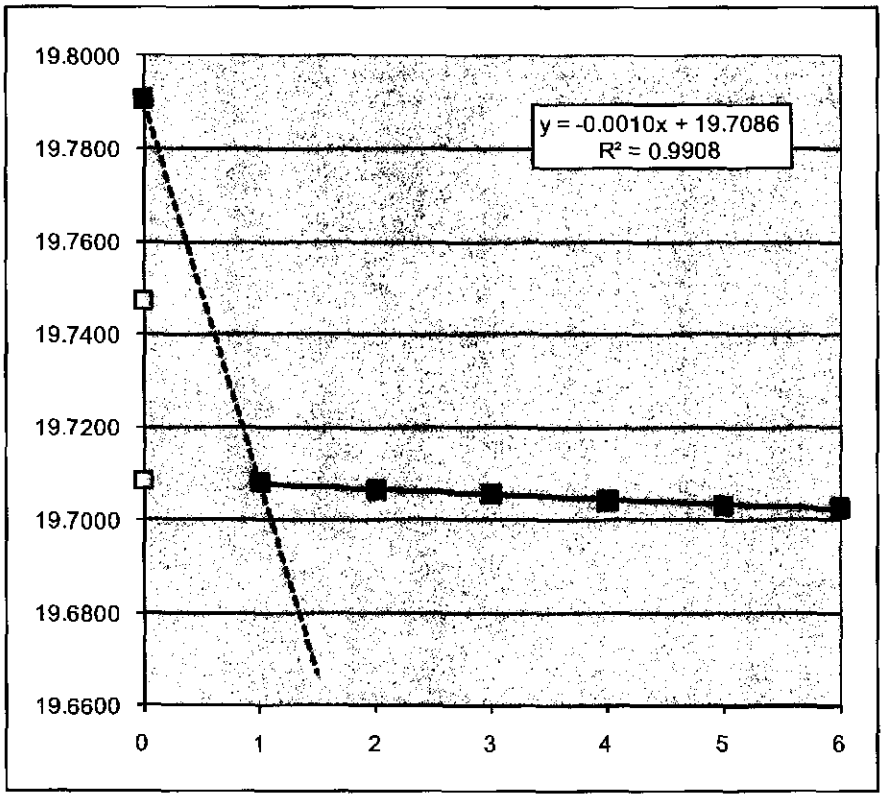
Cleaning Cycle	Wt (g)
0	19.7894
1	19.6775
2	19.6730
3	19.6718
4	19.6711
5	19.6696
6	19.6689



Coupon:	244
Test Matrix:	Fe-Eo-1500-24-2f
Initial wt (g)	19.7472
Removal wt (g)	19.7907

Calculated final wt (g)	19.7086
Total wt loss (g)	0.0386
Total wt loss (mg)	38.6

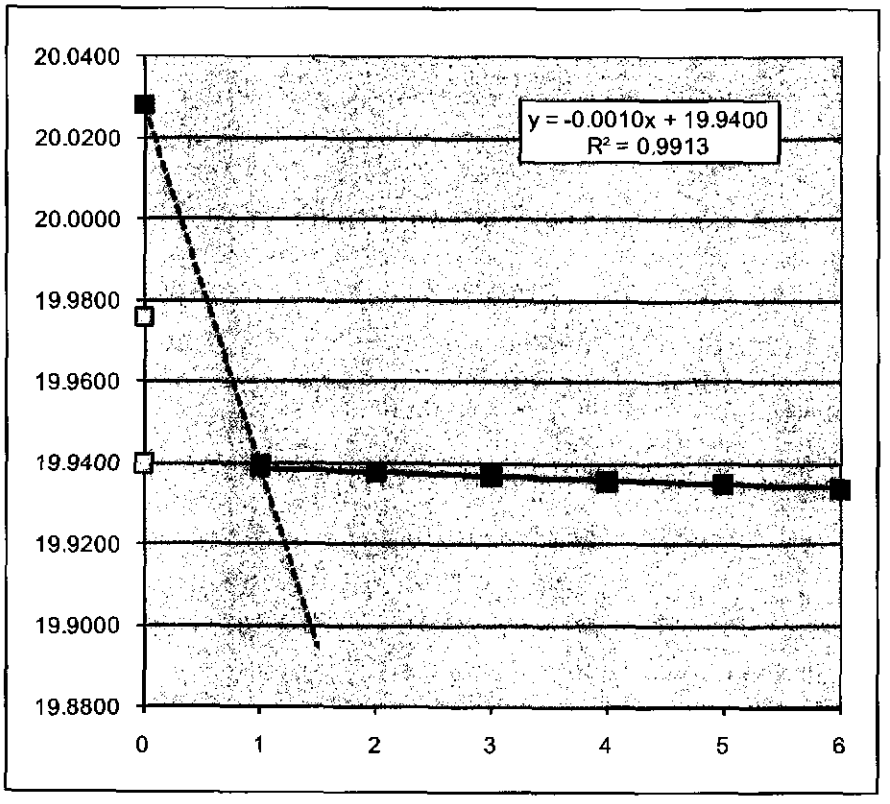
Cleaning Cycle	Wt (g)
0	19.7907
1	19.7083
2	19.7066
3	19.7056
4	19.7043
5	19.7033
6	19.7026



Coupon:	245
Test Matrix:	Fe-Eo-1500-24-3f
Initial wt (g)	19.9761
Removal wt (g)	20.0281

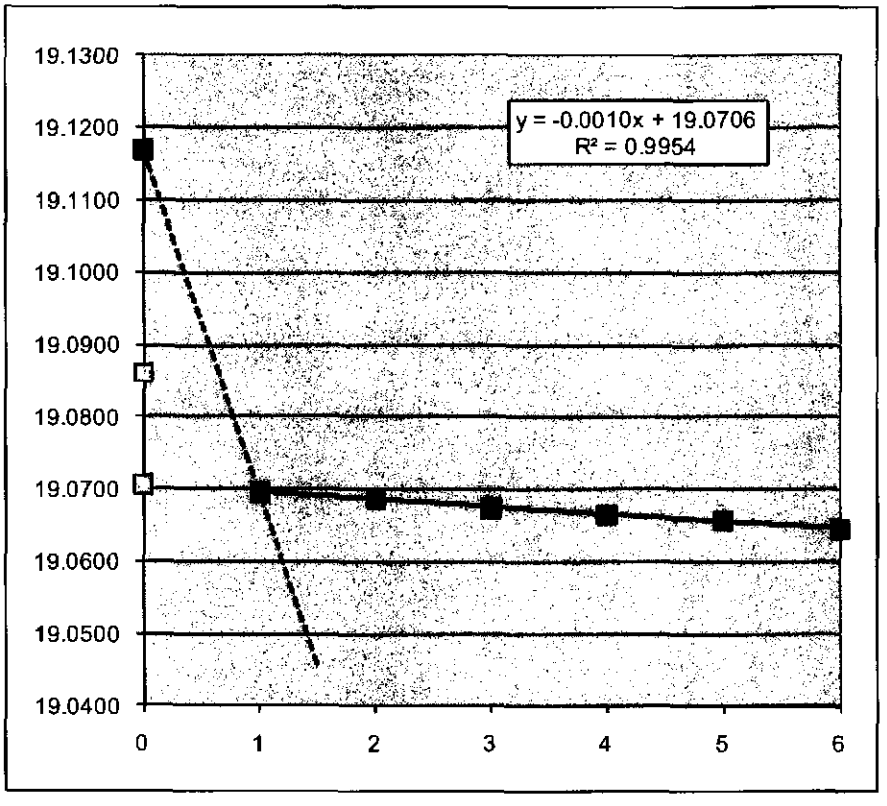
Calculated final wt (g)	19.9400
Total wt loss (g)	0.0361
Total wt loss (mg)	36.1

Cleaning Cycle	Wt (g)
0	20.0281
1	19.9395
2	19.9380
3	19.9370
4	19.9358
5	19.9352
6	19.9339



Coupon:	247		
Test Matrix:	*Fe-Eo-1500-24-2p*		
Initial wt (g)	19.0860	**Calculated final wt (g)**	19.0706
Removal wt (g)	19.1169	**Total wt loss (g)**	0.0154
		Total wt loss (mg)	15.4

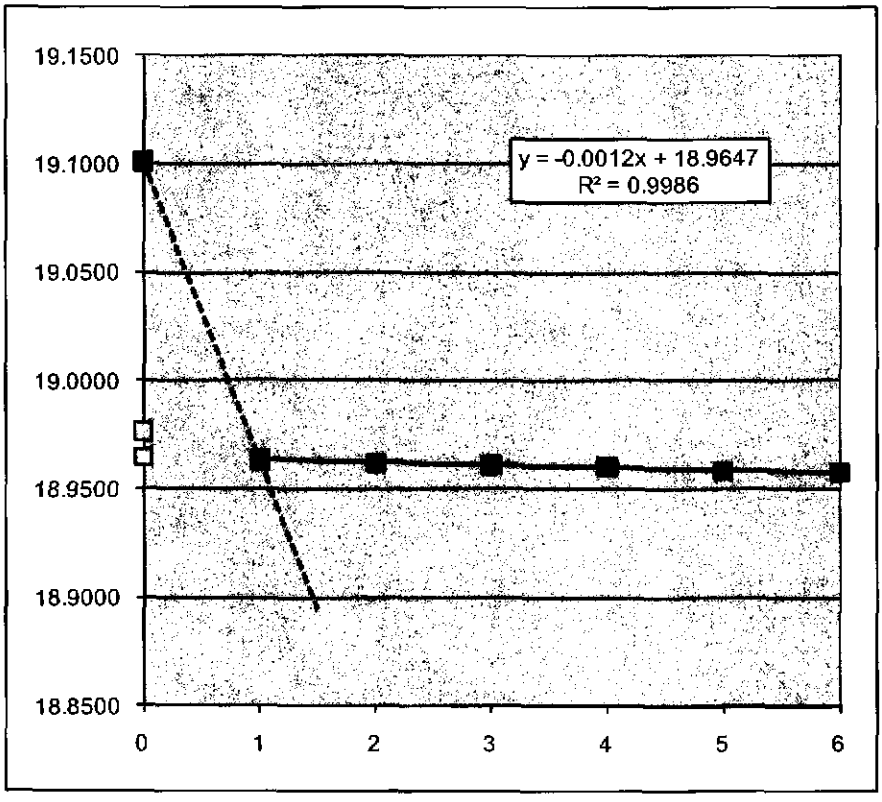
Cleaning Cycle	Wt (g)
0	19.1169
1	19.0695
2	19.0687
3	19.0674
4	19.0665
5	19.0656
6	19.0645



Coupon:	248
Test Matrix:	Fe-Eo-1500-24-3p
Initial wt (g)	18.9766
Removal wt (g)	19.1011

Calculated final wt (g)	18.9647
Total wt loss (g)	0.0119
Total wt loss (mg)	11.9

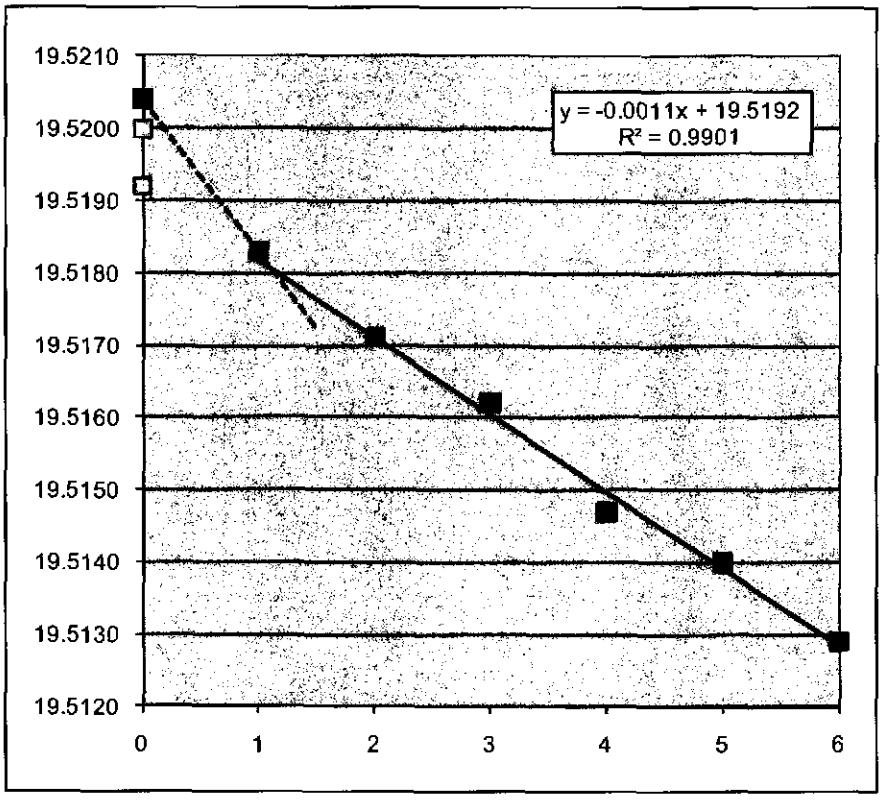
Cleaning Cycle	Wt (g)
0	19.1011
1	18.9635
2	18.9623
3	18.9611
4	18.9601
5	18.9588
6	18.9576



Coupon:	250
Test Matrix:	Fe-Atm-1500-24-2
Initial wt (g)	19.5200
Removal wt (g)	19.5204

Calculated final wt (g)	19.5192
Total wt loss (g)	0.0008
Total wt loss (mg)	0.8

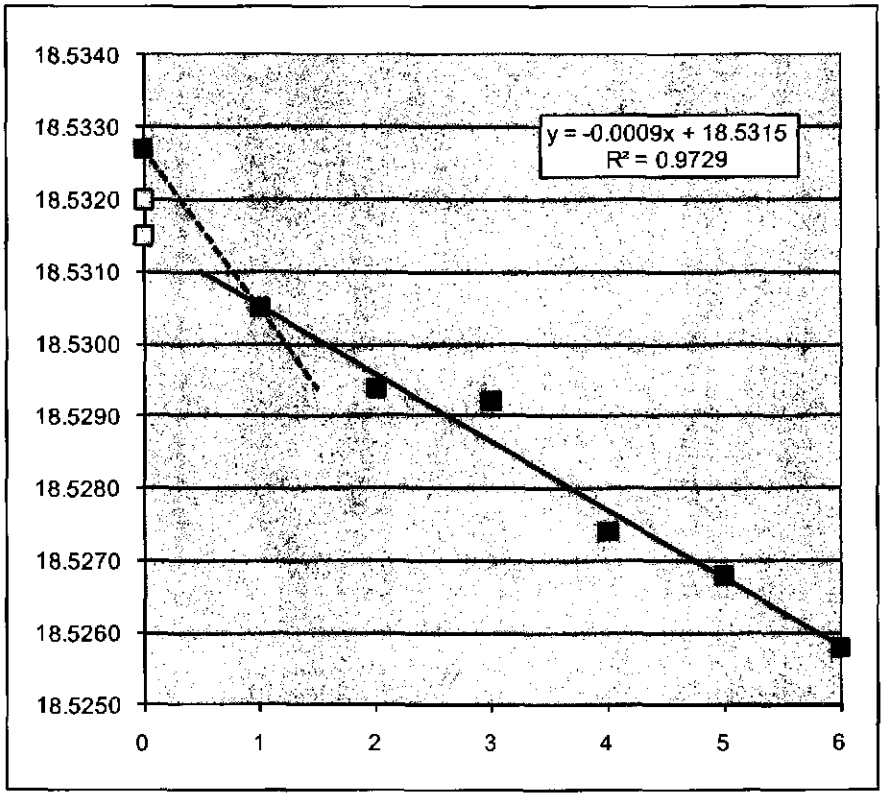
Cleaning Cycle	*Wt (g)*
0	19.5204
1	19.5183
2	19.5171
3	19.5162
4	19.5147
5	19.5140
6	19.5129



Coupon:	251
Test Matrix:	Fe-Atm-1500-24-3
Initial wt (g)	18.5320
Removal wt (g)	18.5327

Calculated final wt (g)	18.5315
Total wt loss (g)	0.0005
Total wt loss (mg)	0.5

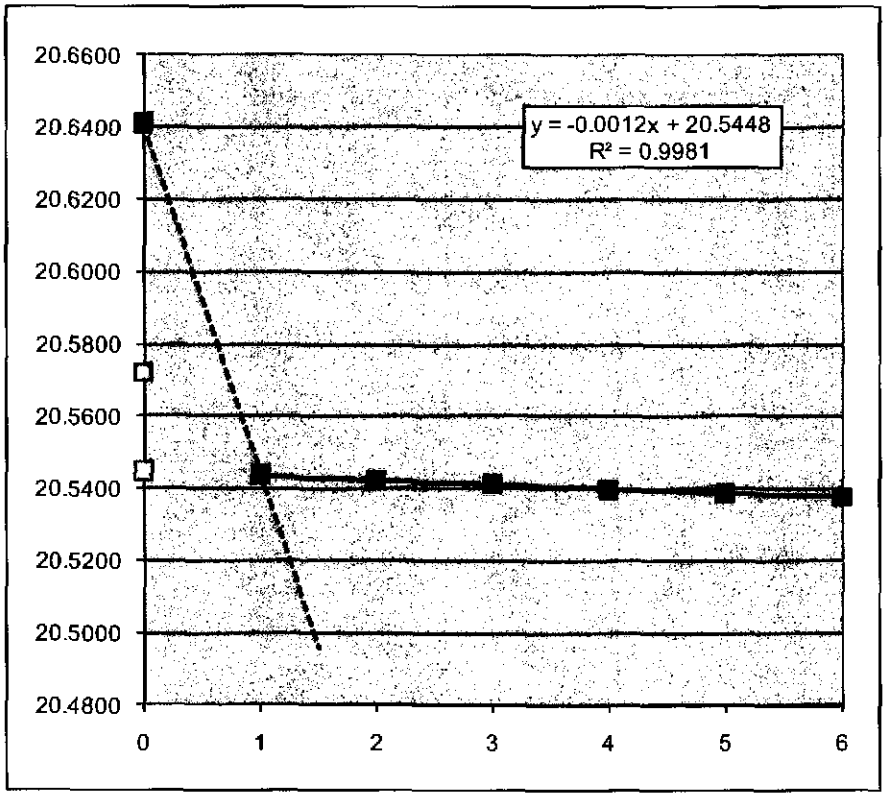
Cleaning Cycle	Wt (g)
0	18.5327
1	18.5305
2	18.5294
3	18.5292
4	18.5274
5	18.5268
6	18.5258



Coupon:	334
Test Matrix:	*Fe-G-3500-24-2f*
Initial wt (g)	20.5720
Removal wt (g)	20.6412

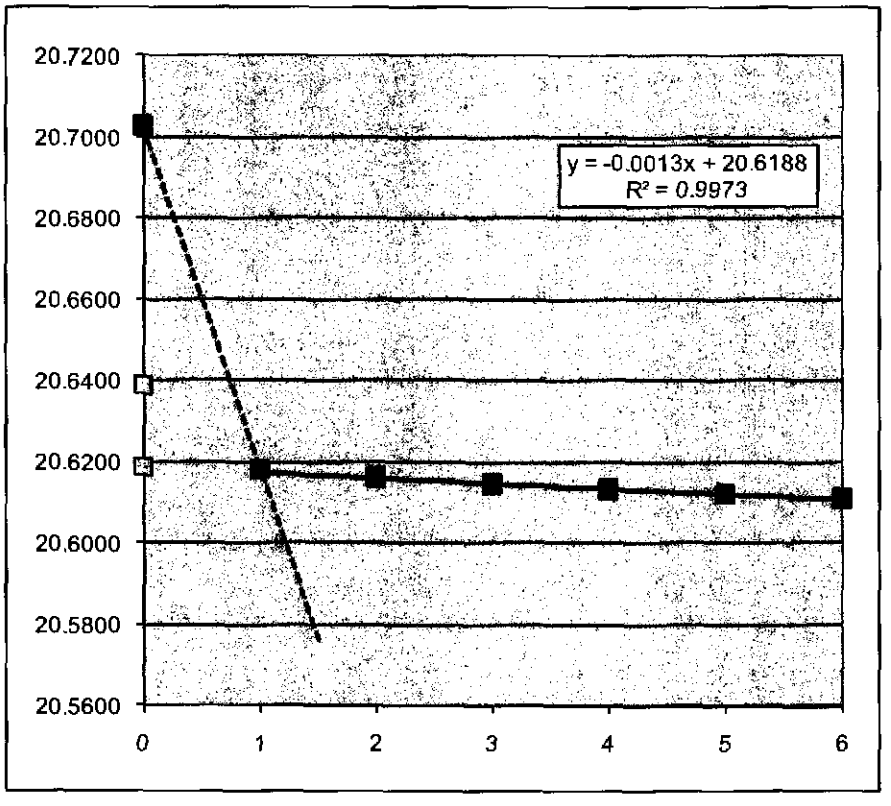
Calculated final wt (g)	20.5448
Total wt loss (g)	0.0272
Total wt loss (mg)	27.2

Cleaning Cycle	Wt (g)
0	20.6412
1	20.5442
2	20.5424
3	20.5413
4	20.5399
5	20.5389
6	20.5376



Coupon:	335		
Test Matrix:	Fe-G-3500-24-3f		
Initial wt (g)	20.6391	**Calculated final wt (g)**	20.6188
***Removal* wt (g)**	20.7028	**Total wt loss (g)**	0.0203
		Total wt loss (mg)	20.3

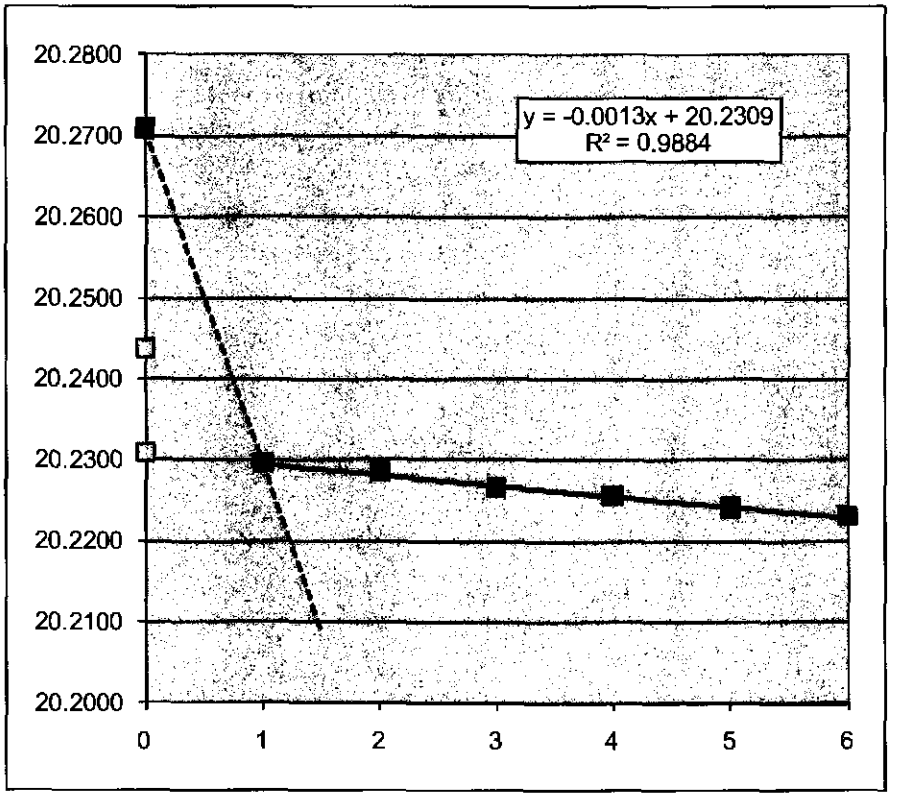
Cleaning Cycle	Wt (g)
0	20.7028
1	20.6185
2	20.6163
3	20.6148
4	20.6134
5	20.6122
6	20.6110



Coupon:	337
Test Matrix:	Fe-G-3500-24-2p
Initial wt (g)	20.2438
Removal wt (g)	20.2709

Calculated final wt (g)	20.2309
Total wt loss (g)	0.0129
Total wt loss (mg)	12.9

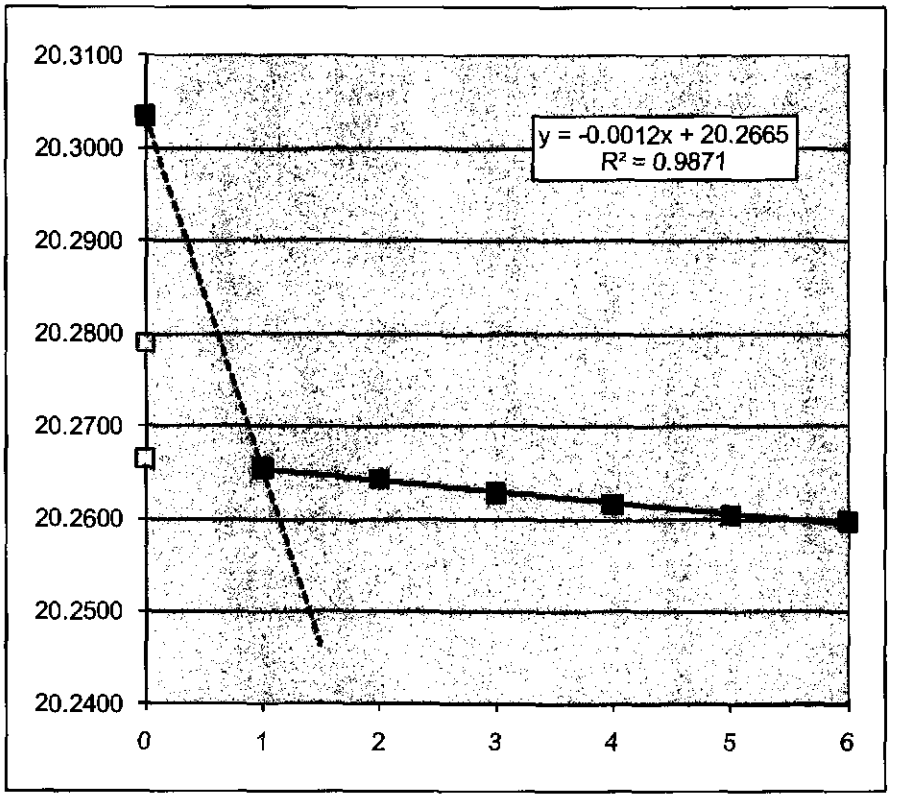
Cleaning Cycle	Wt (g)
0	20.2709
1	20.2298
2	20.2285
3	20.2266
4	20.2257
5	20.2242
6	20.2231



Coupon:	338
Test Matrix:	Fe-G-3500-24-3p
Initial wt (g)	20.2790
Removal wt (g)	20.3035

Calculated final wt (g)	20.2665
Total wt loss (g)	0.0125
Total wt loss (mg)	12.5

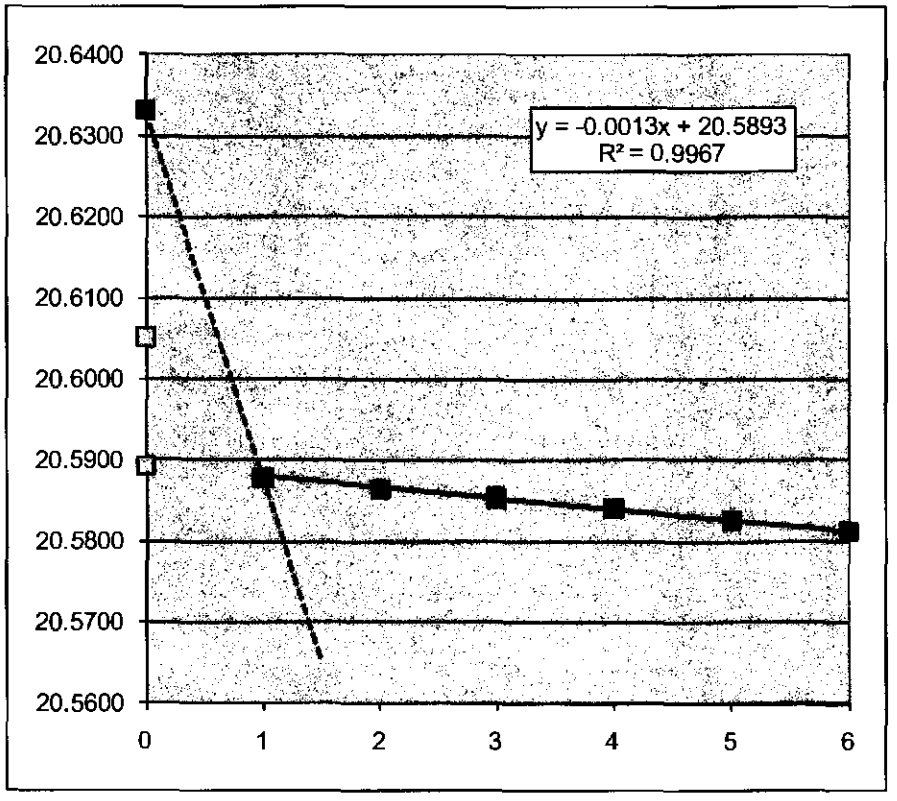
Cleaning Cycle	Wt (g)
0	20.3035
1	20.2655
2	20.2644
3	20.2628
4	20.2617
5	20.2605
6	20.2597



Coupon:	340
Test Matrix:	Fe-Go-3500-24-2f
Initial wt (g)	20.6052
Removal wt (g)	20.6332

Calculated final wt (g)	20.5893
Total wt loss (g)	0.0159
Total wt loss (mg)	15.9

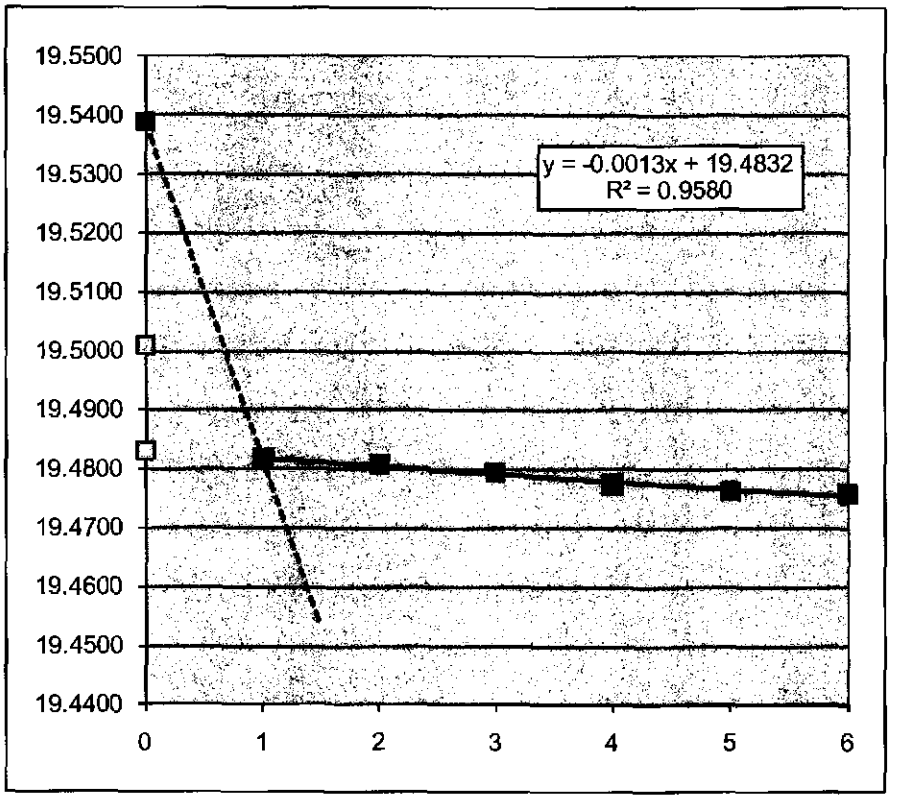
Cleaning Cycle	Wt (g)
0	20.6332
1	20.5878
2	20.5865
3	20.5854
4	20.5841
5	20.5827
6	20.5812



Coupon:	341
Test Matrix:	Fe-Go-3500-24-3f
Initial wt (g)	19.5010
Removal wt (g)	19.5390

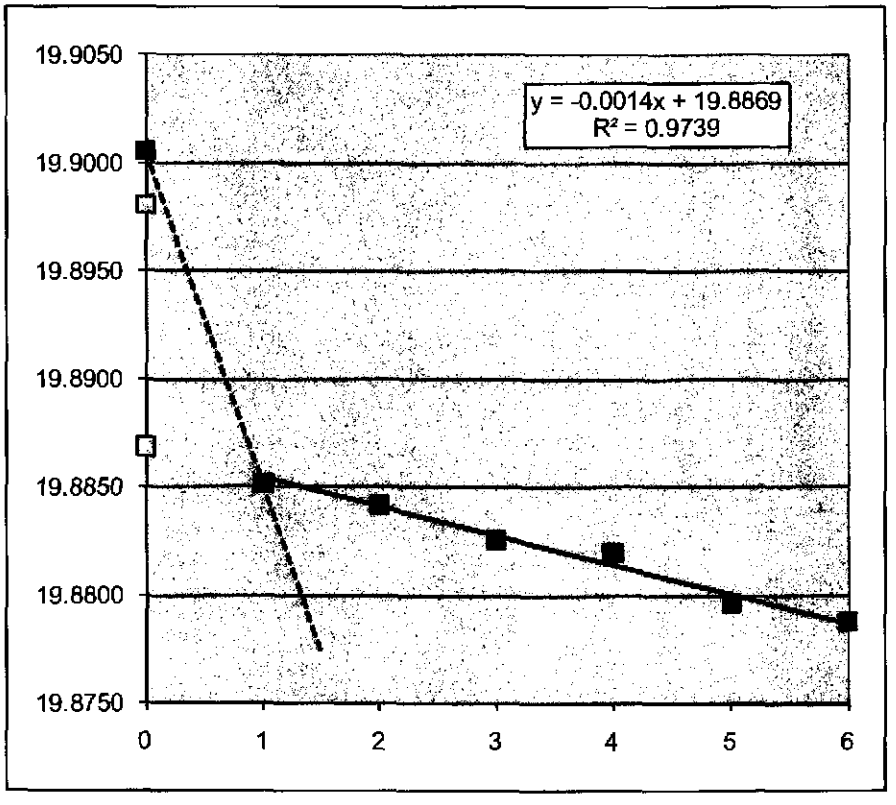
Calculated final wt (g)	19.4832
Total wt loss (g)	0.0178
Total wt loss (mg)	17.8

Cleaning Cycle	Wt (g)
0	19.5390
1	19.4819
2	19.4808
3	19.4795
4	19.4775
5	19.4763
6	19.4759



Coupon:	343		
Test Matrix:	Fe-Go-3500-24-2p		
Initial wt (g)	19.8981	**Calculated final wt (g)**	19.8869
Removal wt (g)	19.9006	***Total wt loss (g)***	0.0112
		Total wt loss (mg)	11.2

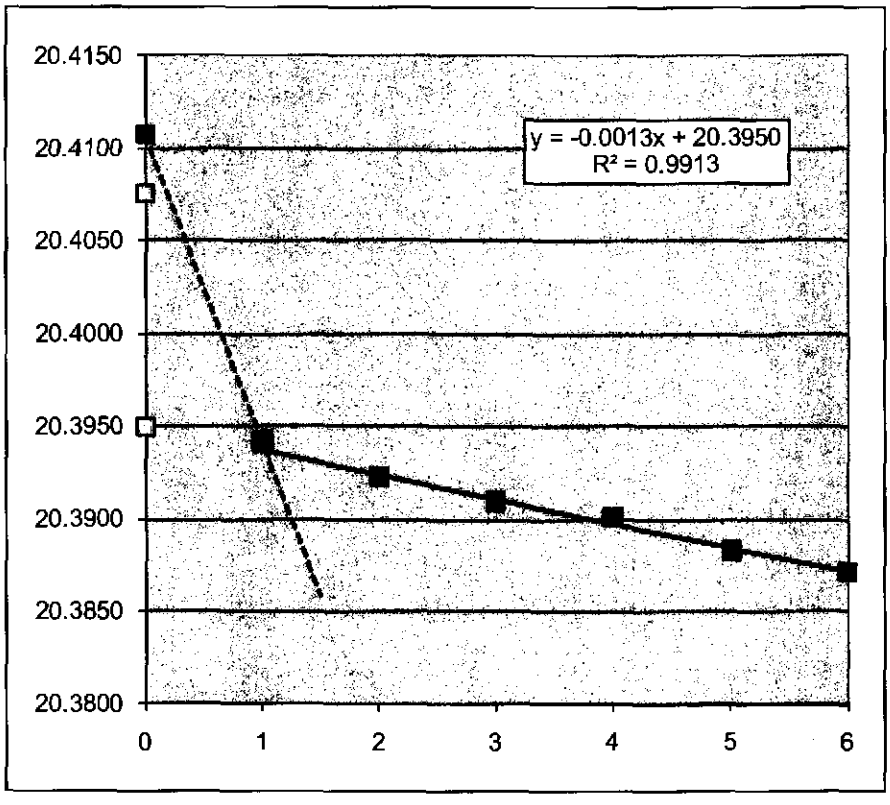
Cleaning Cycle	Wt (g)
0	19.9006
1	19.8852
2	19.8842
3	19.8826
4	19.8820
5	19.8797
6	19.8788



Coupon:	345
Test Matrix:	Fe-Go-3500-24-3p
Initial wt (g)	20.4076
Removal wt (g)	20.4108

Calculated final wt (g)	20.3950
Total wt loss (g)	0.0126
Total wt loss (mg)	12.6

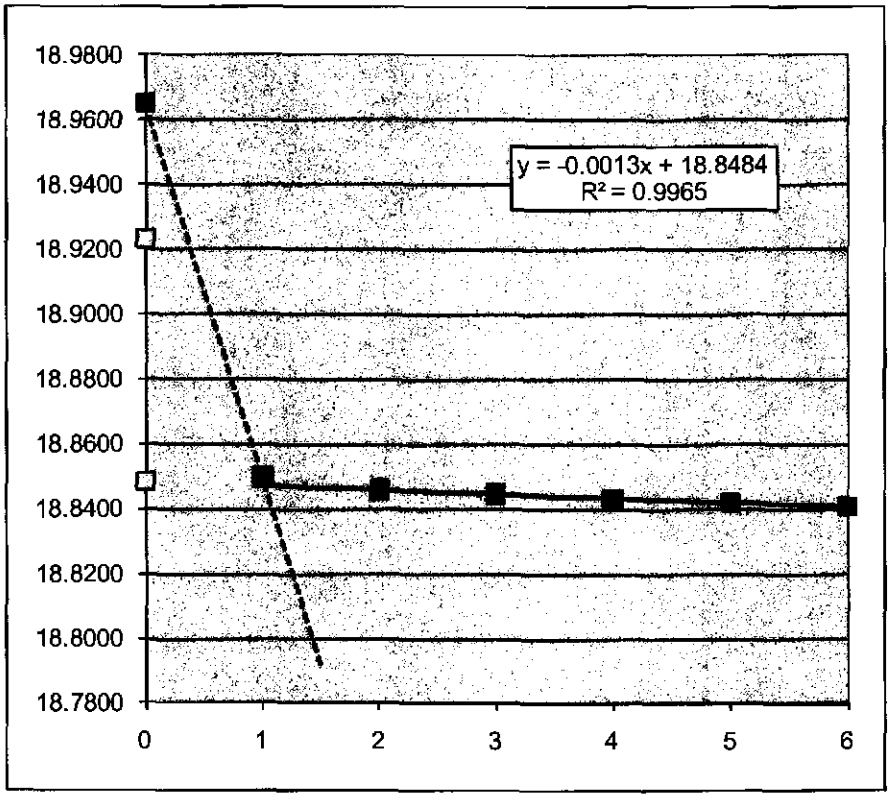
Cleaning Cycle	Wt (g)
0	20.4108
1	20.3942
2	20.3923
3	20.3910
4	20.3901
5	20.3883
6	20.3871



Coupon:	347
Test Matrix:	Fe-E-3500-24-2f
Initial wt (g)	18.9234
Removal wt (g)	18.9653

Calculated final wt (g)	18.8484
Total wt loss (g)	0.0750
Total wt loss (mg)	75.0

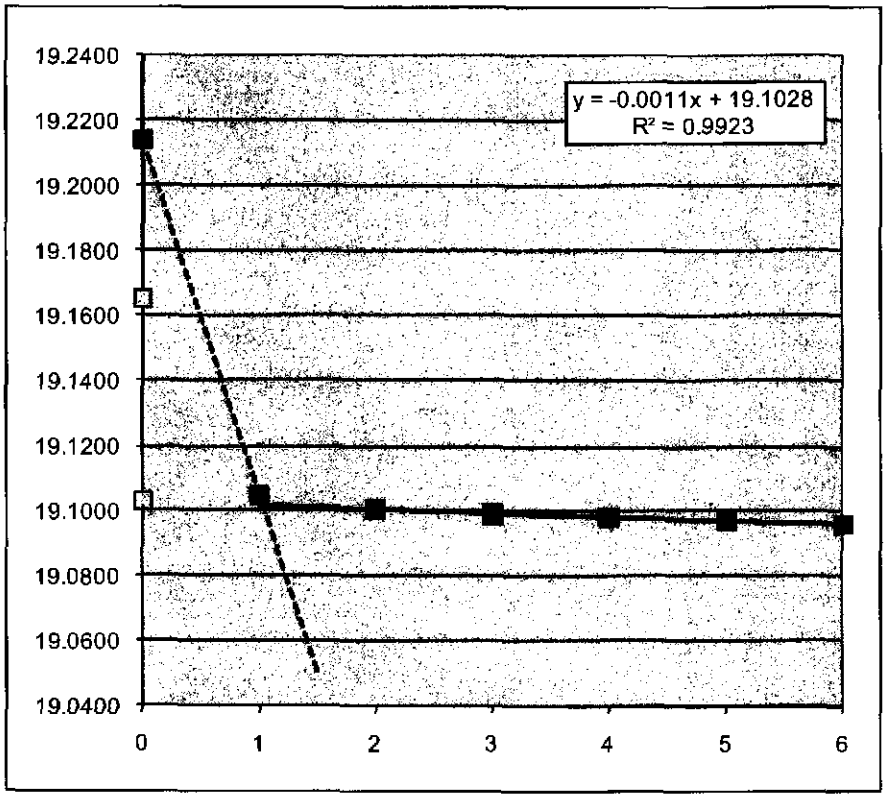
Cleaning Cycle	Wt (g)
0	18.9653
1	18.8500
2	18.8458
3	18.8446
4	18.8430
5	18.8419
6	18.8407



Coupon:	348
Test Matrix:	Fe-E-3500-24-3f
Initial wt (g)	19.1652
Removal wt (g)	19.2142

Calculated final wt (g)	19.1028
Total wt loss (g)	0.0624
Total wt loss (mg)	62.4

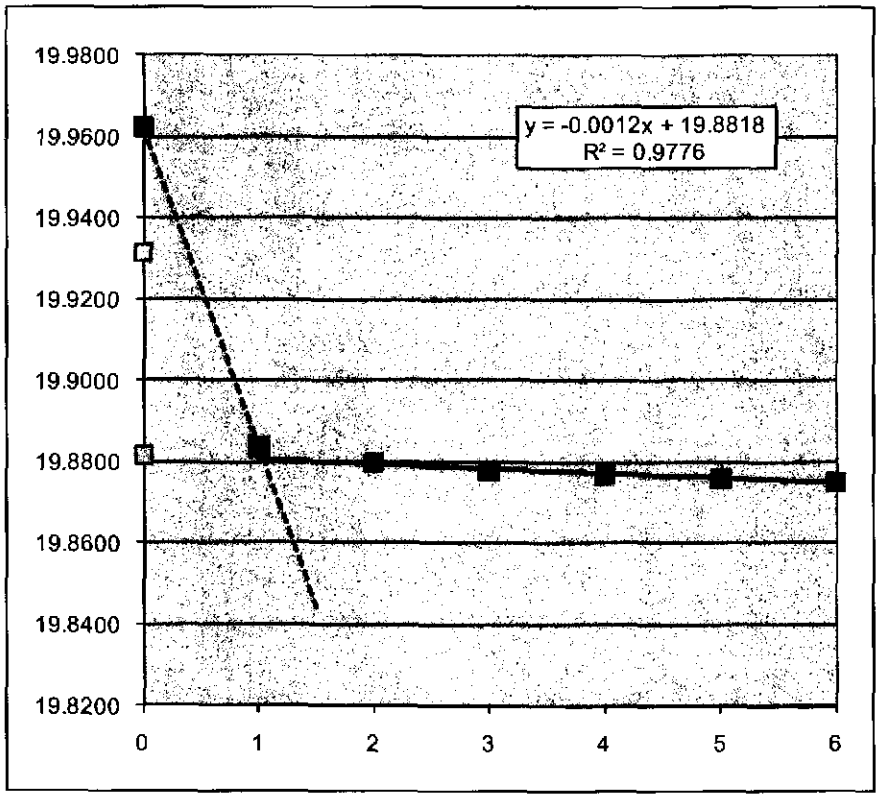
Cleaning Cycle	Wt (g)
0	19.2142
1	19.1046
2	19.1007
3	19.0992
4	19.0982
5	19.0973
6	19.0960



Coupon:	350
Test Matrix:	Fe-E-3500-24-2p
Initial wt (g)	19.9314
Removal wt (g)	19.9624

Calculated final wt (g)	19.8818
Total wt loss (g)	0.0496
Total wt loss (mg)	49.6

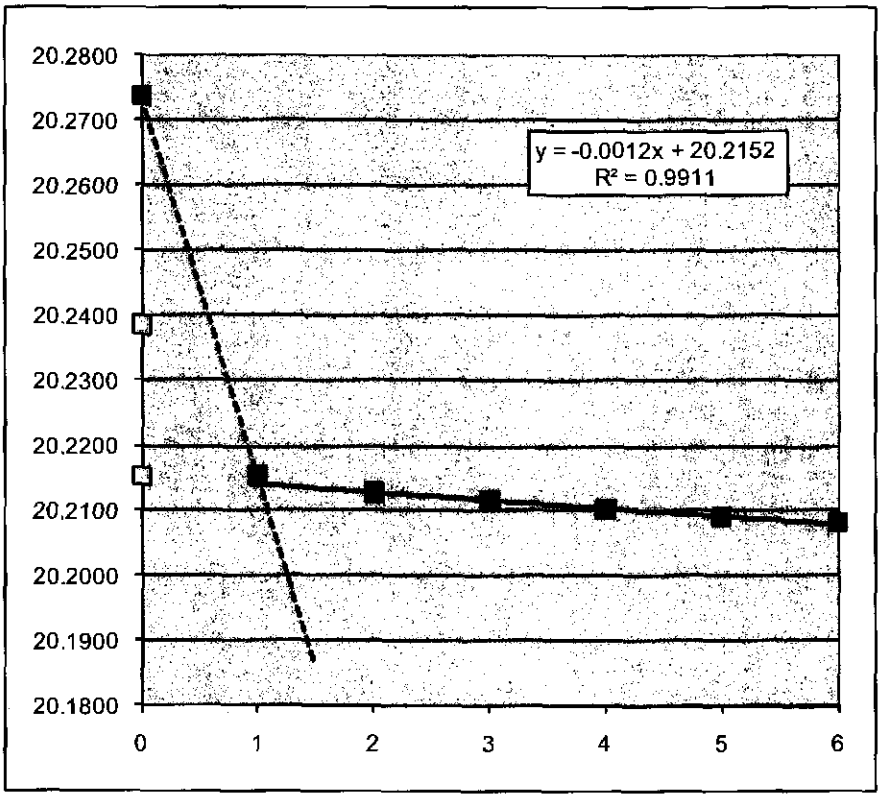
Cleaning Cycle	Wt (g)
0	19.9624
1	19.8838
2	19.8798
3	19.8779
4	19.8772
5	19.8760
6	19.8750



Coupon:	351
Test Matrix:	Fe-E-3500-24-3p
Initial wt (g)	20.2387
Removal wt (g)	20.2739

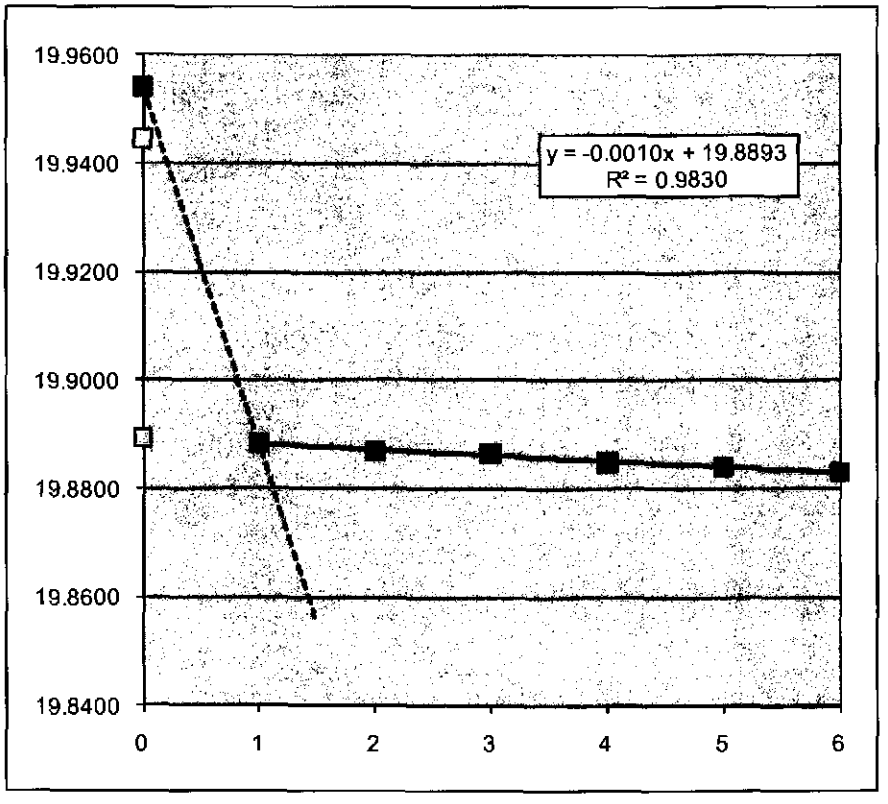
Calculated final wt (g)	20.2152
Total wt loss (g)	0.0235
Total wt loss (mg)	23.5

Cleaning Cycle	Wt (g)
0	20.2739
1	20.2154
2	20.2128
3	20.2118
4	20.2102
5	20.2091
6	20.2082



Coupon:	353		
Test Matrix:	Fe-Eo-3500-24-2f		
Initial wt (g)	19.9447	**Calculated final wt (g)**	19.8893
Removal wt (g)	19.9542	**Total wt loss (g)**	0.0554
		Total wt loss (mg)	55.4

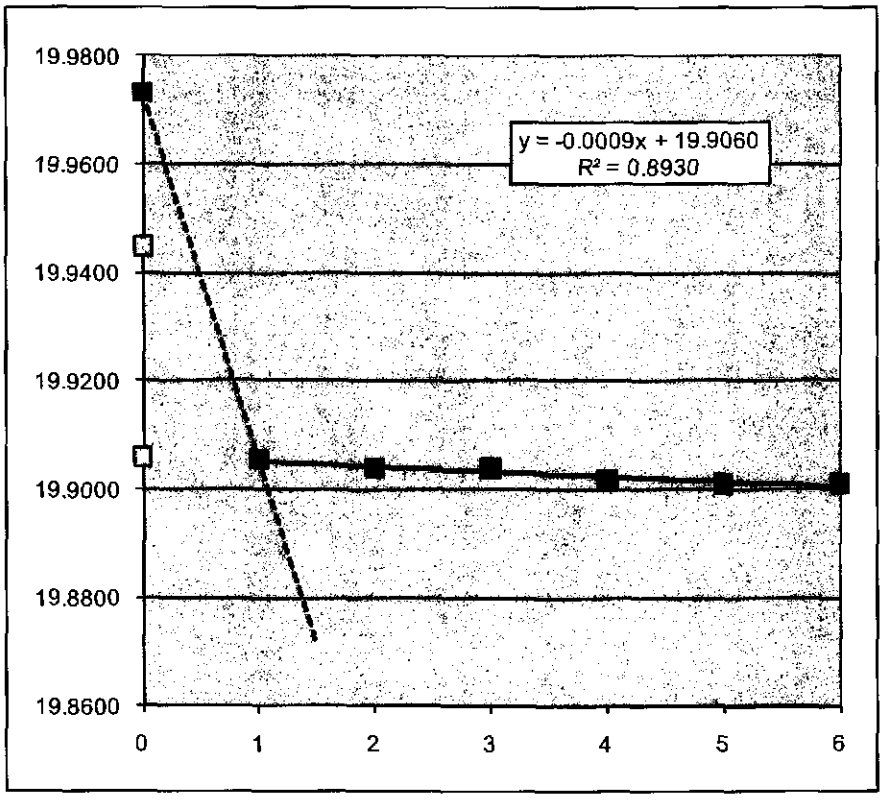
Cleaning Cycle	Wt (g)
0	19.9542
1	19.8884
2	19.8870
3	19.8865
4	19.8850
5	19.8842
6	19.8830



Coupon:	354
Test Matrix:	Fe-Eo-3500-24-3f
Initial wt (g)	19.9449
Removal wt (g)	19.9732

Calculated final wt (g)	19.9060
Total wt loss (g)	0.0389
Total wt loss (mg)	38.9

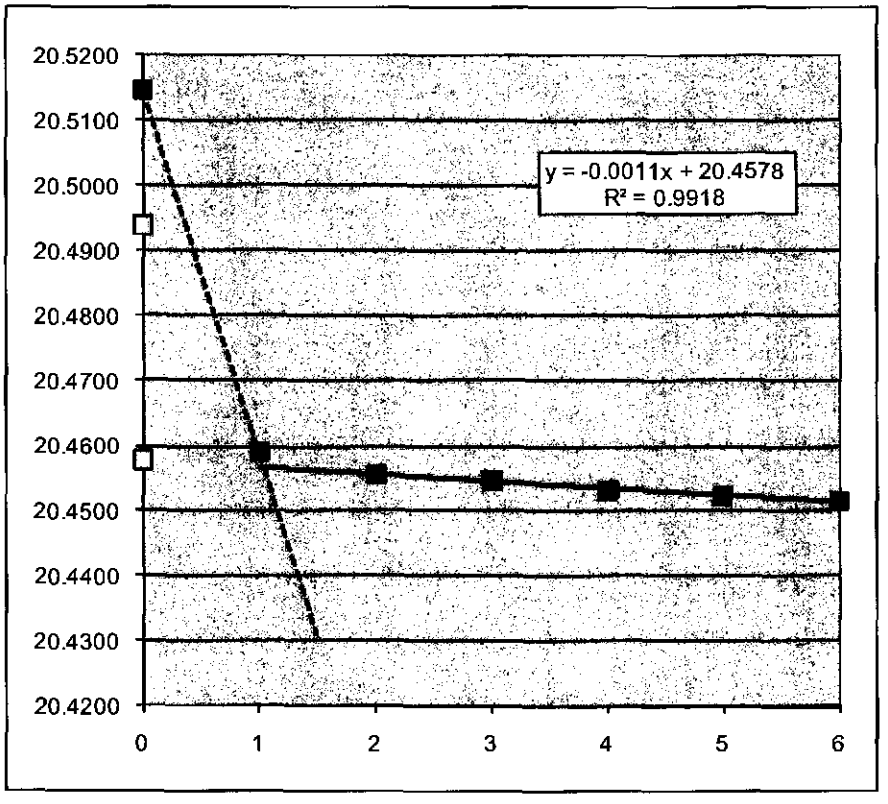
Cleaning Cycle	*Wt (g)*
0	19.9732
1	19.9055
2	19.9041
3	19.9039
4	19.9020
5	19.9011
6	19.9011



Coupon:	356
Test Matrix:	Fe-Eo-3500-24-2p
Initial wt (g)	20.4940
Removal wt (g)	20.5148

Calculated final wt (g)	20.4578
Total wt loss (g)	0.0362
Total wt loss (mg)	36.2

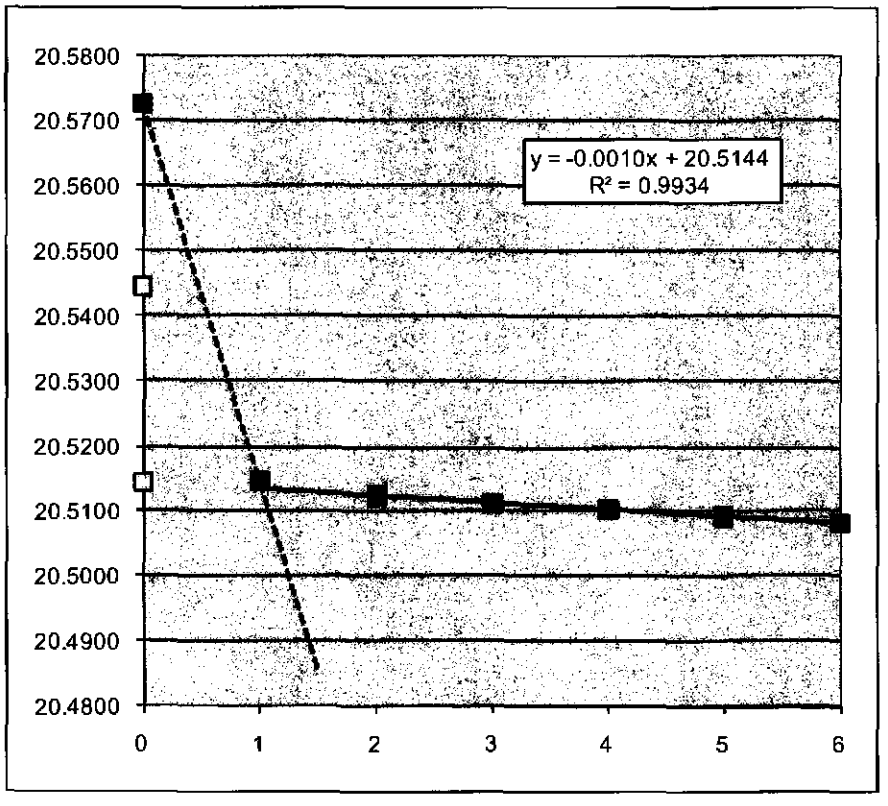
Cleaning Cycle	Wt (g)
0	20.5148
1	20.4591
2	20.4556
3	20.4548
4	20.4533
5	20.4524
6	20.4514



Coupon:	357
Test Matrix:	Fe-Eo-3500-24-3p
Initial wt (g)	20.5446
Removal wt (g)	20.5727

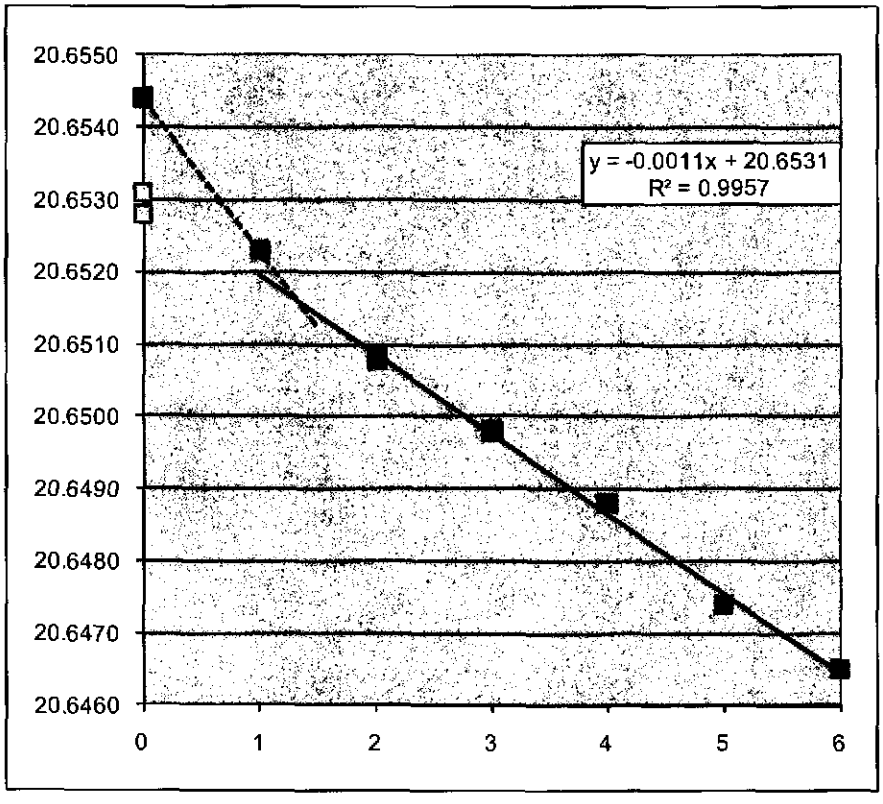
Calculated final wt (g)	20.5144
Total wt loss (g)	0.0302
Total wt loss (mg)	30.2

Cleaning Cycle	Wt (g)
0	20.5727
1	20.5148
2	20.5125
3	20.5111
4	20.5103
5	20.5093
6	20.5082



Coupon:	359		
Test Matrix:	Fe-Atm-3500-24-2		
Initial wt (g)	20.6528	**Calculated final wt (g)**	20.6531
Removal wt (g)	20.6544	**Total wt loss (g)**	-0.0003
		Total wt loss (mg)	-0.3

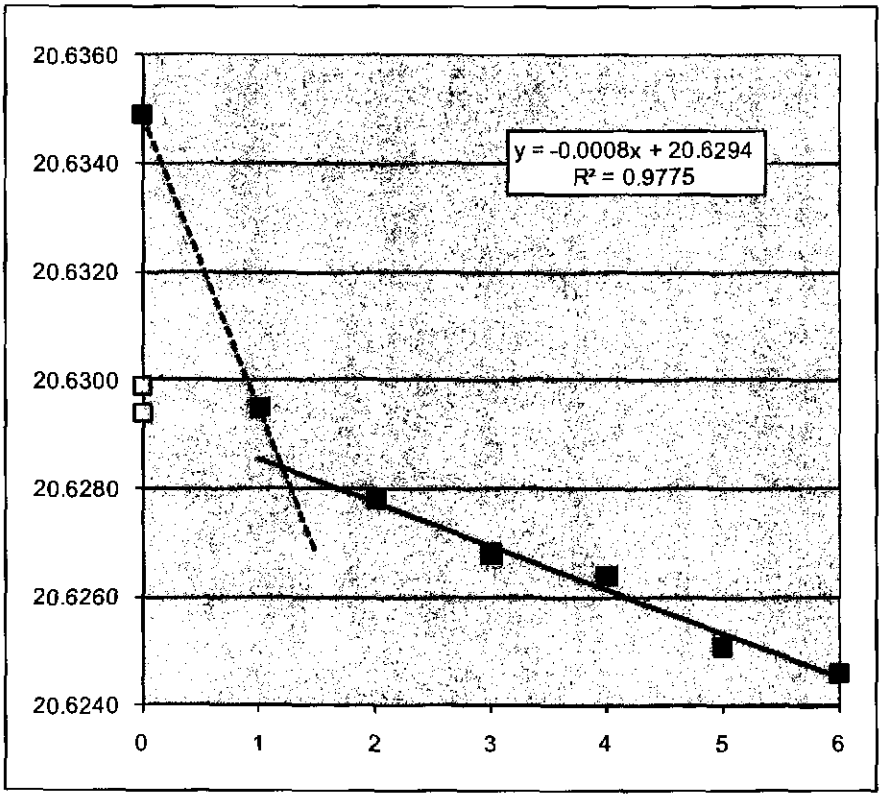
Cleaning Cycle	Wt (g)
0	20.6544
1	20.6523
2	20.6508
3	20.6498
4	20.6488
5	20.6474
6	20.6465



Coupon:	360
Test Matrix:	Fe-Atm-3500-24-3
Initial wt (g)	20.6299
Removal wt (g)	20.6349

Calculated final wt (g)	20.6294
Total wt loss (g)	0.0005
Total wt loss (mg)	0.5

Cleaning Cycle	Wt (g)
0	20.6349
1	20.6295
2	20.6278
3	20.6268
4	20.6264
5	20.6251
6	20.6246



APPENDIX D

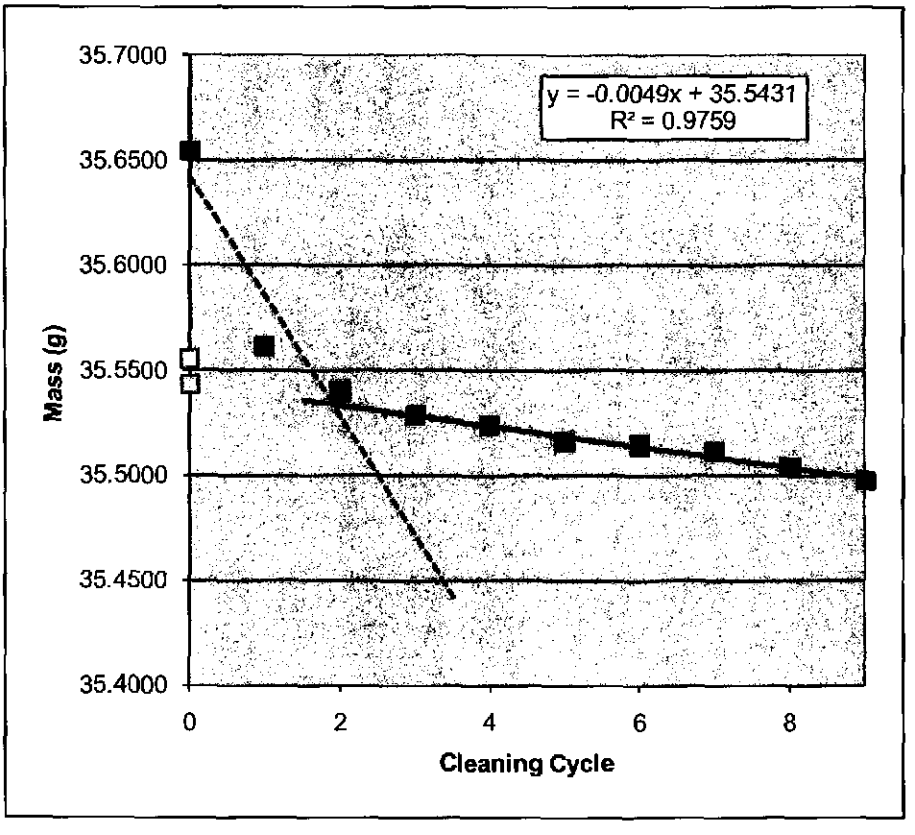
This appendix contains all of the weight loss cleaning cycle data, as well as the results of the graphical analysis of that data for each of the lead coupons (see individual data sheets for each coupon in WIPP-FePb-3 Supplemental Binder C). Each of the following pages lists the initial coupon weight, removal weight, cleaning cycle weights, calculated final weight and the resulting weight loss. The environmental conditions for each coupon can be read from the test matrix label that is given for each coupon. The meaning of the test matrix labels is discussed in Section 2.

For each coupon the graphical analysis is shown (see Section 3.1 for details of the process). The blue symbols indicate those parts of the cleaning cycle data used to determine the calculated final weight, which is the y-intercept of the line fit to the blue symbols. The red symbols show the cleaning cycle data not used in the linear regression. Yellow symbols indicate the initial coupon weight (prior to the experiment) and the final calculated weight.

Coupon:	L002
Test Matrix:	Pb-G-0000-24-2f
Initial wt (g)	35.5556
Removal wt (g)	35.6542

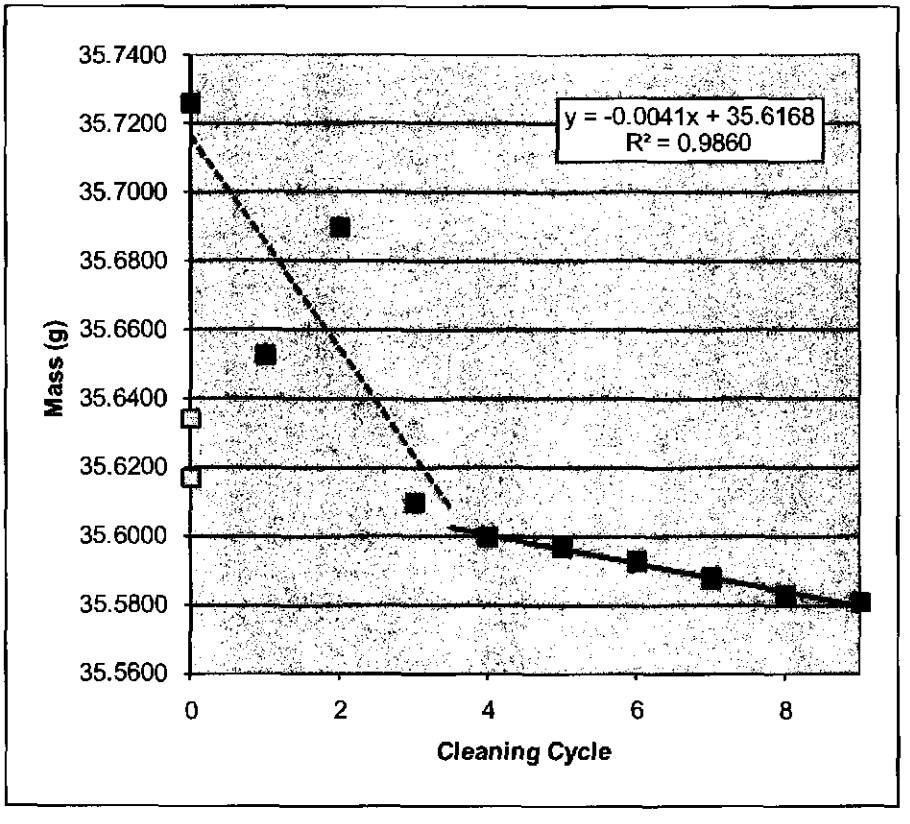
Calculated final wt (g)	35.5431
Total wt loss (g)	0.0125
Total wt loss (mg)	12.5

Cleaning Cycle	Wt (g)
0	35.6542
1	35.5611
2	35.5399
3	35.5285
4	35.5242
5	35.5157
6	35.5143
7	35.5112
8	35.5039
9	35.4977



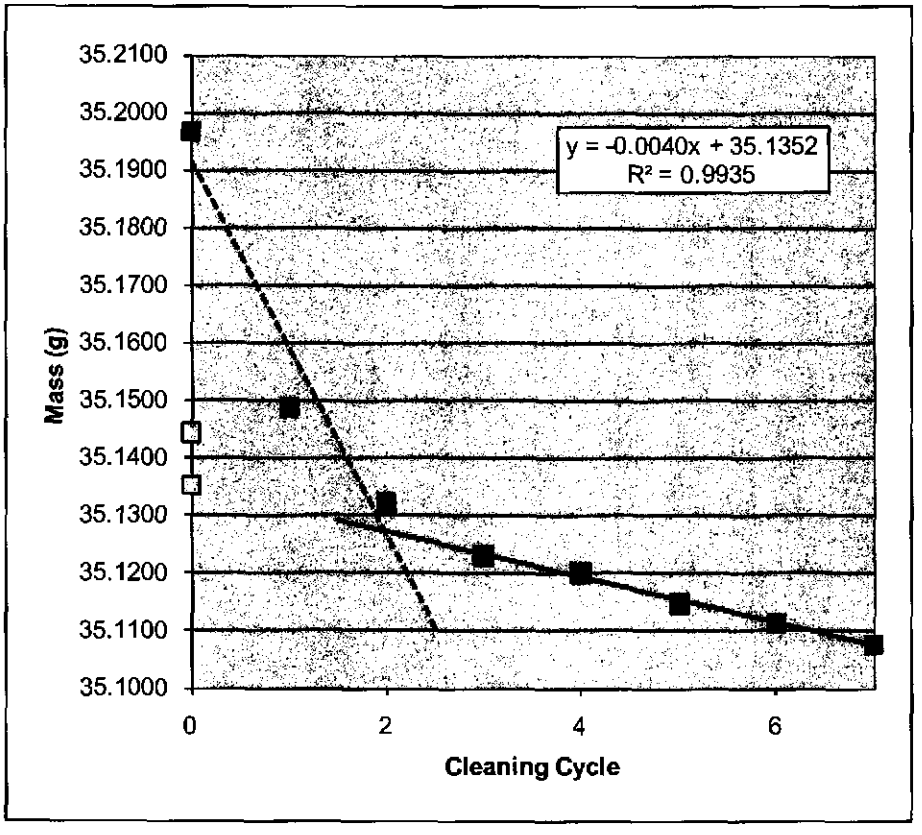
Coupon:	L003		
Test Matrix:	Pb-G-0000-24-3f		
Initial wt (g)	35.6341	**Calculated final wt (g)**	35.6168
Removal wt (g)	35.7262	**Total wt loss (g)**	0.0173
		Total wt loss (mg)	17.3

Cleaning Cycle	Wt (g)
0	35.7262
1	35.6525
2	35.6899
3	35.6097
4	35.5997
5	35.5971
6	35.5926
7	35.5875
8	35.5825
9	35.5806



Coupon:	L005		
Test Matrix:	Pb-G-0000-24-2p		
Initial wt (g)	35.1444	**Calculated final wt (g)**	35.1352
Removal wt (g)	35.1968	**Total wt loss (g)**	0.0092
		Total wt loss (mg)	9.2

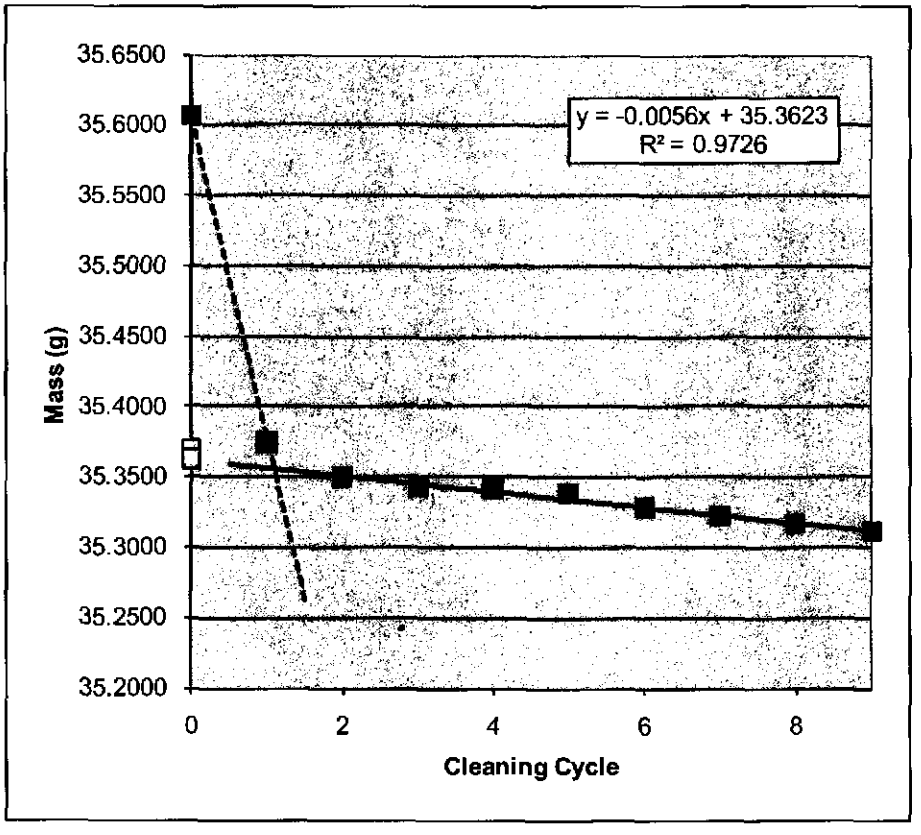
Cleaning Cycle	Wt (g)
0	35.1968
1	35.1488
2	35.1321
3	35.1231
4	35.1201
5	35.1148
6	35.1113
7	35.1077



Coupon:	L006
Test Matrix:	Pb-G-0000-24-3p
Initial wt (g)	35.3700
Removal wt (g)	35.6063

Calculated final wt (g)	35.3623
Total wt loss (g)	0.0077
Total wt loss (mg)	7.7

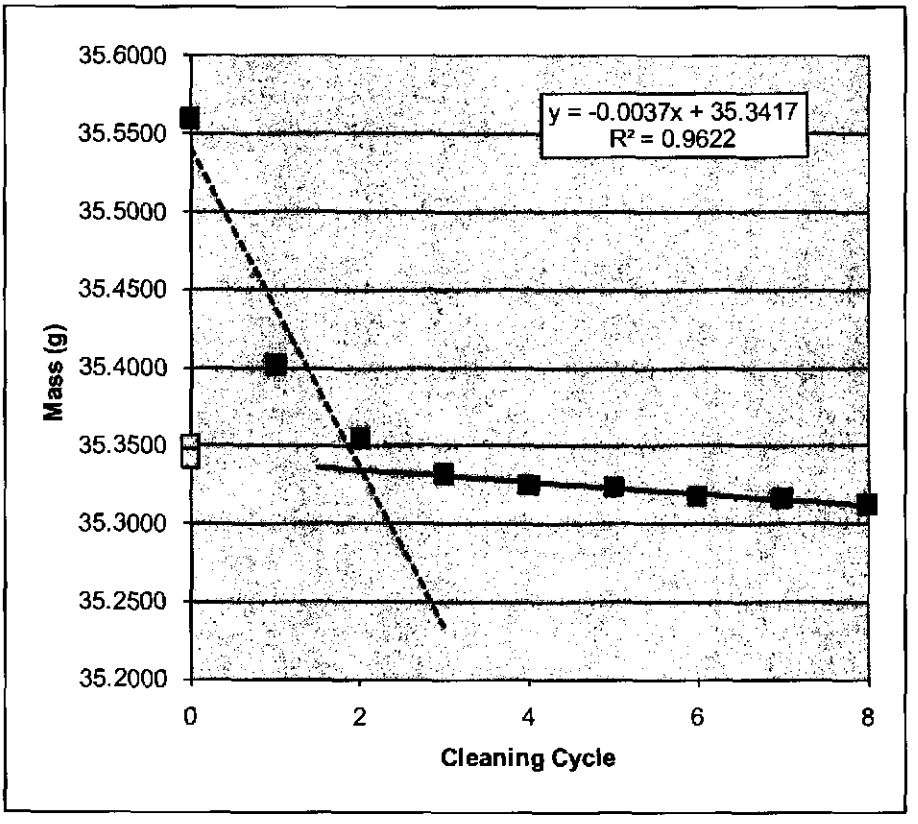
Cleaning Cycle	Wt (g)
0	35.6063
1	35.3749
2	35.3504
3	35.3424
4	35.3420
5	35.3389
6	35.3286
7	35.3224
8	35.3166
9	35.3117



Coupon:	L008
Test Matrix:	Pb-Go-0000-24-2f
Initial wt (g)	35.3503
Removal wt (g)	35.5600

Calculated final wt (g)	35.3417
Total wt loss (g)	0.0086
Total wt loss (mg)	8.6

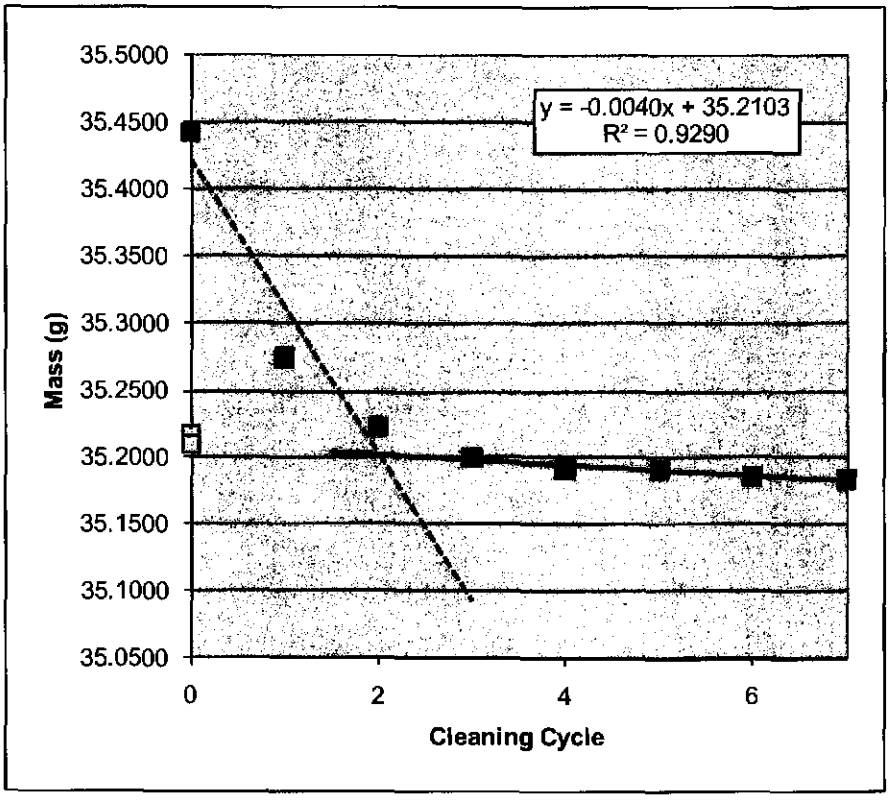
Cleaning Cycle	Wt (g)
0	35.5600
1	35.4020
2	35.3554
3	35.3319
4	35.3251
5	35.3238
6	35.3175
7	35.3165
8	35.3122



Coupon:	L009
Test Matrix:	Pb-Go-0000-24-3f
Initial wt (g)	35.2176
Removal wt (g)	35.4428

Calculated final wt (g)	35.2103
Total wt loss (g)	0.0073
Total wt loss (mg)	7.3

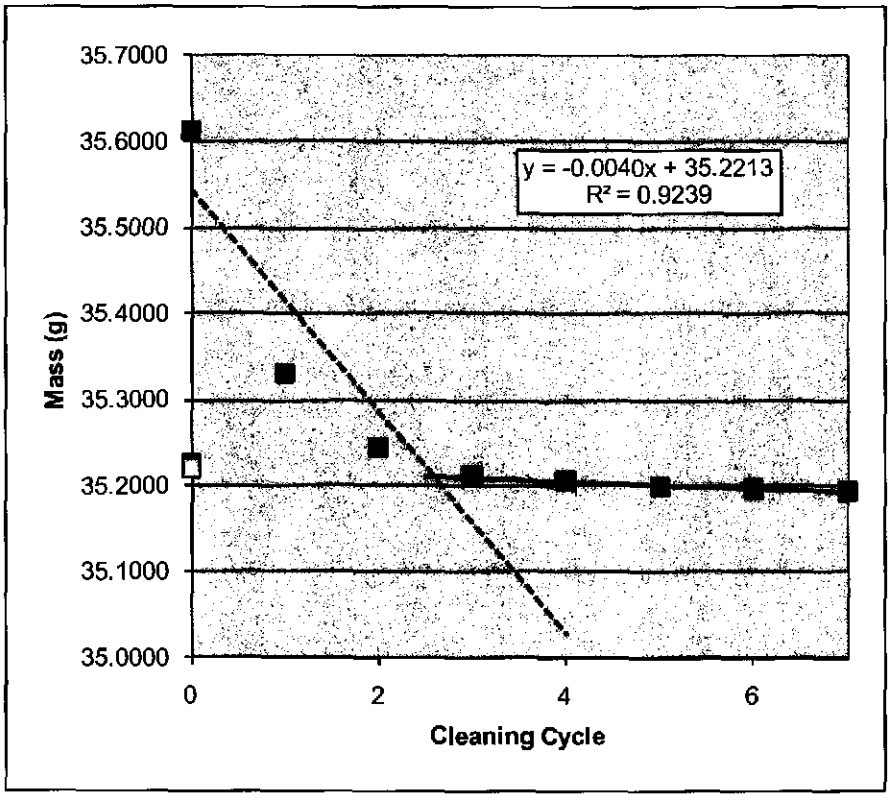
Cleaning Cycle	Wt (g)
0	35.4428
1	35.2752
2	35.2233
3	35.2003
4	35.1919
5	35.1910
6	35.1858
7	35.1836



Coupon:	L011
Test Matrix:	Pb-Go-0000-24-2p
Initial wt (g)	35.2259
Removal wt (g)	35.6133

Calculated final wt (g)	35.2213
Total wt loss (g)	0.0046
Total wt loss (mg)	4.6

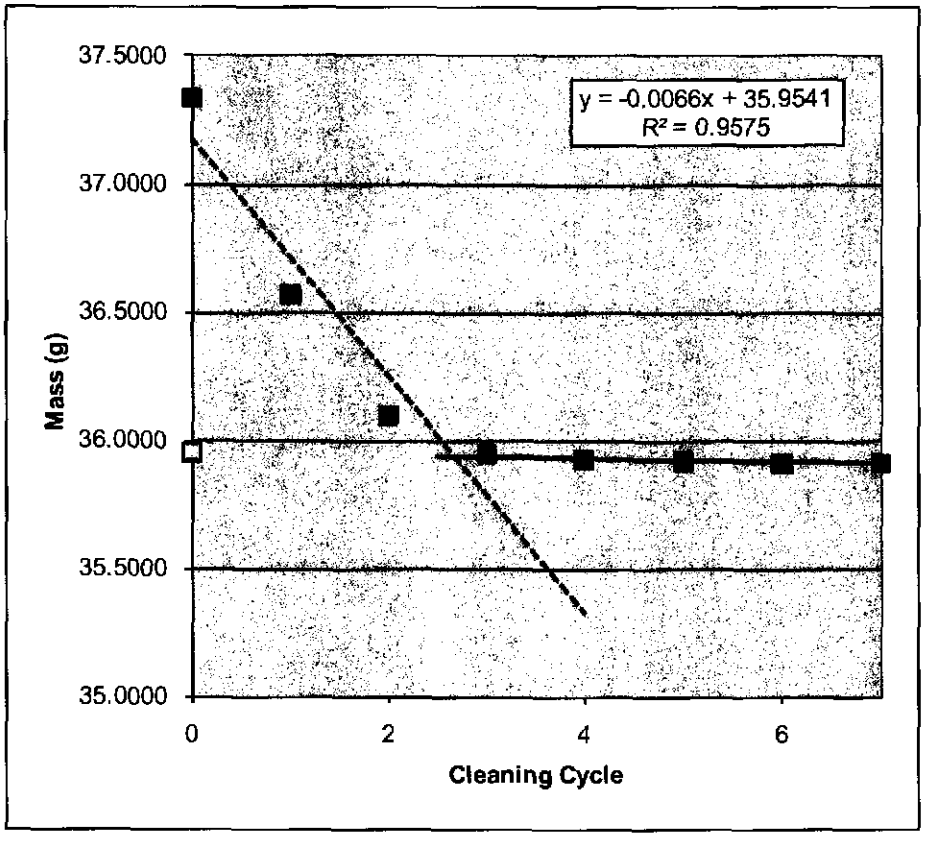
Cleaning Cycle	Wt (g)
0	35.6133
1	35.3309
2	35.2444
3	35.2138
4	35.2067
5	35.1994
6	35.1968
7	35.1942



Coupon:	L012
Test Matrix:	Pb-Go-0000-24-3p
Initial wt (g)	35.9487
Removal wt (g)	37.3361

Calculated final wt (g)	35.9541
Total wt loss (g)	-0.0054
Total wt loss (mg)	-5.4

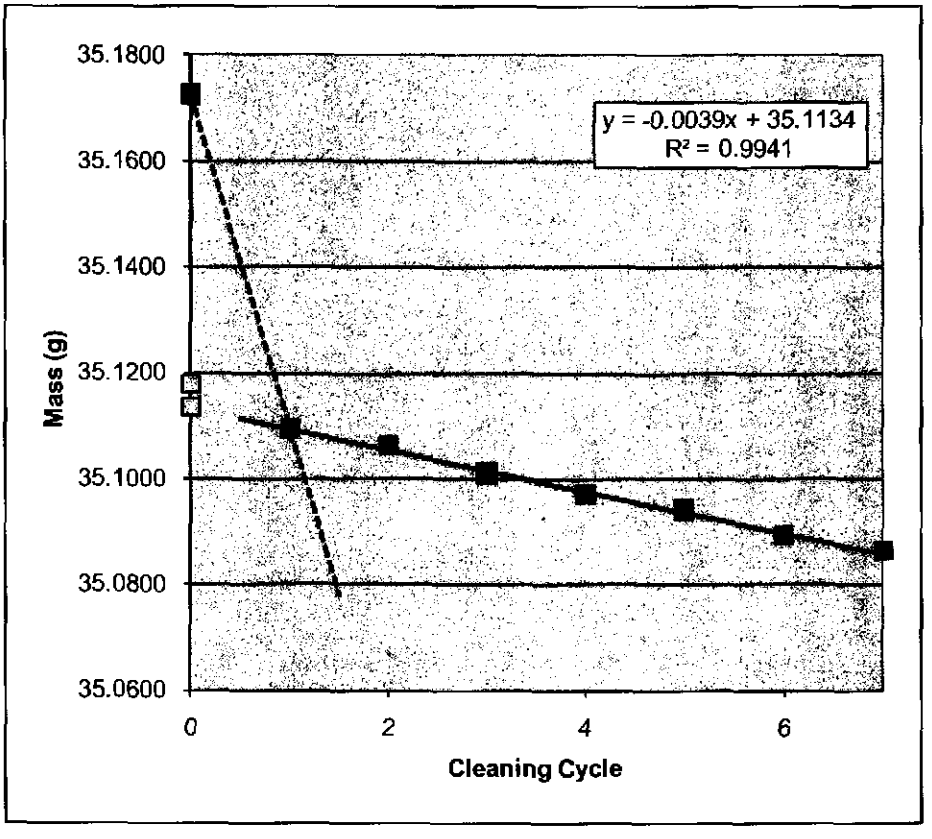
Cleaning Cycle	Wt (g)
0	37.3361
1	36.5657
2	36.0946
3	35.9476
4	35.9275
5	35.9228
6	35.9122
7	35.9091



Coupon:	L014
Test Matrix:	Pb-E-0000-24-2f
Initial wt (g)	35.1179
Removal wt (g)	35.1726

Calculated final wt (g)	35.1134
Total wt loss (g)	0.0045
Total wt loss (mg)	4.5

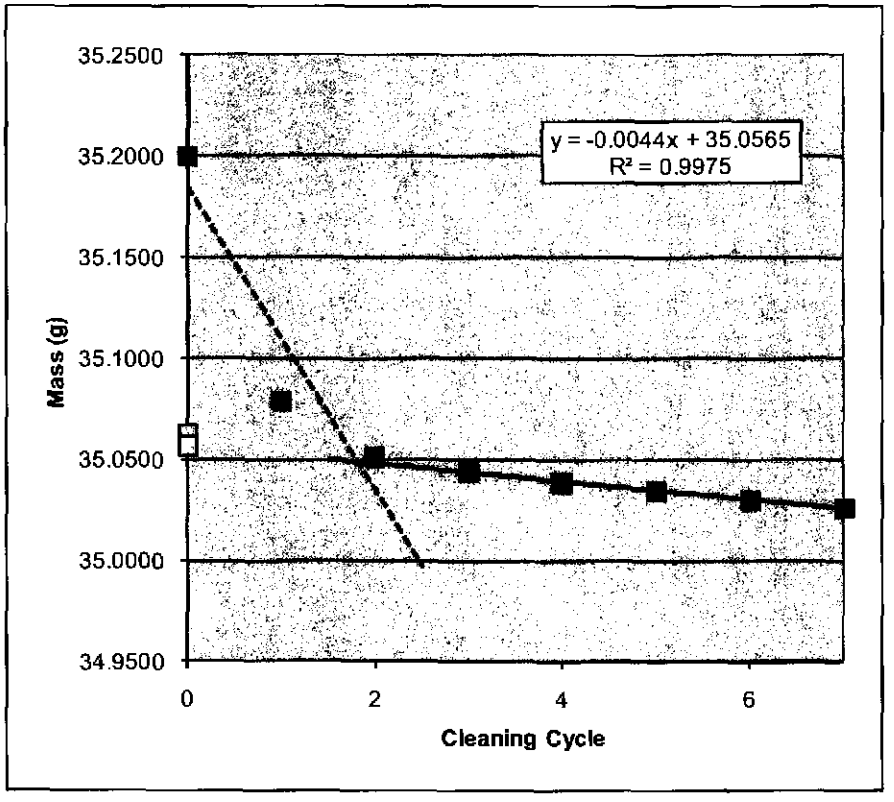
Cleaning Cycle	Wt (g)
0	35.1726
1	35.1095
2	35.1062
3	35.1010
4	35.0973
5	35.0941
6	35.0892
7	35.0863



Coupon:	L015
Test Matrix:	Pb-E-0000-24-3f
Initial wt (g)	35.0627
Removal wt (g)	35.2000

Calculated final wt (g)	35.0565
Total wt loss (g)	0.0062
Total wt loss (mg)	6.2

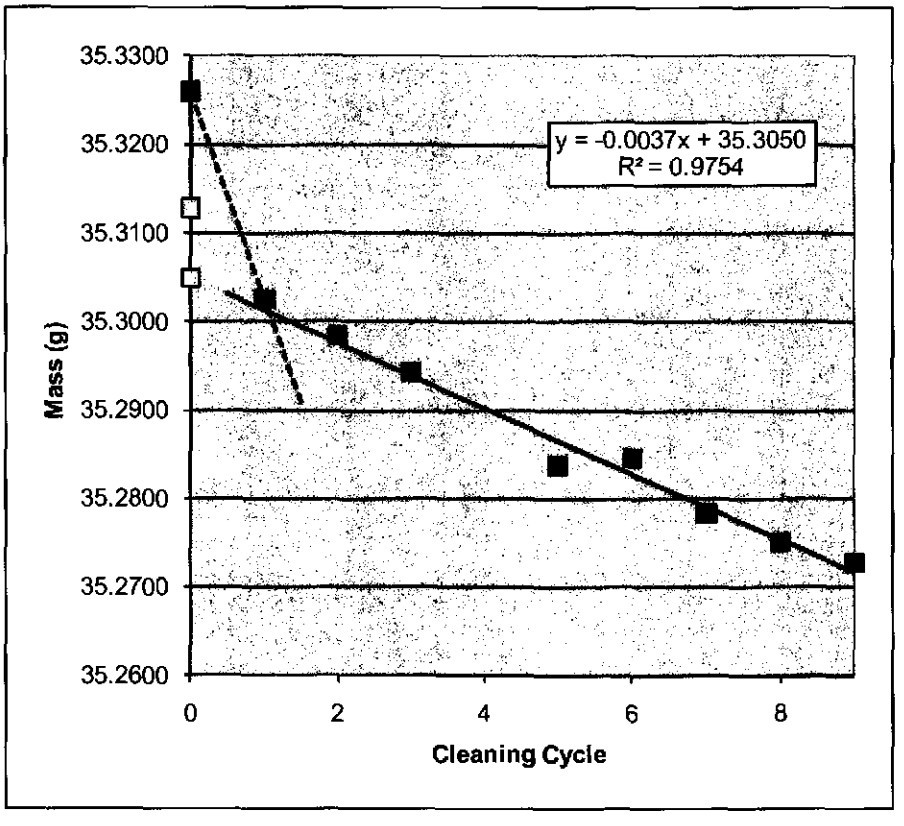
Cleaning Cycle	Wt (g)
0	35.2000
1	35.0784
2	35.0507
3	35.0436
4	35.0386
5	35.0340
6	35.0298
7	35.0259



Coupon:	L017		
Test Matrix:	Pb-E-0000-24-2p		
Initial wt (g)	35.3128	**Calculated final wt (g)**	35.3050
Removal wt (g)	35.3260	**Total wt loss (g)**	0.0078
		Total wt loss (mg)	7.8

Cleaning Cycle	Wt (g)
0	35.3260
1	35.3026
2	35.2984
3	35.2943
4	35.2838
5	35.2837
6	35.2846
7	35.2783
8	35.2751
9	35.2727

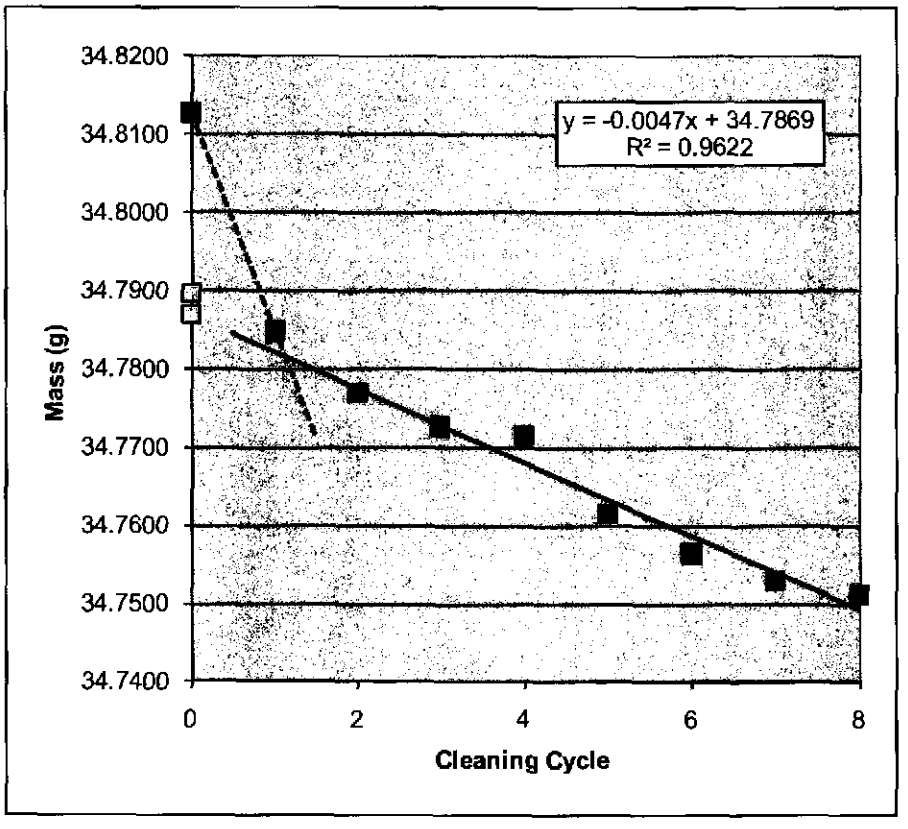
Note: data from cleaning cycle 4 not used in regression



Coupon:	L018
Test Matrix:	*Pb-E-0000-24-3p*
Initial wt (g)	34.7897
Removal wt (g)	34.8128

Calculated final wt (g)	34.7869
Total wt loss (g)	0.0028
Total wt loss (mg)	2.8

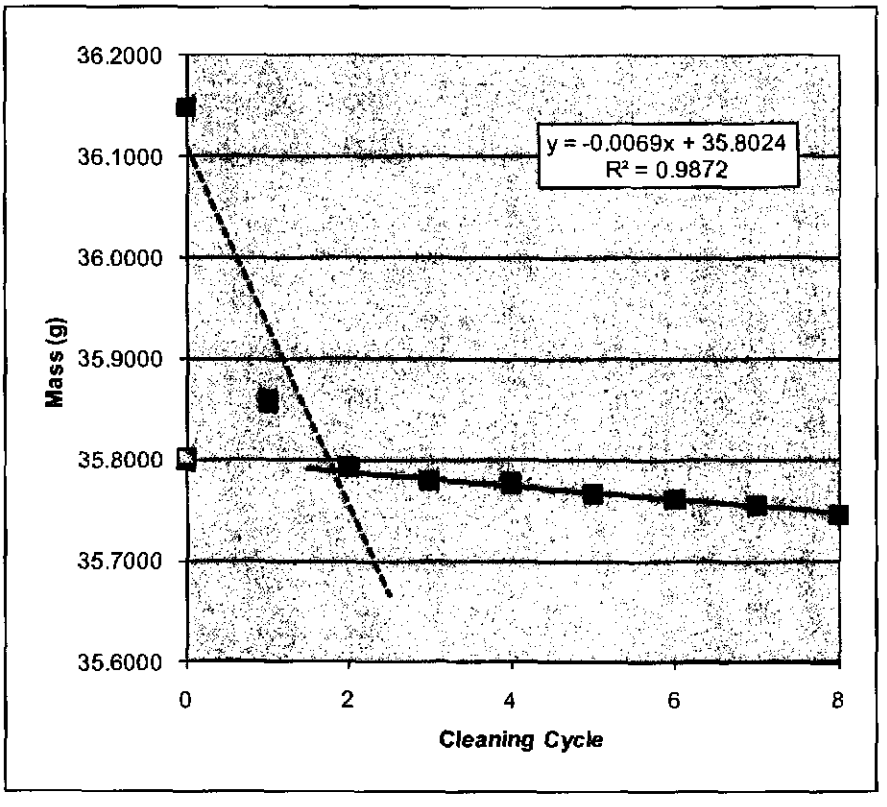
Cleaning Cycle	Wt (g)
0	34.8128
1	34.7849
2	34.7770
3	34.7727
4	34.7715
5	34.7615
6	34.7565
7	34.7530
8	34.7511



Coupon:	L020
Test Matrix:	Pb-Eo-0000-24-2f
Initial wt (g)	35.7989
Removal wt (g)	36.1490

Calculated final wt (g)	35.8024
Total wt loss (g)	-0.0035
Total wt loss (mg)	-3.5

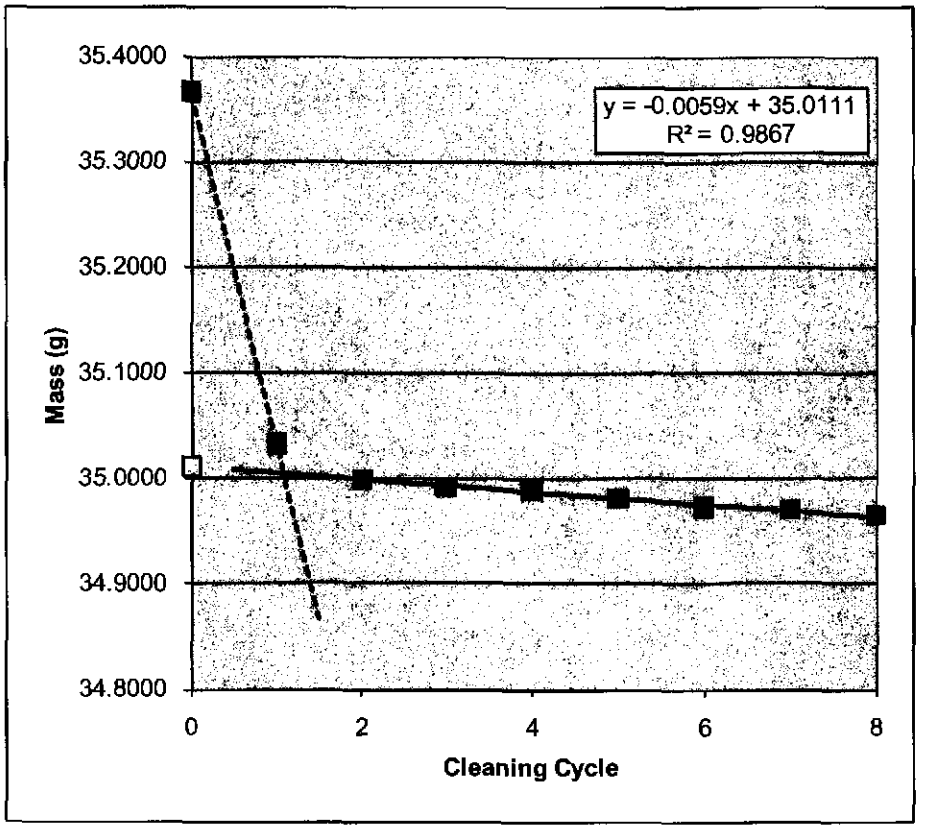
Cleaning Cycle	Wt (g)
0	36.1490
1	35.8585
2	35.7927
3	35.7800
4	35.7767
5	35.7668
6	35.7613
7	35.7550
8	35.7456



Coupon:	L021
Test Matrix:	Pb-Eo-0000-24-3f
Initial wt (g)	35.0101
Removal wt (g)	35.3663

Calculated final wt (g)	35.0111
Total wt loss (g)	-0.001
Total wt loss (mg)	-1.0

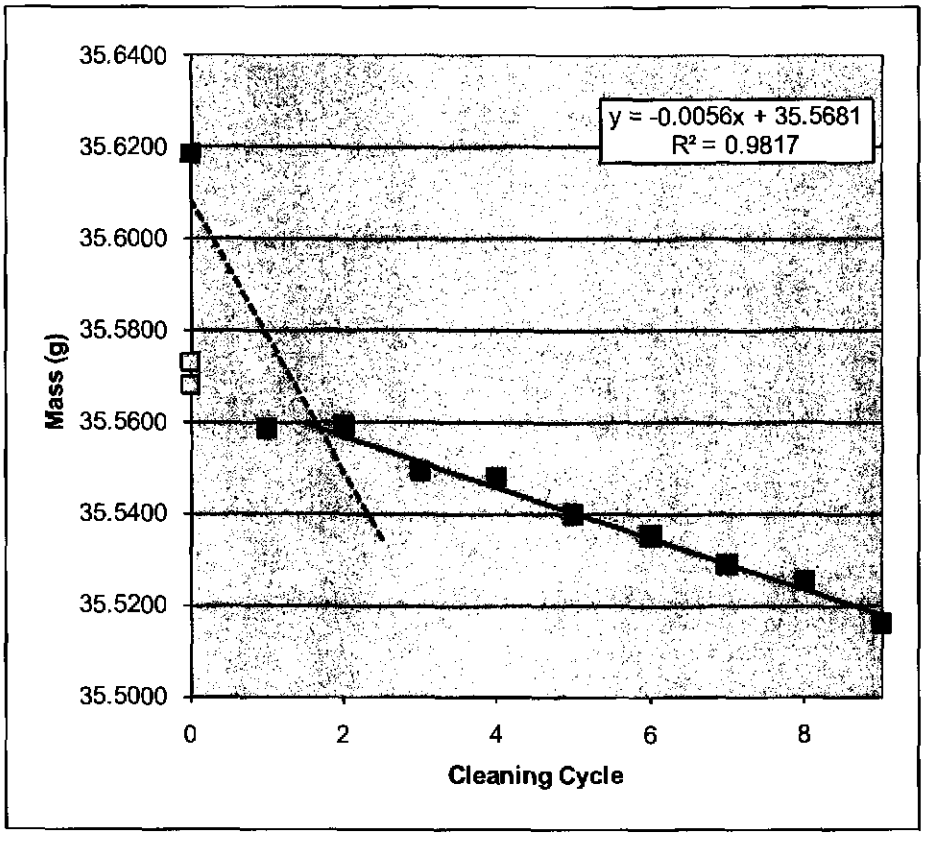
Cleaning Cycle	Wt (g)
0	35.3663
1	35.0331
2	34.9996
3	34.9920
4	34.9897
5	34.9818
6	34.9733
7	34.9700
8	34.9646



Coupon:	L023
Test Matrix:	Pb-Eo-0000-24-2p
Initial wt (g)	35.5732
Removal wt (g)	35.6188

Calculated final wt (g)	35.5681
Total wt loss (g)	0.0051
Total wt loss (mg)	5.1

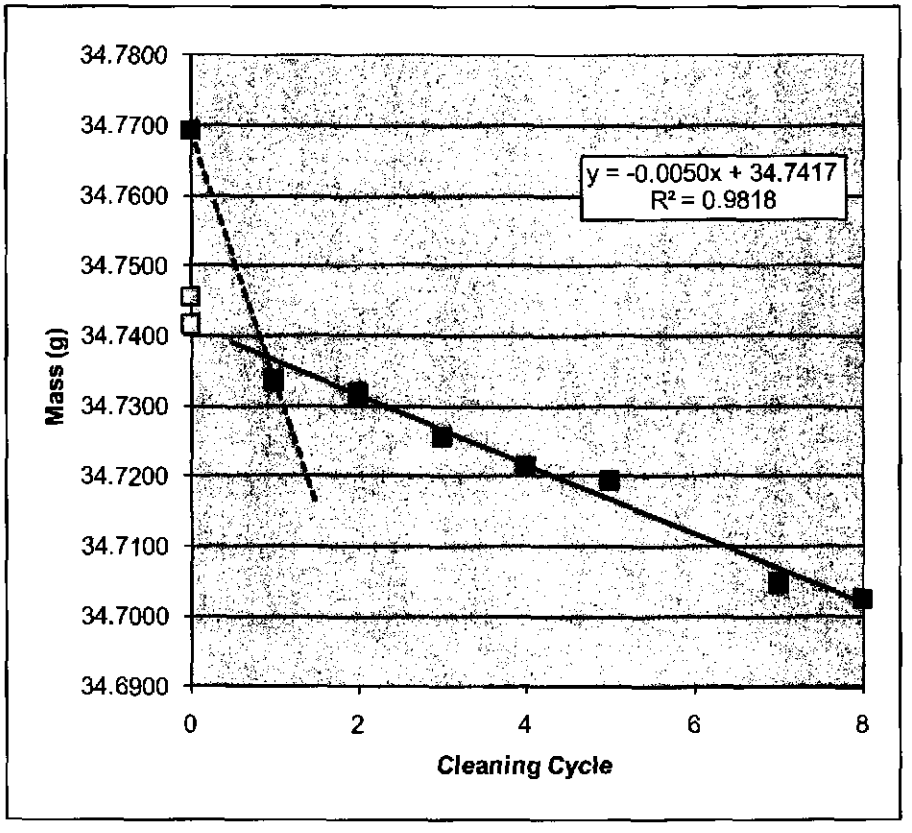
Cleaning Cycle	Wt (g)
0	35.6188
1	35.5587
2	35.5592
3	35.5494
4	35.5480
5	35.5399
6	35.5353
7	35.5291
8	35.5254
9	35.5161



Coupon:	L024		
Test Matrix:	Pb-Eo-0000-24-3p		
Initial wt (g)	34.7456	**Calculated final wt (g)**	34.7417
Removal wt (g)	34.7693	**Total wt loss (g)**	0.0039
		Total wt loss (mg)	3.9

Cleaning Cycle	Wt (g)
0	34.7693
1	34.7338
2	34.7319
3	34.7257
4	34.7215
5	34.7194
6	34.7211
7	34.7049
8	34.7026

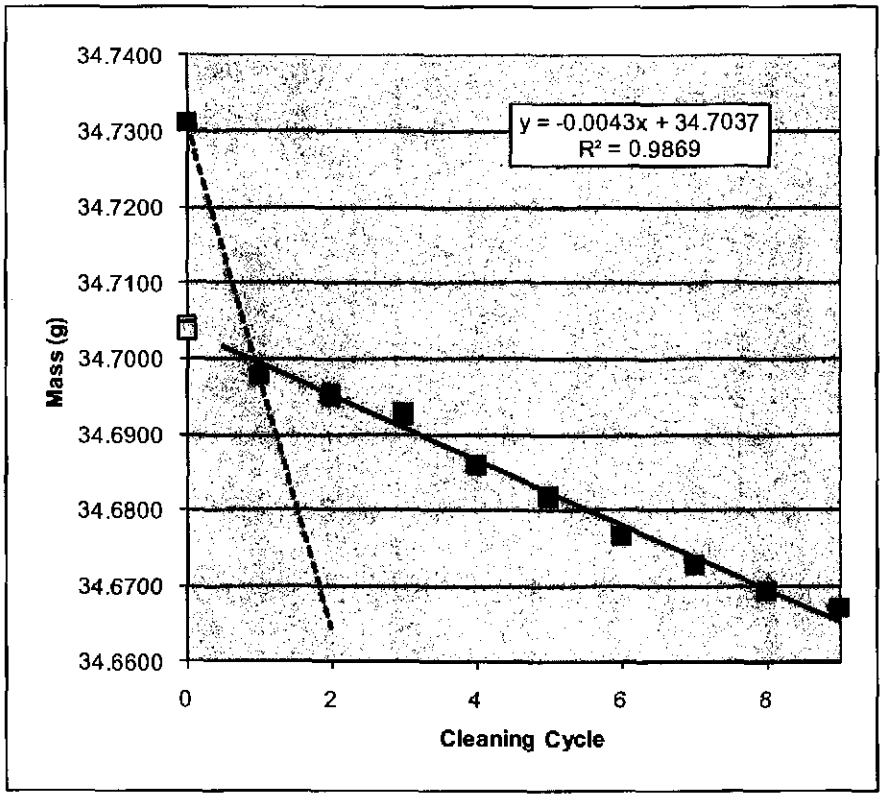
Note: data from cleaning cycle 6 not used in regression



Coupon:	L026
Test Matrix:	Pb-Atm-0000-24-2
Initial wt (g)	34.7043
Removal wt (g)	34.7312

Calculated final wt (g)	34.7037
Total wt loss (g)	0.0006
Total wt loss (mg)	0.6

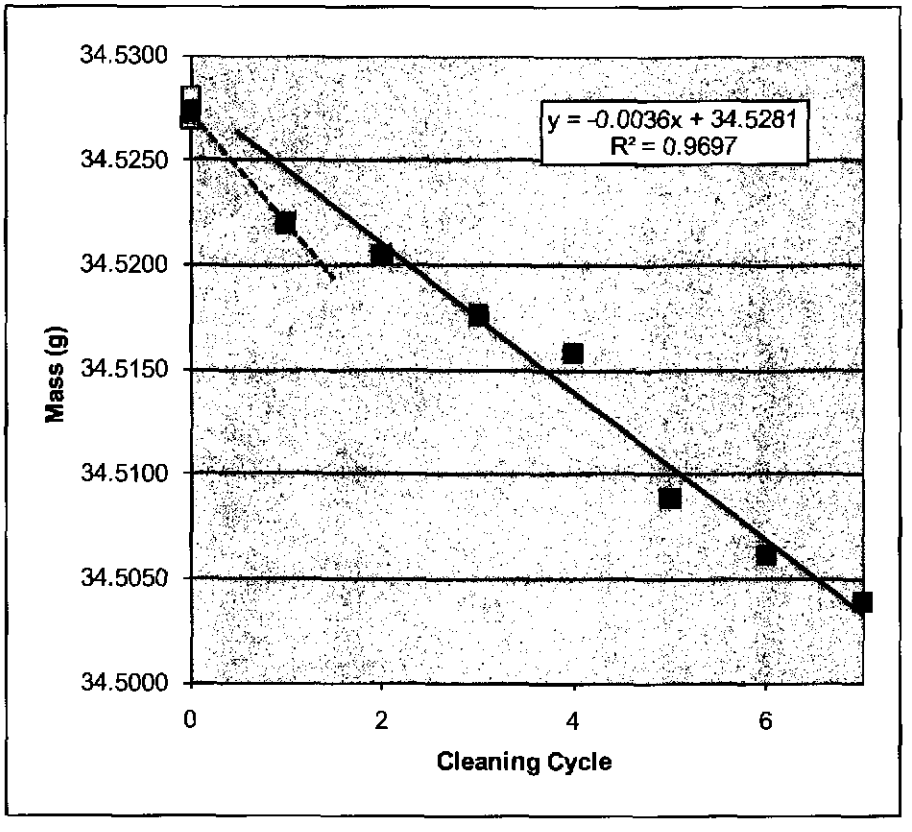
Cleaning Cycle	Wt (g)
0	34.7312
1	34.6979
2	34.6952
3	34.6927
4	34.6860
5	34.6818
6	34.6767
7	34.6729
8	34.6693
9	34.6671



Coupon:	L027
Test Matrix:	Pb-Atm-0000-24-3
Initial wt (g)	34.5269
Removal wt (g)	34.5273

Calculated final wt (g)	34.5281
Total wt loss (g)	-0.0012
Total wt loss (mg)	-1.2

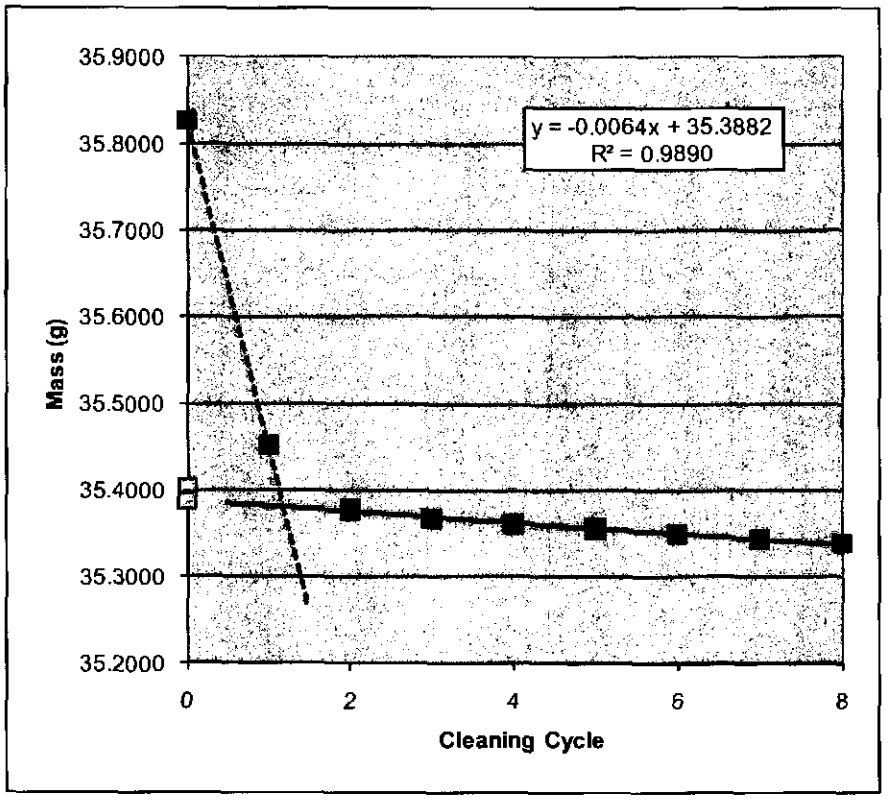
Cleaning Cycle	Wt (g)
0	34.5273
1	34.5220
2	34.5205
3	34.5176
4	34.5158
5	34.5089
6	34.5061
7	34.5039



Coupon:	L137
Test Matrix:	Pb-G-0350-24-2f
Initial wt (g)	35.4022
Removal wt (g)	35.8274

Calculated final wt (g)	35.3882
Total wt loss (g)	0.0140
Total wt loss (mg)	14.0

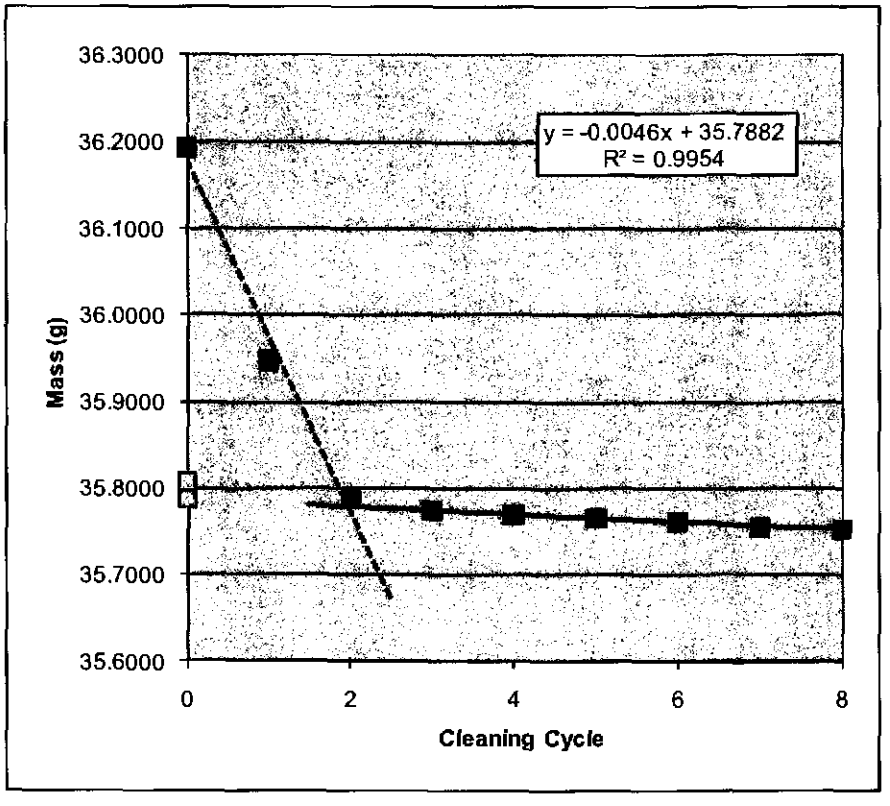
Cleaning Cycle	Wt (g)
0	35.8274
1	35.4510
2	35.3780
3	35.3676
4	35.3614
5	35.3555
6	35.3496
7	35.3438
8	35.3384



Coupon:	L138
Test Matrix:	Pb-G-0350-24-3f
Initial wt (g)	35.8065
Removal wt (g)	36.1930

Calculated final wt (g)	35.7882
Total wt loss (g)	0.0183
Total wt loss (mg)	18.3

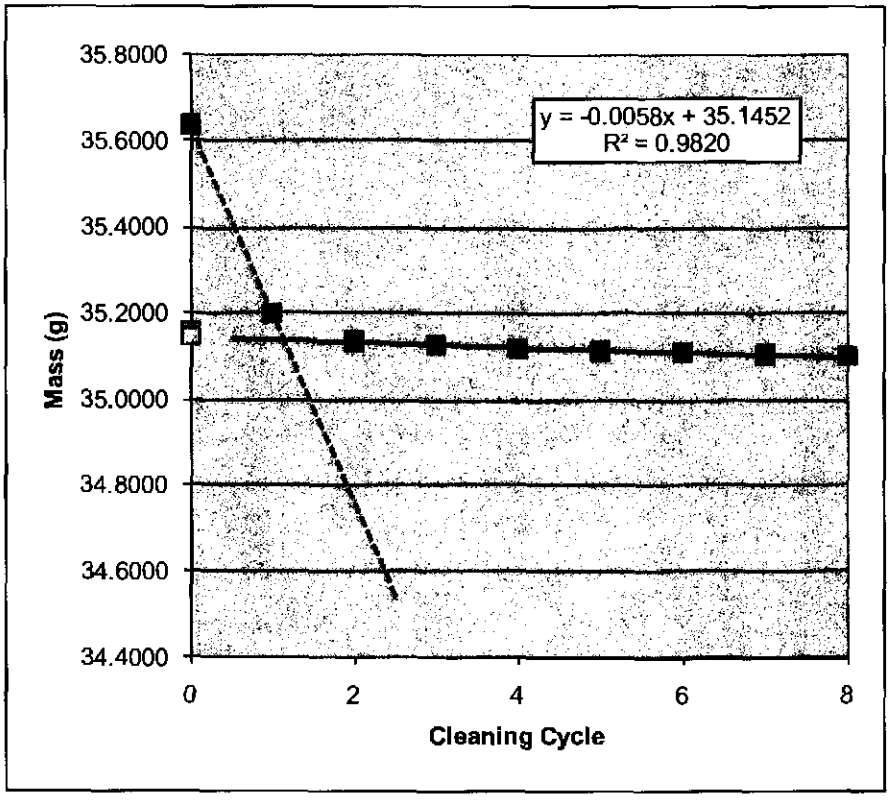
Cleaning Cycle	Wt (g)
0	36.1930
1	35.9481
2	35.7875
3	35.7743
4	35.7703
5	35.7649
6	35.7608
7	35.7551
8	35.7521



Coupon:	L140
Test Matrix:	Pb-G-0350-24-2p
Initial wt (g)	35.1586
Removal wt (g)	35.6371

Calculated final wt (g)	35.1452
Total wt loss (g)	0.0134
Total wt loss (mg)	13.4

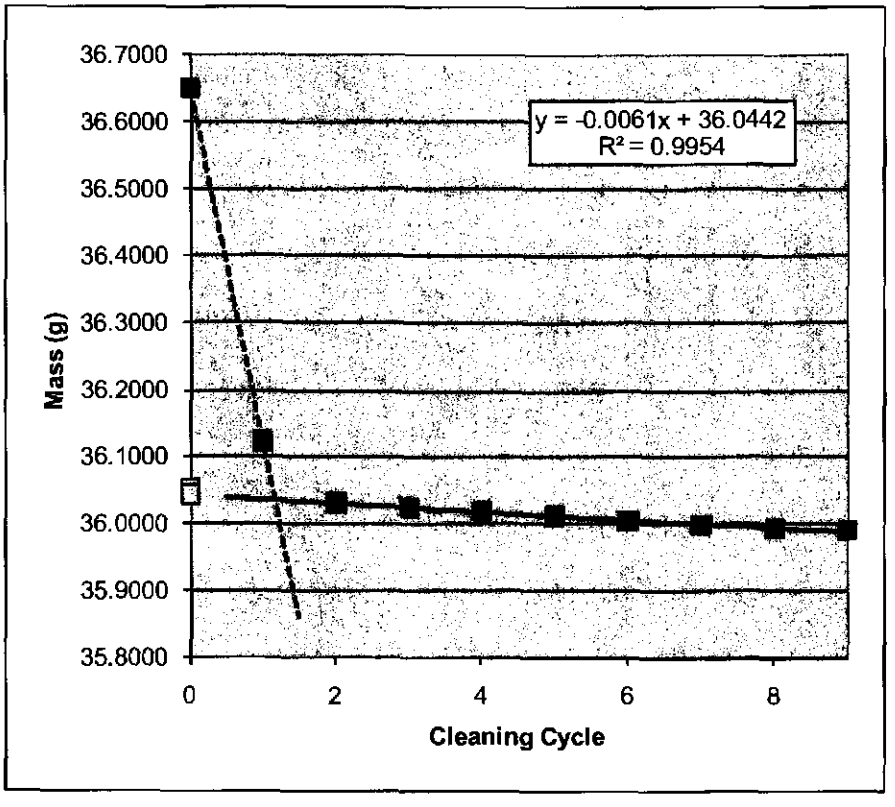
Cleaning Cycle	Wt (g)
0	35.6371
1	35.1997
2	35.1360
3	35.1277
4	35.1207
5	35.1138
6	35.1104
7	35.1047
8	35.1008



Coupon:	L141
Test Matrix:	Pb-G-0350-24-3p
Initial wt (g)	36.0541
Removal wt (g)	36.6505

Calculated final wt (g)	36.0442
Total wt loss (g)	0.0099
Total wt loss (mg)	9.9

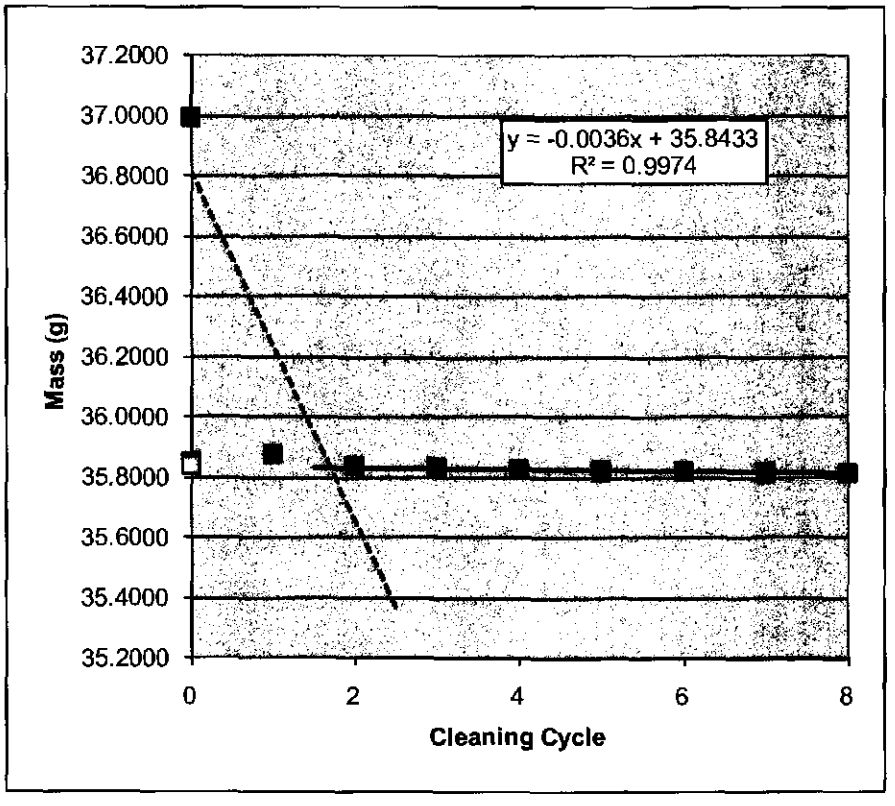
Cleaning Cycle	Wt (g)
0	36.6505
1	36.1246
2	36.0330
3	36.0255
4	36.0199
5	36.0130
6	36.0060
7	36.0000
8	35.9951
9	35.9905



Coupon:	L143
Test Matrix:	Pb-Go-0350-24-2f
Initial wt (g)	35.8544
Removal wt (g)	36.9988

Calculated final wt (g)	35.8433
Total wt loss (g)	0.0111
Total wt loss (mg)	11.1

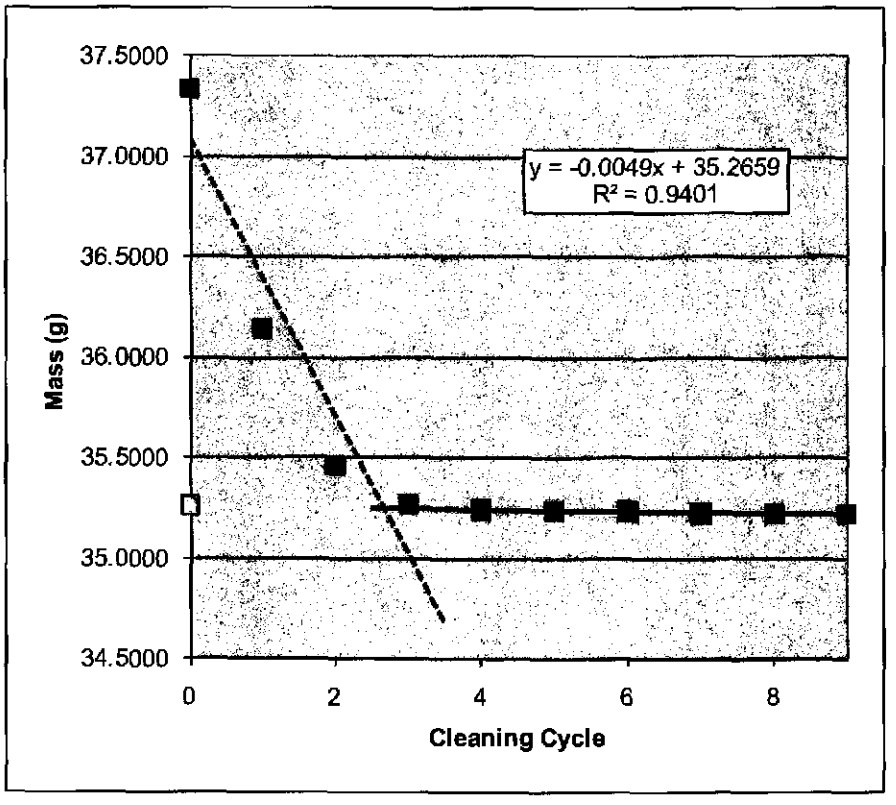
Cleaning Cycle	Wt (g)
0	36.9988
1	35.8803
2	35.8399
3	35.8323
4	35.8290
5	35.8251
6	35.8215
7	35.8186
8	35.8140



Coupon:	L144
Test Matrix:	Pb-Go-0350-24-3f
Initial wt (g)	35.2684
Removal wt (g)	37.3369

Calculated final wt (g)	35.2659
Total wt loss (g)	0.0025
Total wt loss (mg)	2.5

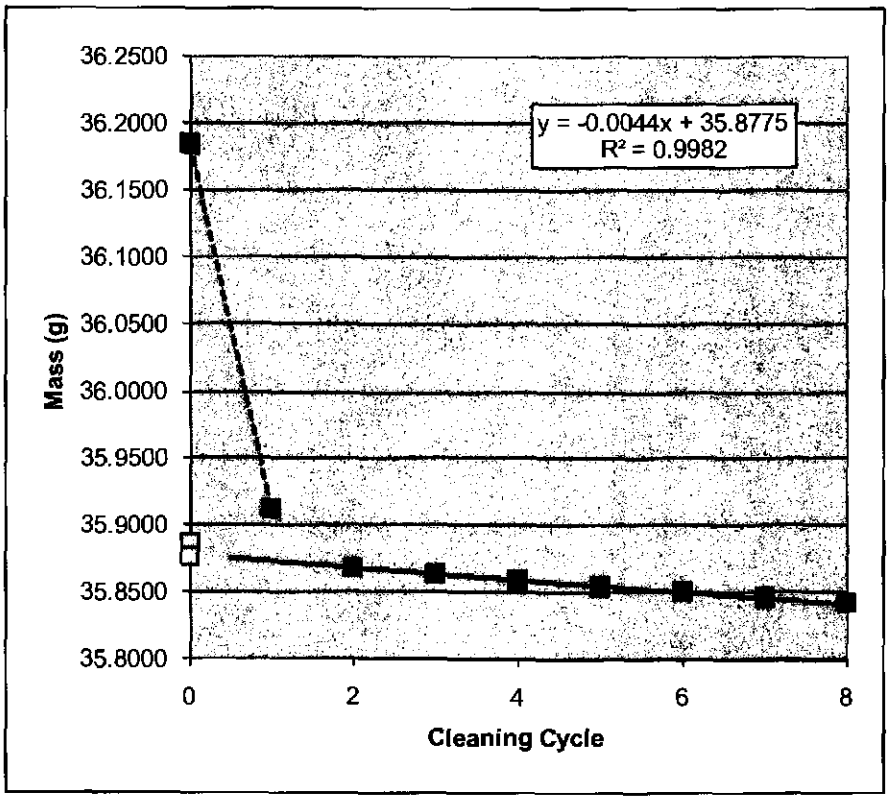
Cleaning Cycle	Wt (g)
0	37.3369
1	36.1502
2	35.4602
3	35.2714
4	35.2466
5	35.2404
6	35.2391
7	35.2286
8	35.2242
9	35.2239



Coupon:	L146
Test Matrix:	Pb-Go-0350-24-2p
Initial wt (g)	35.8863
Removal wt (g)	36.1851

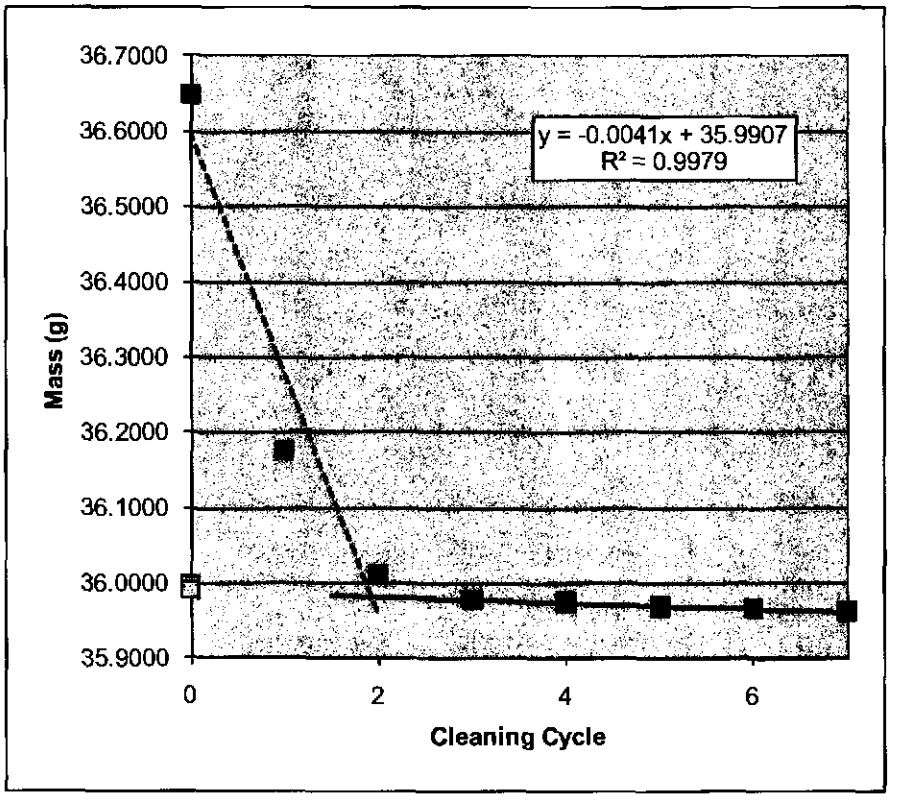
Calculated final wt (g)	35.8775
Total wt loss (g)	0.0088
Total wt loss (mg)	8.8

Cleaning Cycle	Wt (g)
0	36.1851
1	35.9127
2	35.8690
3	35.8644
4	35.8593
5	35.8550
6	35.8514
7	35.8462
8	35.8425



Coupon:	L147		
Test Matrix:	Pb-Go-0350-24-3p		
Initial wt (g)	35.9994	**Calculated final wt (g)**	35.9907
Removal wt (g)	36.6499	**Total wt loss (g)**	0.0087
		Total wt loss (mg)	8.7

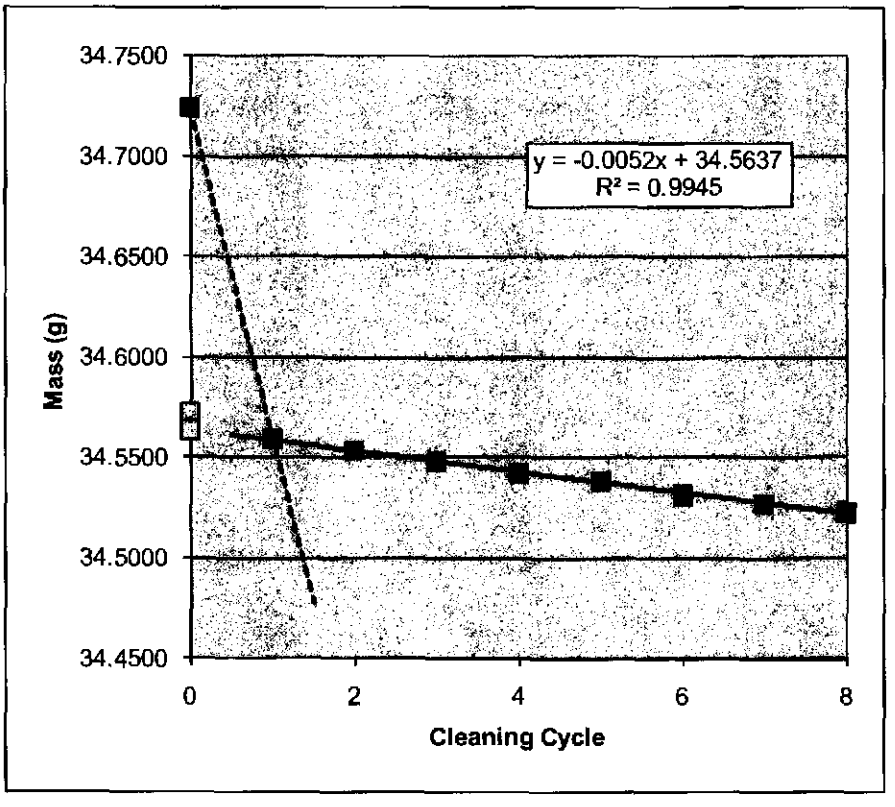
Cleaning Cycle	Wt (g)
0	36.6499
1	36.1775
2	36.0121
3	35.9785
4	35.9745
5	35.9698
6	35.9665
7	35.9621



Coupon:	L149
Test Matrix:	Pb-E-0350-24-2f
Initial wt (g)	34.5729
Removal wt (g)	34.7244

Calculated final wt (g)	34.5637
Total wt loss (g)	0.0092
Total wt loss (mg)	9.2

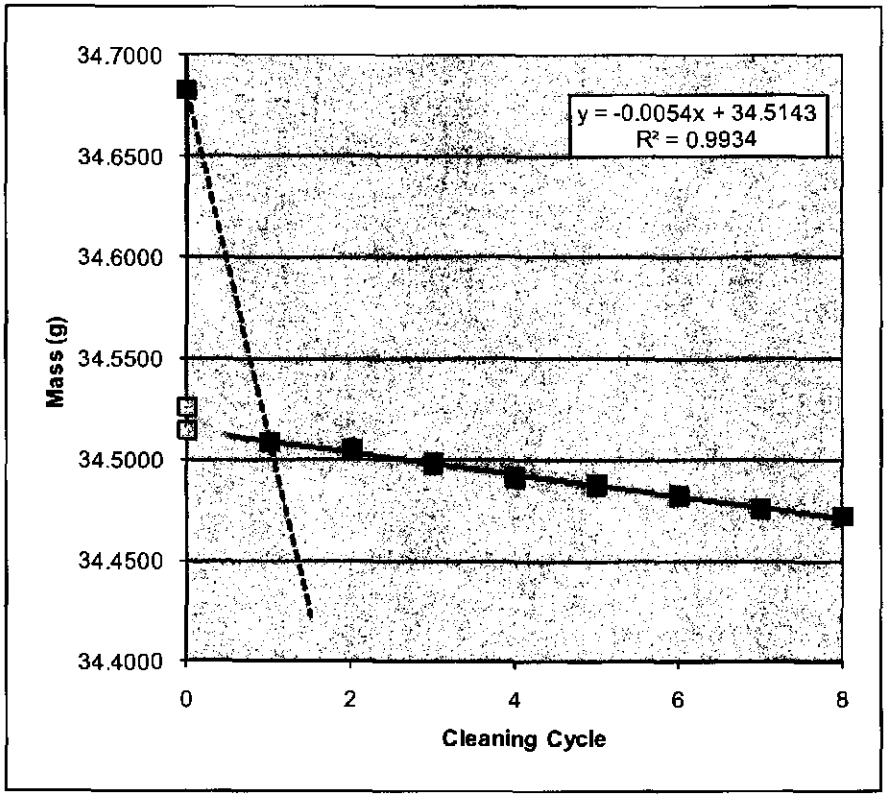
Cleaning Cycle	Wt (g)
0	34.7244
1	34.5597
2	34.5540
3	34.5478
4	34.5422
5	34.5388
6	34.5313
7	34.5274
8	34.5228



Coupon:	L150
Test Matrix:	Pb-E-0350-24-3f
Initial wt (g)	34.5257
Removal wt (g)	34.6827

Calculated final wt (g)	34.5143
Total wt loss (g)	0.0114
Total wt loss (mg)	11.4

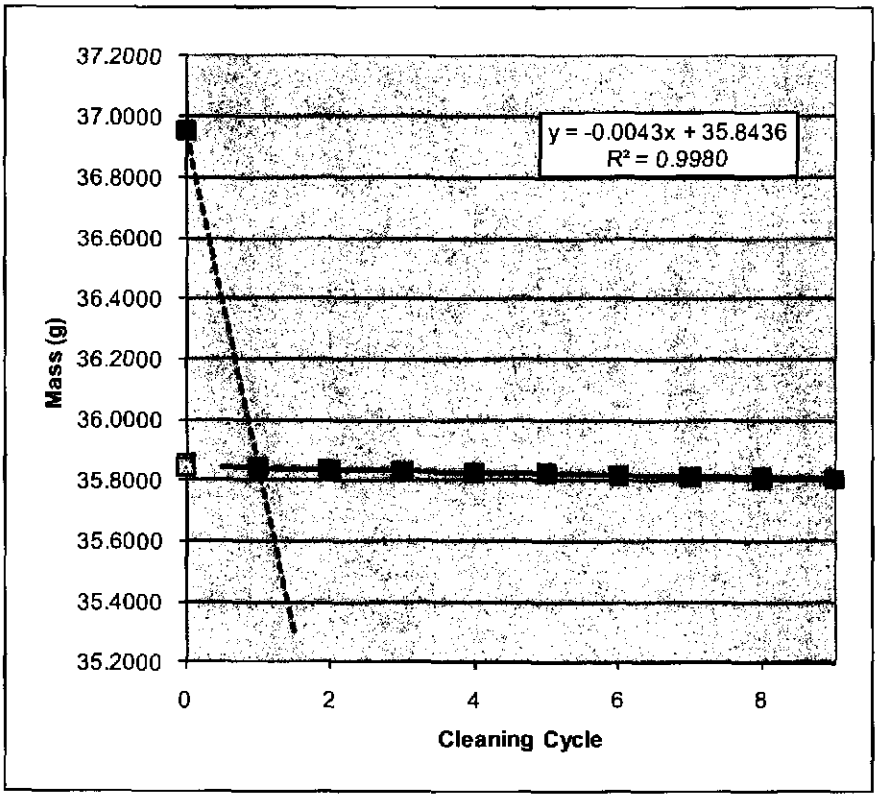
Cleaning Cycle	**Wt (g)**
0	34.6827
1	34.5091
2	34.5047
3	34.4978
4	34.4912
5	34.4875
6	34.4826
7	34.4758
8	34.4719



Coupon:	L152
Test Matrix:	Pb-E-0350-24-2p
Initial wt (g)	35.8550
Removal wt (g)	36.9522

Calculated final wt (g)	35.8436
Total wt loss (g)	0.0114
Total wt loss (mg)	11.4

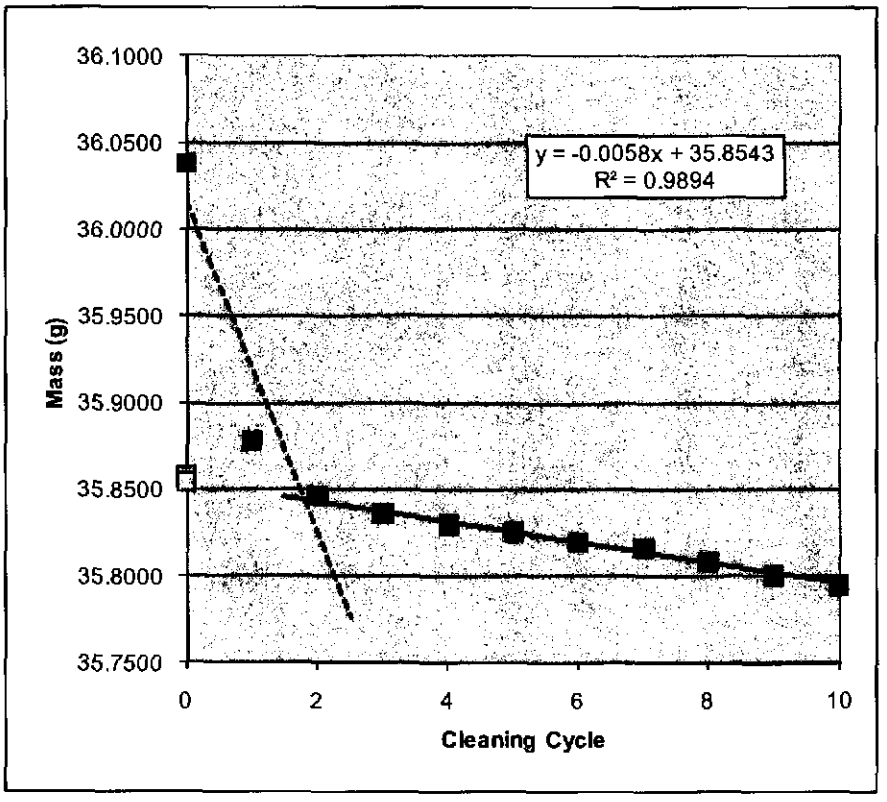
Cleaning Cycle	Wt (g)
0	36.9522
1	35.8419
2	35.8348
3	35.8303
4	35.8266
5	35.8227
6	35.8188
7	35.8138
8	35.8093
9	35.8046



Coupon:	L153
Test Matrix:	Pb-E-0350-24-3p
Initial wt (g)	35.8579
Removal wt (g)	36.0379

Calculated final wt (g)	35.8543
Total wt loss (g)	0.0036
Total wt loss (mg)	3.6

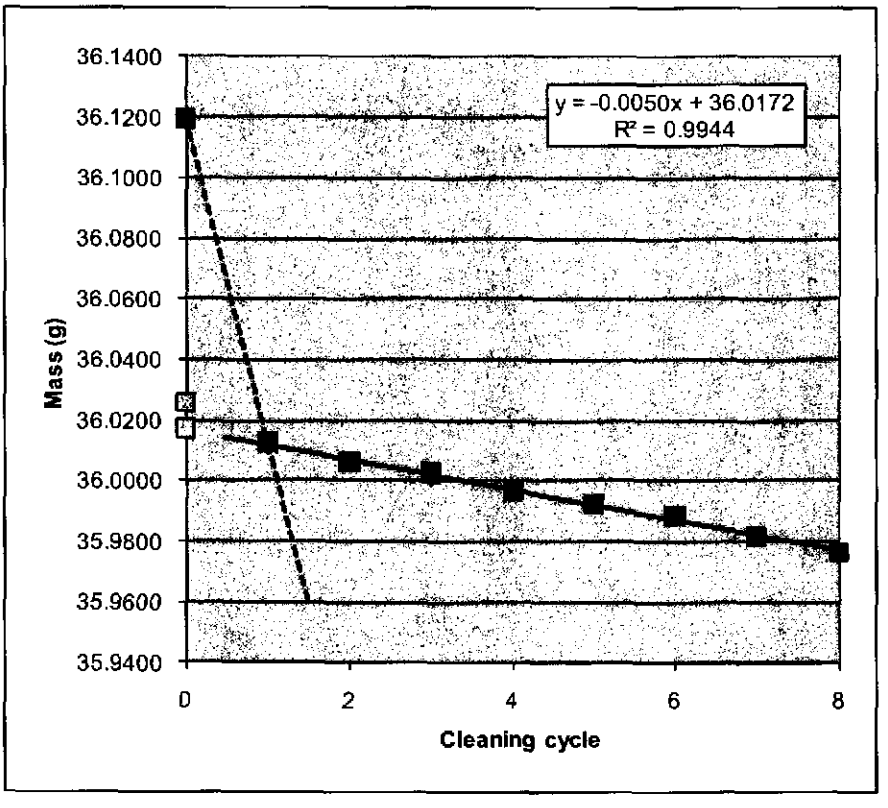
Cleaning Cycle	Wt (g)
0	36.0379
1	35.8782
2	35.8462
3	35.8358
4	35.8299
5	35.8256
6	35.8197
7	35.8163
8	35.8085
9	35.8001
10	35.7949



Coupon:	L155
Test Matrix:	Pb-Eo-0350-24-2f
Initial wt (g)	36.0256
Removal wt (g)	36.1196

Calculated final wt (g)	36.0172
Total wt loss (g)	0.0084
Total wt loss (mg)	8.4

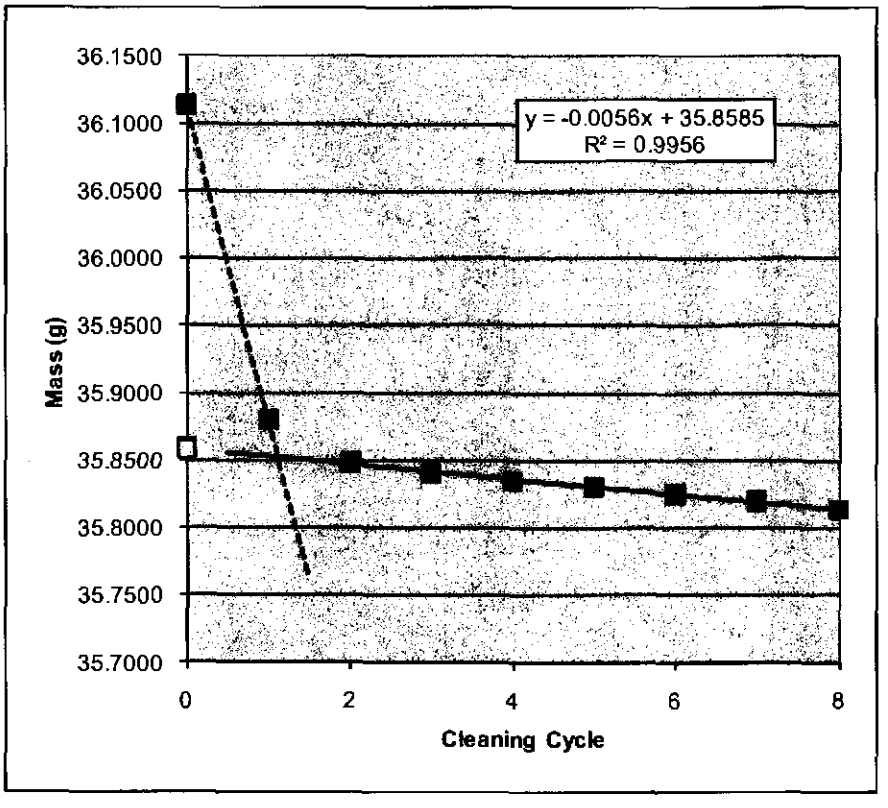
Cleaning Cycle	Wt (g)
0	36.1196
1	36.0129
2	36.0063
3	36.0028
4	35.9971
5	35.9922
6	35.9886
7	35.9816
8	35.9765



Coupon:	L156
Test Matrix:	Pb-Eo-0350-24-3f
Initial wt (g)	35.8608
Removal wt (g)	36.1138

Calculated final wt (g)	35.8585
Total wt loss (g)	0.0023
Total wt loss (mg)	2.3

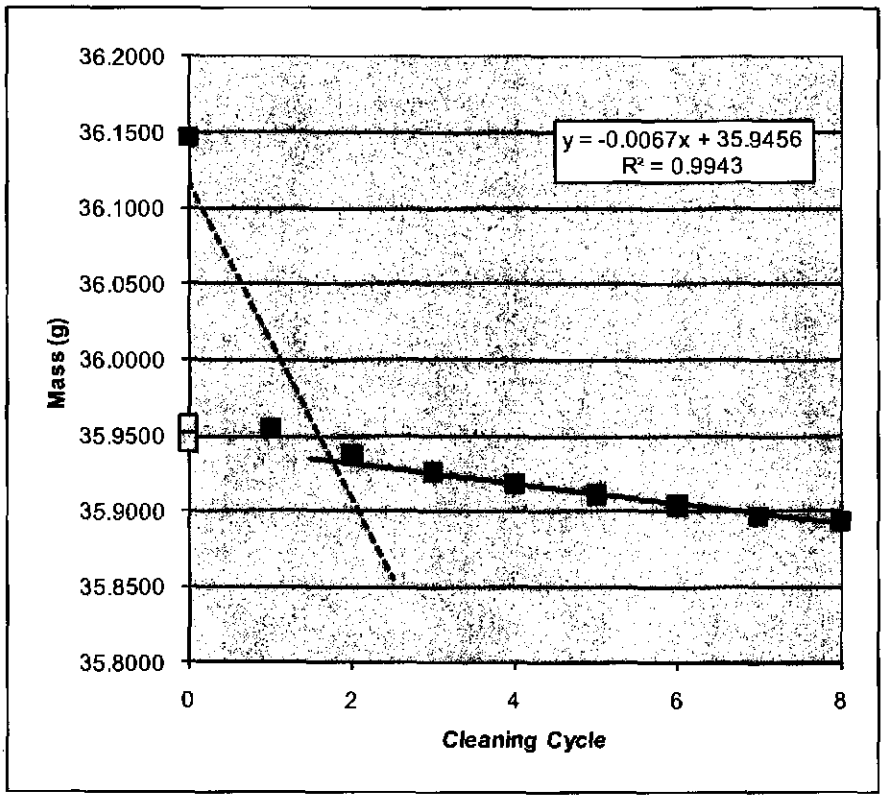
Cleaning Cycle	Wt (g)
0	36.1138
1	35.8800
2	35.8483
3	35.8410
4	35.8353
5	35.8303
6	35.8258
7	35.8201
8	35.8132



Coupon:	L158
Test Matrix:	Pb-Eo-0350-24-2p
Initial wt (g)	35.9581
Removal wt (g)	36.1466

Calculated final wt (g)	35.9456
Total wt loss (g)	0.0125
Total wt loss (mg)	12.5

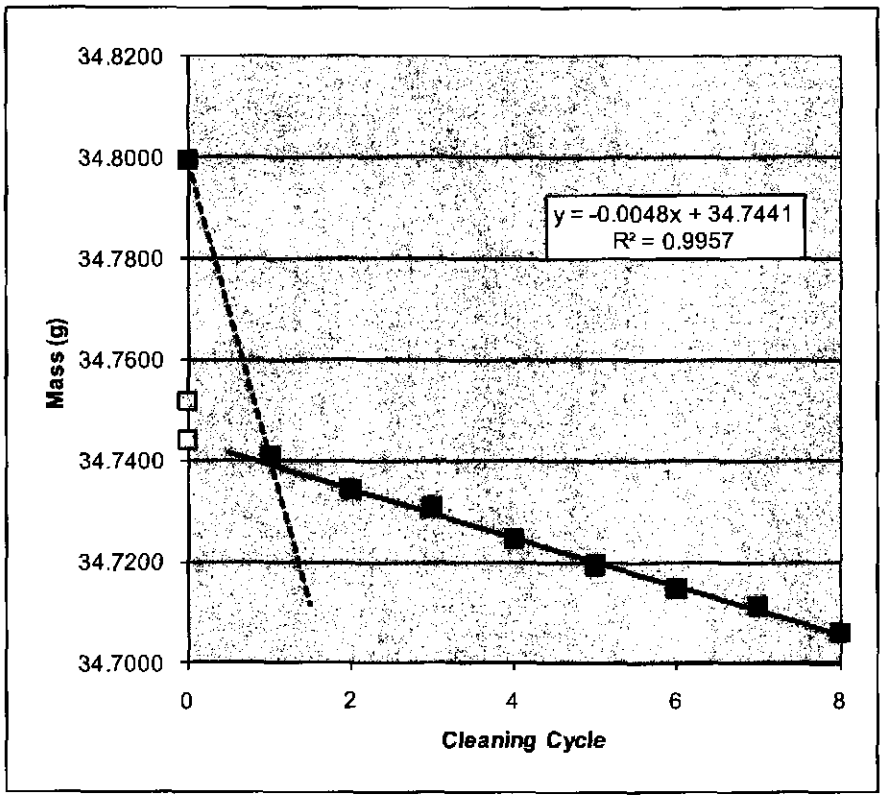
Cleaning Cycle	Wt (g)
0	36.1466
1	35.9551
2	35.9374
3	35.9260
4	35.9188
5	35.9117
6	35.9043
7	35.8974
8	35.8932



Coupon:	L159
Test Matrix:	Pb-Eo-0350-24-3p
Initial wt (g)	34.7519
Removal wt (g)	34.7995

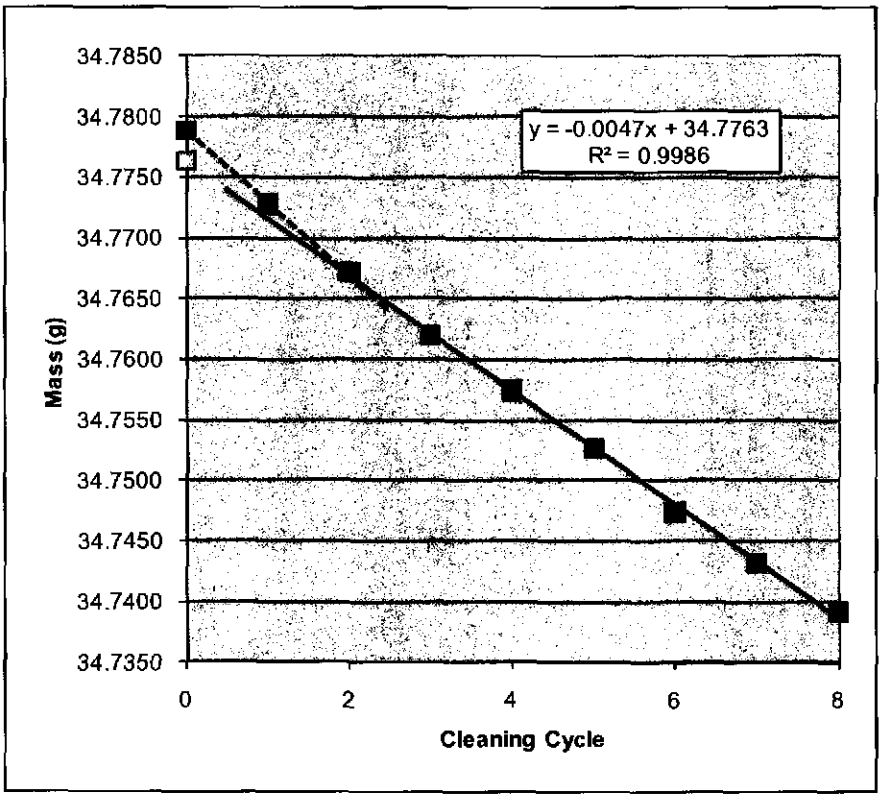
Calculated final wt (g)	34.7441
Total wt loss (g)	0.0078
Total wt loss (mg)	7.8

Cleaning Cycle	Wt (g)
0	34.7995
1	34.7410
2	34.7344
3	34.7308
4	34.7245
5	34.7195
6	34.7147
7	34.7113
8	34.7060



Coupon:	L161		
Test Matrix:	Pb-Atm-0350-24-2		
Initial wt (g)	34.7789	**Calculated final wt (g)**	34.7763
Removal wt (g)	34.7788	**Total wt loss (g)**	0.0026
		Total wt loss (mg)	2.6

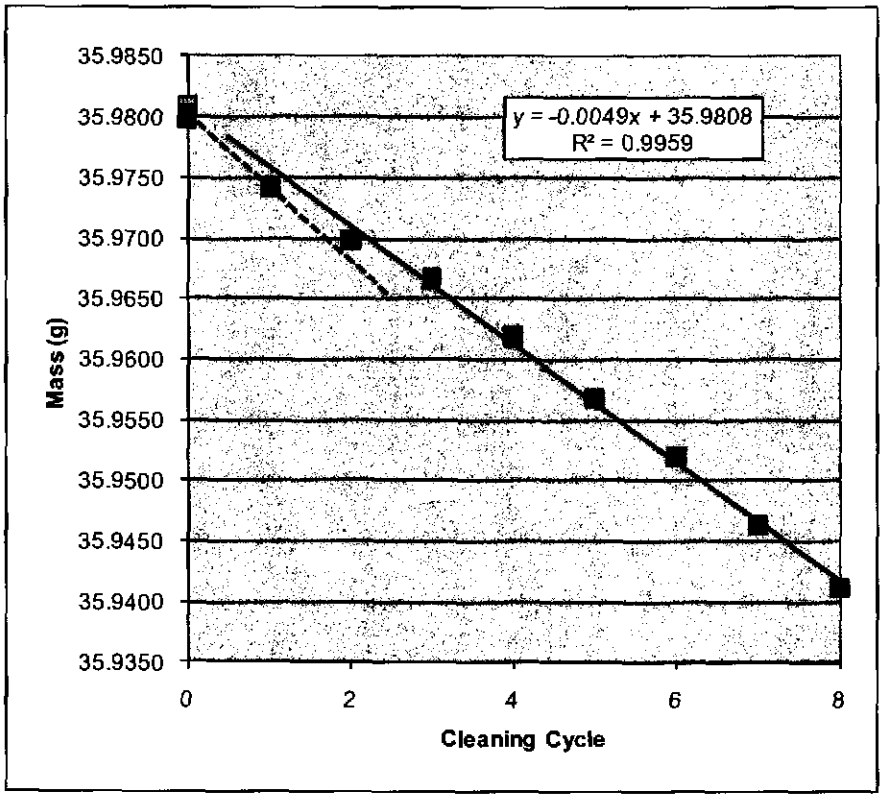
Cleaning Cycle	Wt (g)
0	34.7788
1	34.7728
2	34.7672
3	34.7620
4	34.7575
5	34.7527
6	34.7474
7	34.7432
8	34.7392



Coupon:	L162
Test Matrix:	Pb-Atm-0350-24-3
Initial wt (g)	35.9799
Removal wt (g)	35.9802

Calculated final wt (g)	35.9808
Total wt loss (g)	-0.0009
Total wt loss (mg)	-0.9

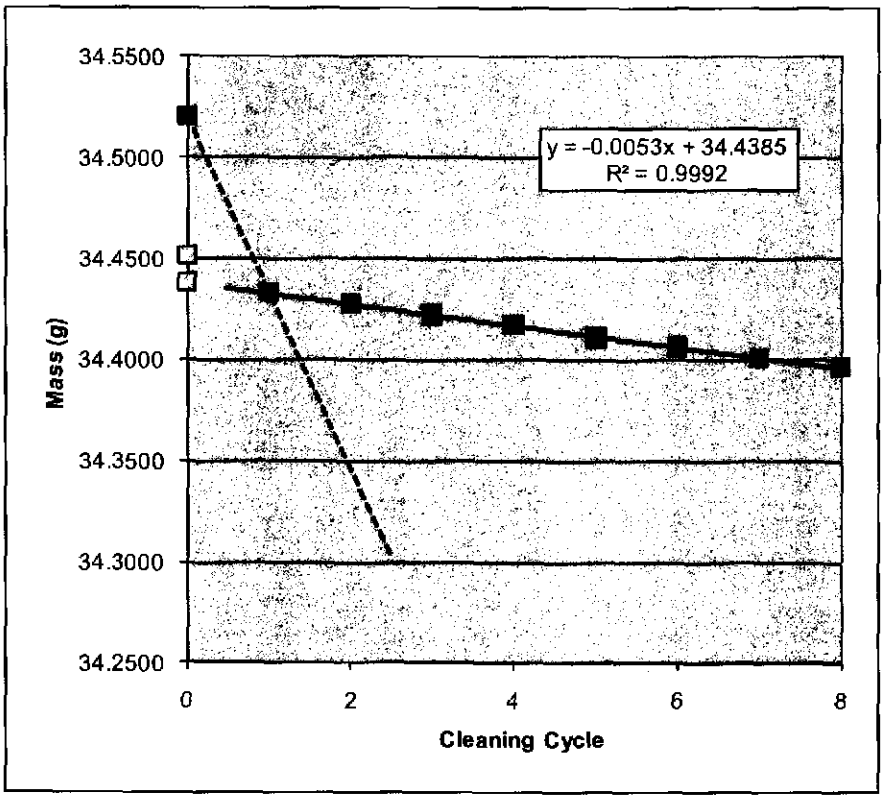
Cleaning Cycle	Wt (g)
0	35.9802
1	35.9742
2	35.9699
3	35.9666
4	35.9619
5	35.9568
6	35.9520
7	35.9464
8	35.9411



Coupon:	L218
Test Matrix:	Pb-G-1500-24-2f
Initial wt (g)	34.4518
Removal wt (g)	34.5204

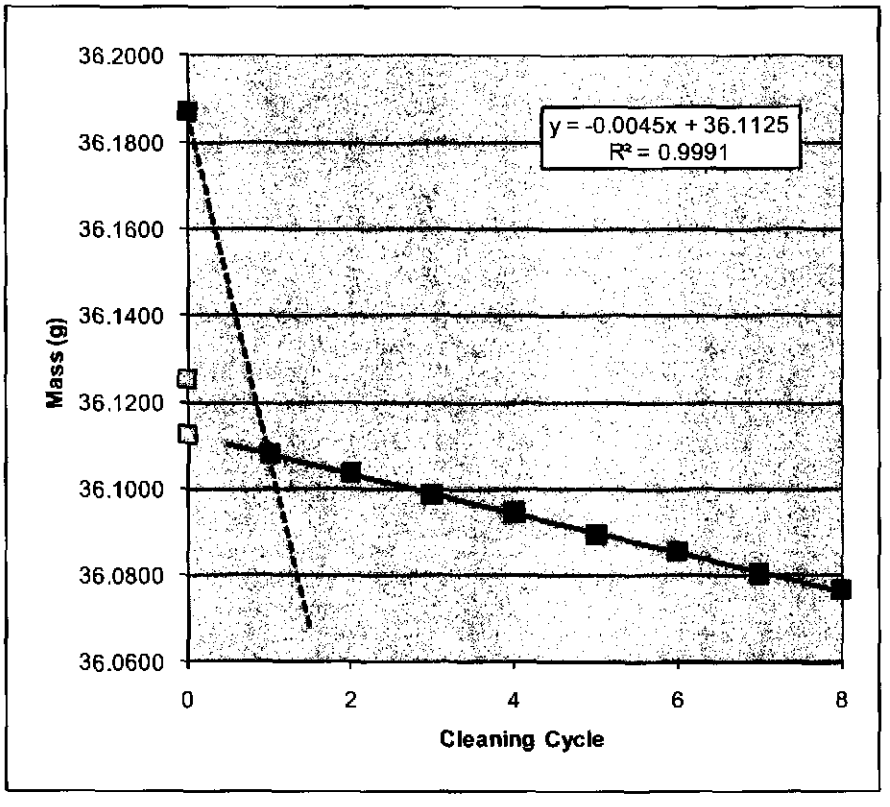
Calculated final wt (g)	34.4385
Total wt loss (g)	0.0133
Total wt loss (mg)	13.3

Cleaning Cycle	Wt (g)
0	34.5204
1	34.4334
2	34.4282
3	34.4228
4	34.4172
5	34.4115
6	34.4065
7	34.4017
8	34.3965



Coupon:	L219		
Test Matrix:	Pb-G-1500-24-3f		
Initial wt (g)	36.1254	**Calculated final wt (g)**	36.1125
Removal wt (g)	36.1871	**Total wt loss (g)**	0.0129
		Total wt loss (mg)	12.9

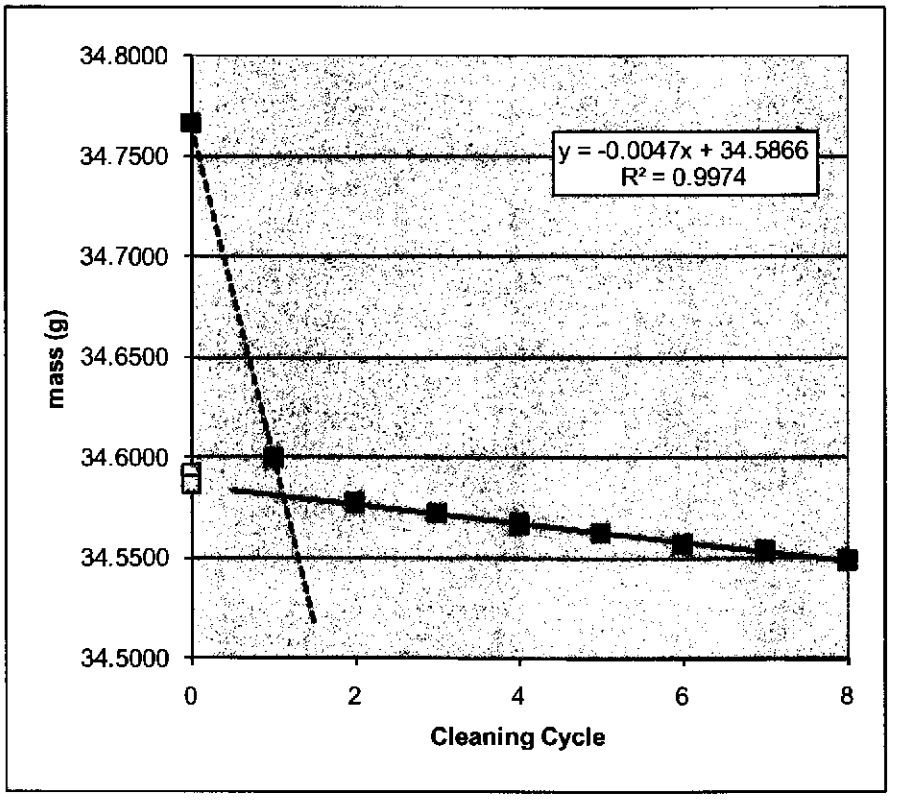
Cleaning Cycle	Wt (g)
0	36.1871
1	36.1081
2	36.1037
3	36.0989
4	36.0946
5	36.0896
6	36.0855
7	36.0806
8	36.0769



Coupon:	L221
Test Matrix:	Pb-G-1500-24-2p
Initial wt (g)	34.5919
Removal wt (g)	34.7666

Calculated final wt (g)	34.5866
Total wt loss (g)	0.0053
Total wt loss (mg)	5.3

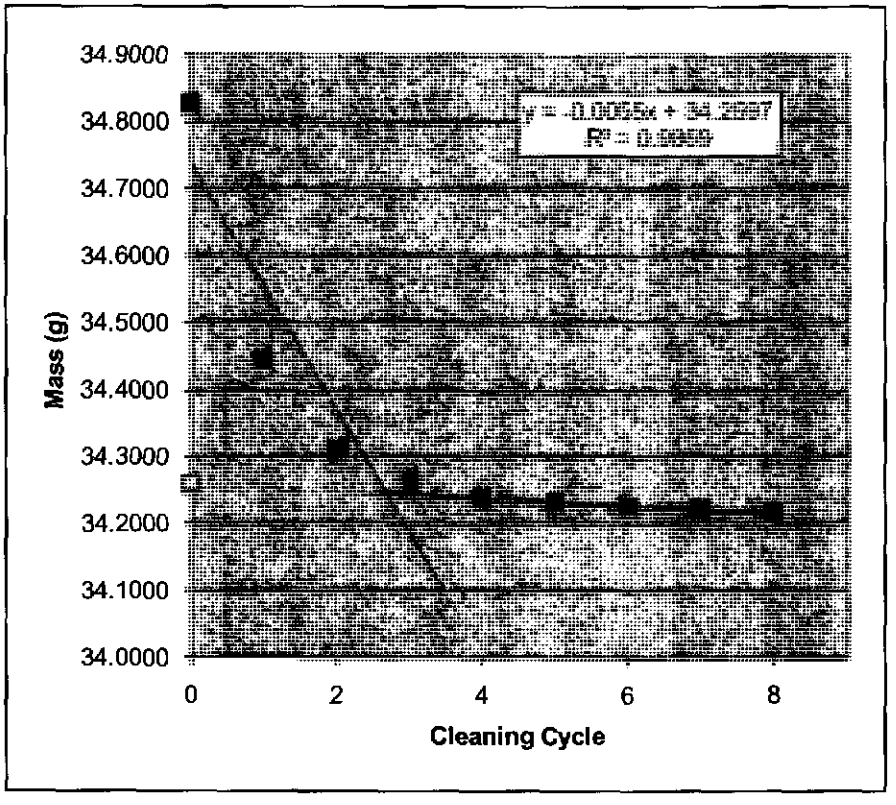
Cleaning Cycle	Wt (g)
0	34.7666
1	34.5997
2	34.5777
3	34.5723
4	34.5670
5	34.5631
6	34.5574
7	34.5537
8	34.5491



Coupon:	L222
Test Matrix:	Pb-G-1500-24-3p
Initial wt (g)	34.2593
Removal wt (g)	34.8276

Calculated final wt (g)	34.2597
Total wt loss (g)	-0.0004
Total wt loss (mg)	-0.4

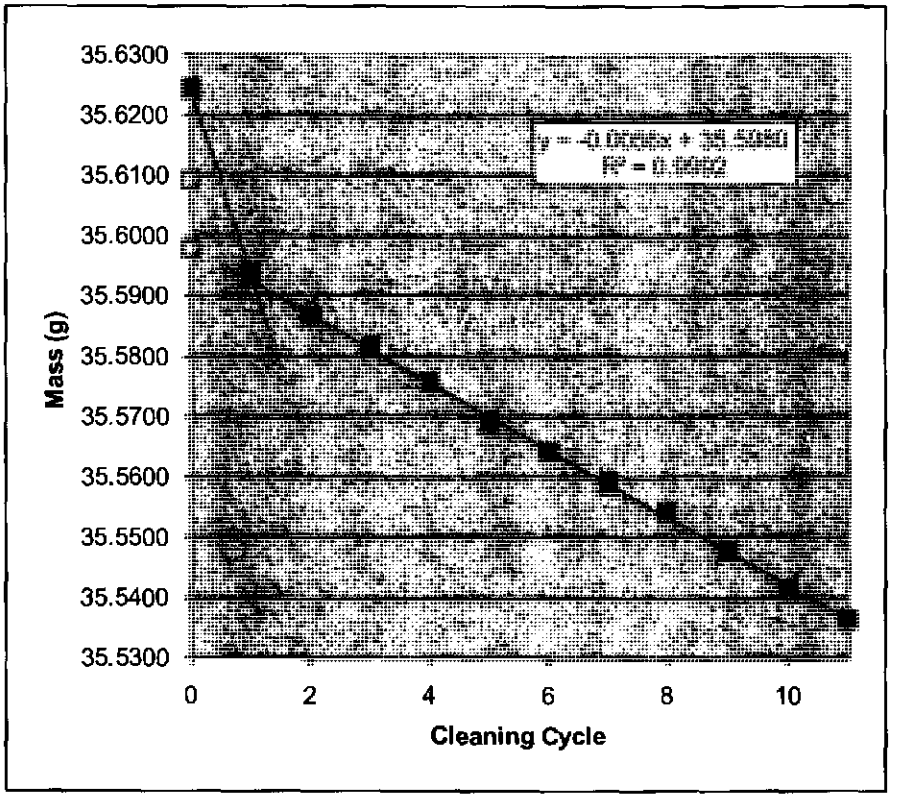
Cleaning Cycle	Wt (g)
0	34.8276
1	34.4461
2	34.3087
3	34.2619
4	34.2388
5	34.2312
6	34.2254
7	34.2212
8	34.2162



Coupon:	L224
Test Matrix:	Pb-Go-1500-24-2f
Initial wt (g)	35.6093
Removal wt (g)	35.6244

Calculated final wt (g)	35.5980
Total wt loss (g)	0.0113
Total wt loss (mg)	11.3

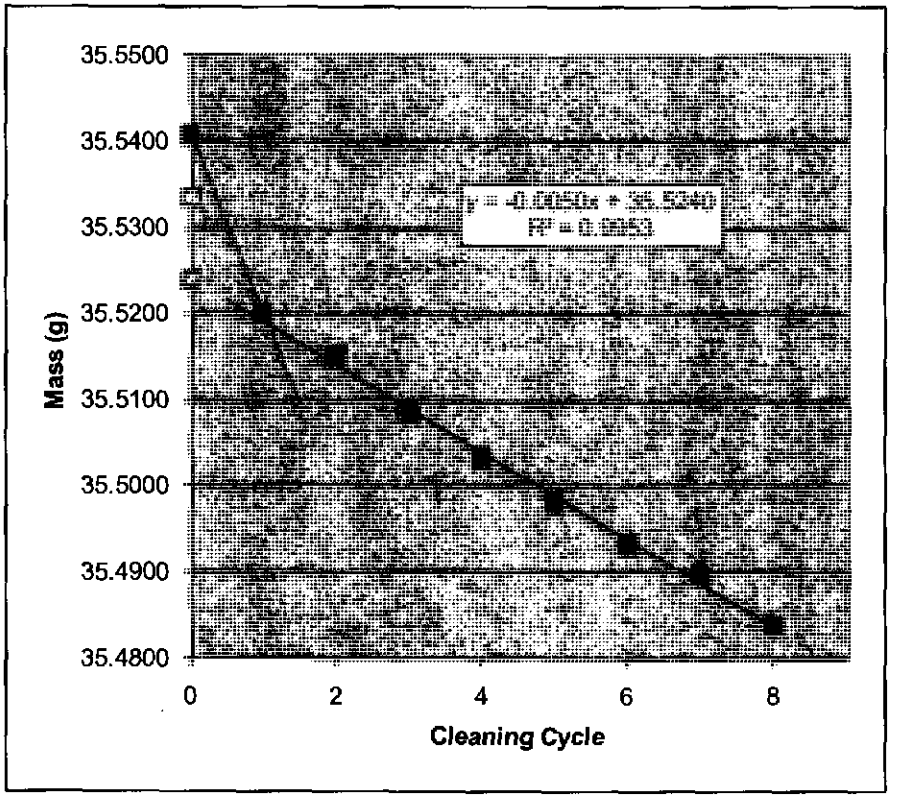
Cleaning Cycle	Wt (g)
0	35.6244
1	35.5937
2	35.5868
3	35.5813
4	35.5757
5	35.5692
6	35.5642
7	35.5591
8	35.5541
9	35.5478
10	35.5414
11	35.5364



Coupon:	L225
Test Matrix:	Pb-Go-1500-24-3f
Initial wt (g)	35.5335
Removal wt (g)	35.5408

Calculated final wt (g)	35.5240
Total wt loss (g)	0.0095
Total wt loss (mg)	9.5

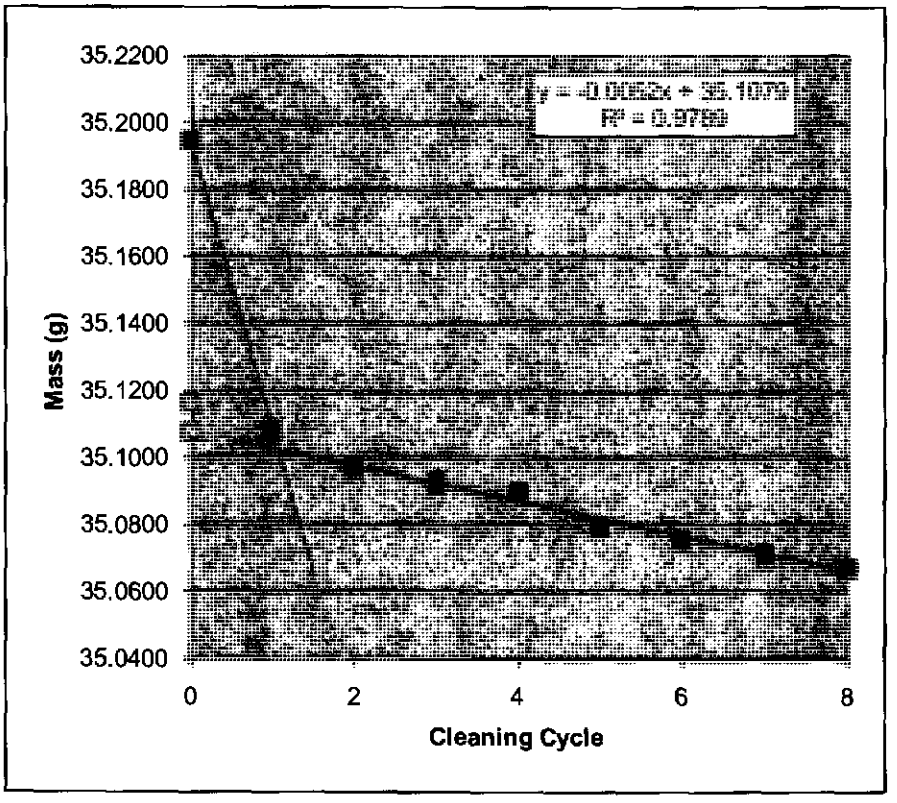
Cleaning Cycle	Wt (g)
0	35.5408
1	35.5200
2	35.5150
3	35.5084
4	35.5032
5	35.4981
6	35.4932
7	35.4896
8	35.4838



Coupon:	L227
Test Matrix:	Pb-Go-1500-24-2p
Initial wt (g)	35.1164
Removal wt (g)	35.1948

Calculated final wt (g)	35.1079
Total wt loss (g)	0.0085
Total wt loss (mg)	8.5

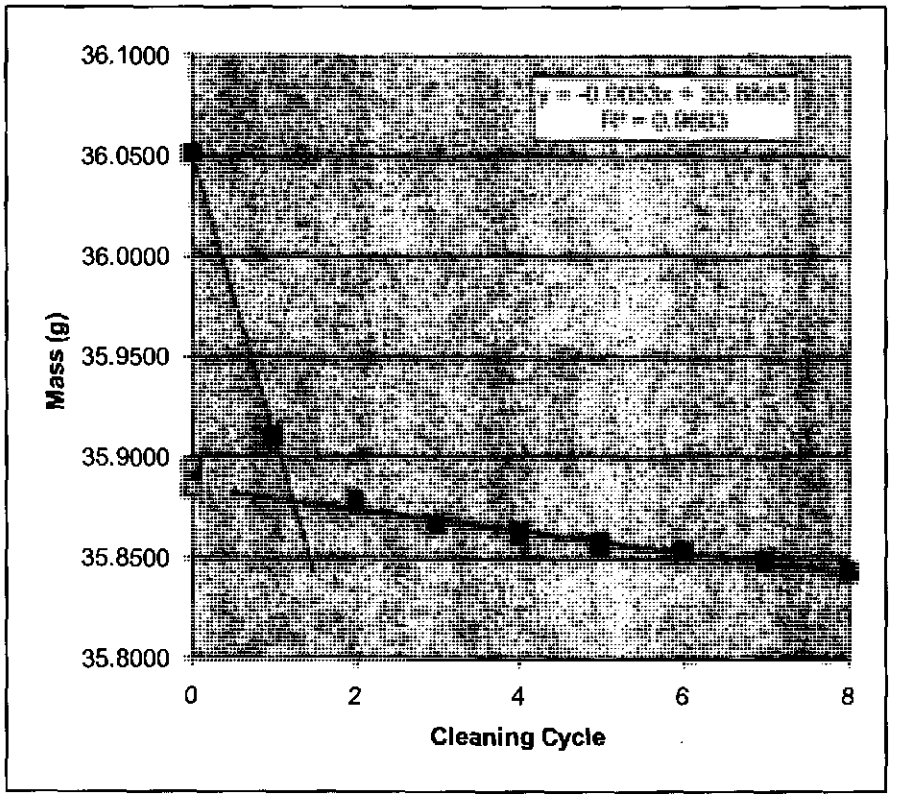
Cleaning Cycle	Wt (g)
0	35.1948
1	35.1078
2	35.0970
3	35.0923
4	35.0899
5	35.0794
6	35.0756
7	35.0711
8	35.0672



Coupon:	L228
Test Matrix:	Pb-Go-1500-24-3p
Initial wt (g)	35.8951
Removal wt (g)	36.0513

Calculated final wt (g)	35.8845
Total wt loss (g)	0.0106
Total wt loss (mg)	10.6

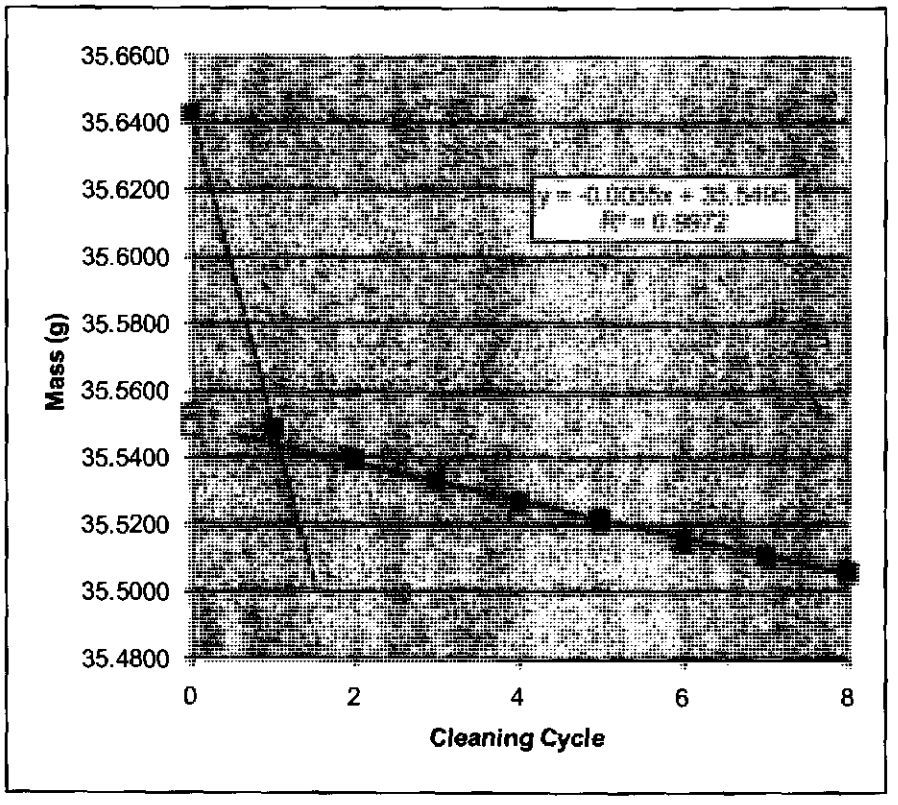
Cleaning Cycle	Wt (g)
0	36.0513
1	35.9107
2	35.8776
3	35.8665
4	35.8616
5	35.8566
6	35.8527
7	35.8484
8	35.8434



Coupon:	L230
Test Matrix:	Pb-E-1500-24-2f
Initial wt (g)	35.5537
Removal wt (g)	35.6427

Calculated final wt (g)	35.5495
Total wt loss (g)	0.0042
Total wt loss (mg)	4.2

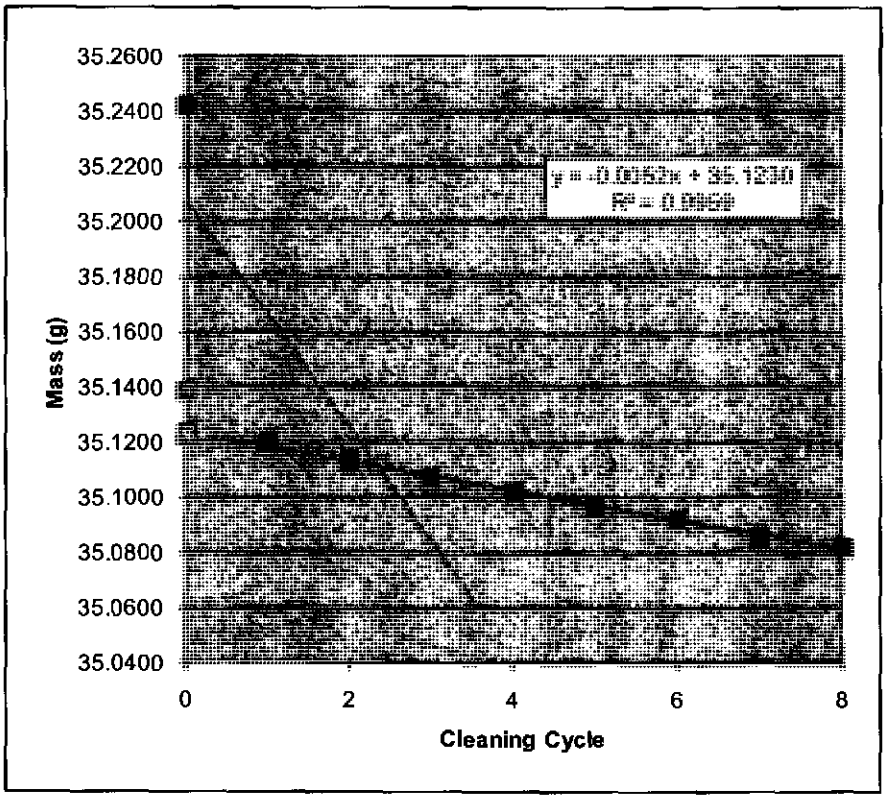
Cleaning Cycle	Wt (g)
0	35.6427
1	35.5492
2	35.5393
3	35.5331
4	35.5266
5	35.5214
6	35.5158
7	35.5110
8	35.5060



Coupon:	L231
Test Matrix:	*Pb-E-1500-24-3f*
Initial wt (g)	35.1384
Removal wt (g)	35.2419

Calculated final wt (g)	35.1230
Total wt loss (g)	0.0154
Total wt loss (mg)	15.4

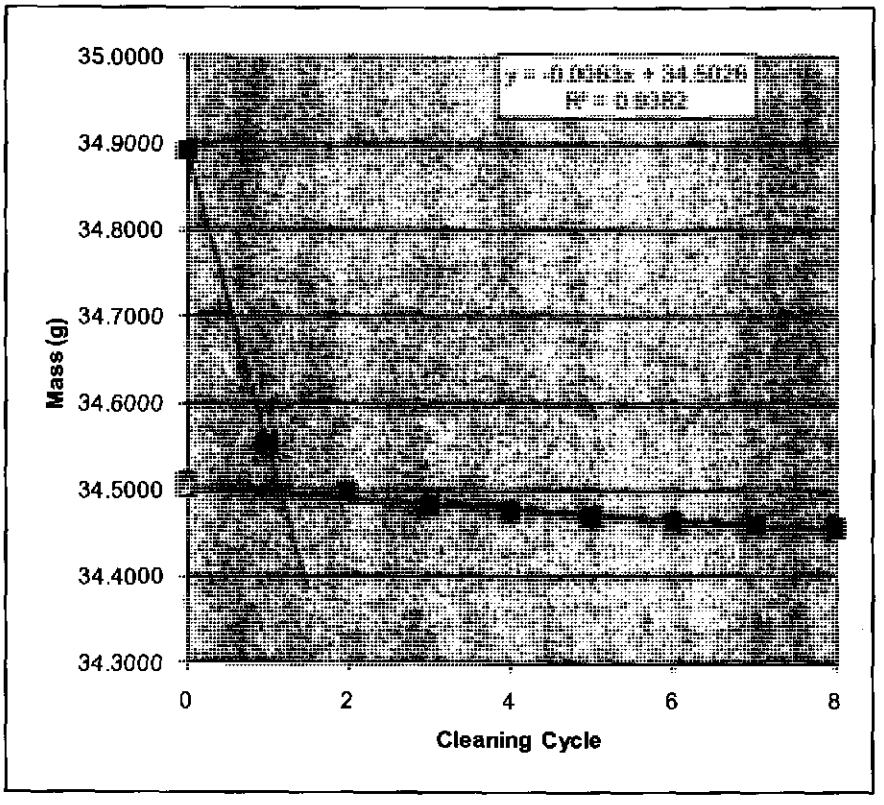
Cleaning Cycle	Wt (g)
0	35.2419
1	35.1200
2	35.1133
3	35.1066
4	35.1017
5	35.0962
6	35.0921
7	35.0853
8	35.0817



Coupon:	L233
Test Matrix:	Pb-E-1500-24-2p
Initial wt (g)	34.5084
Removal wt (g)	34.8924

Calculated final wt (g)	34.5026
Total wt loss (g)	0.0058
Total wt loss (mg)	5.8

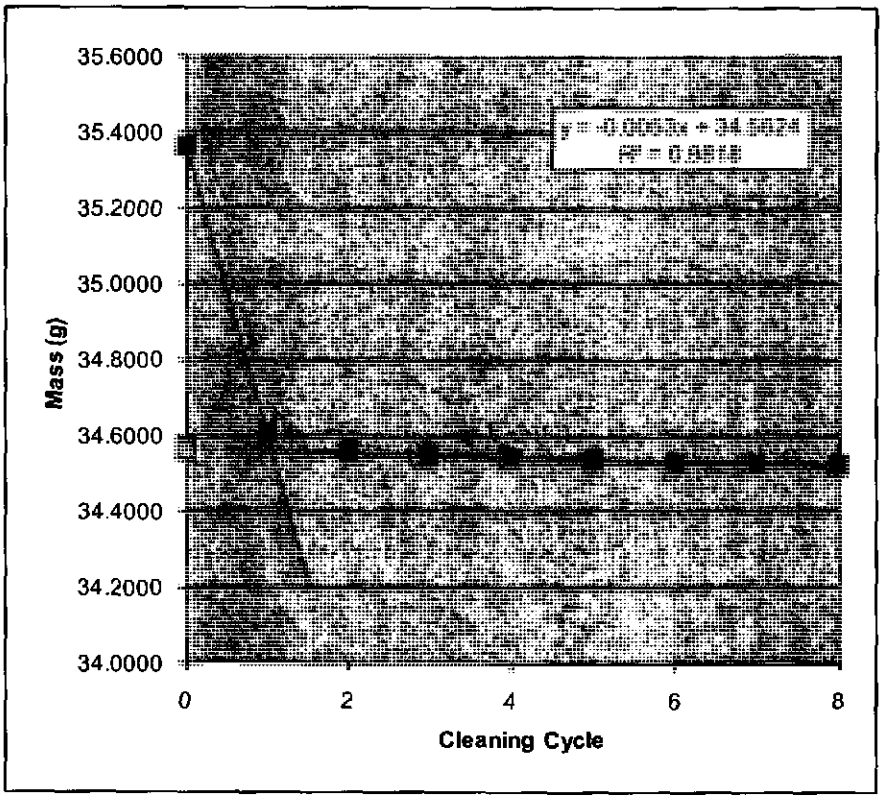
Cleaning Cycle	Wt (g)
0	34.8924
1	34.5516
2	34.4961
3	34.4810
4	34.4742
5	34.4688
6	34.4639
7	34.4594
8	34.4555



Coupon:	L234
Test Matrix:	Pb-E-1500-24-3p
Initial wt (g)	34.5747
Removal wt (g)	35.3631

Calculated final wt (g)	34.5624
Total wt loss (g)	0.0123
Total wt loss (mg)	12.3

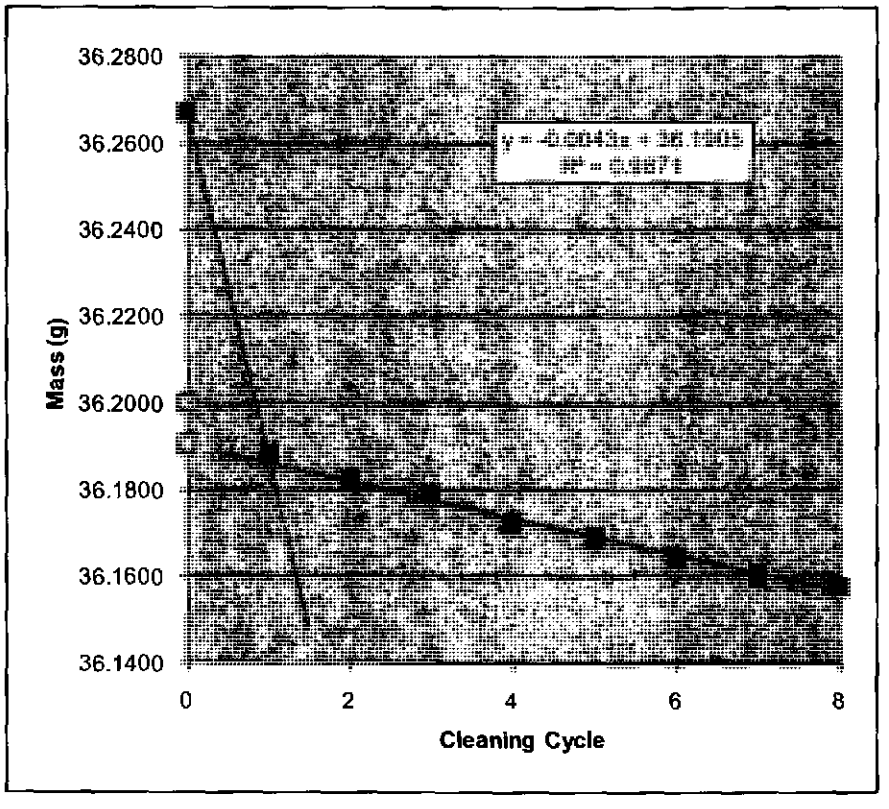
Cleaning Cycle	Wt (g)
0	35.3631
1	34.6069
2	34.5541
3	34.5460
4	34.5395
5	34.5358
6	34.5293
7	34.5252
8	34.5221



Coupon:	L236
Test Matrix:	Pb-Eo-1500-24-2f
Initial wt (g)	36.2002
Removal wt (g)	36.2673

Calculated final wt (g)	36.1905
Total wt loss (g)	0.0097
Total wt loss (mg)	9.7

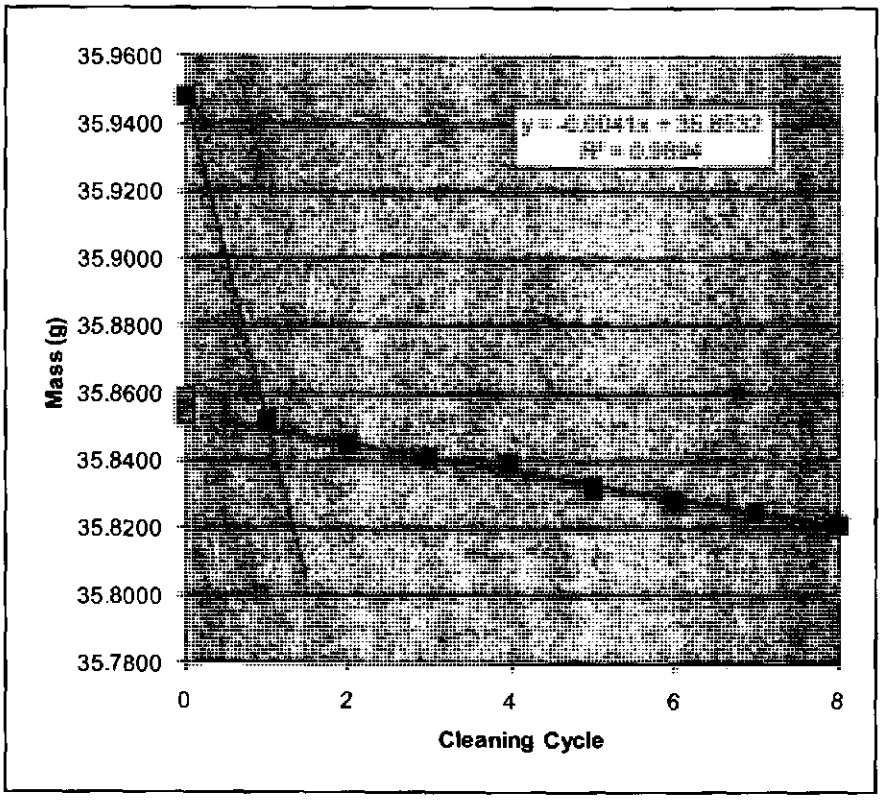
Cleaning Cycle	Wt (g)
0	36.2673
1	36.1880
2	36.1824
3	36.1787
4	36.1721
5	36.1689
6	36.1640
7	36.1597
8	36.1578



Coupon:	L237
Test Matrix:	Pb-Eo-1500-24-3f
Initial wt (g)	35.8591
Removal wt (g)	35.9479

Calculated final wt (g)	35.8532
Total wt loss (g)	0.0059
Total wt loss (mg)	5.9

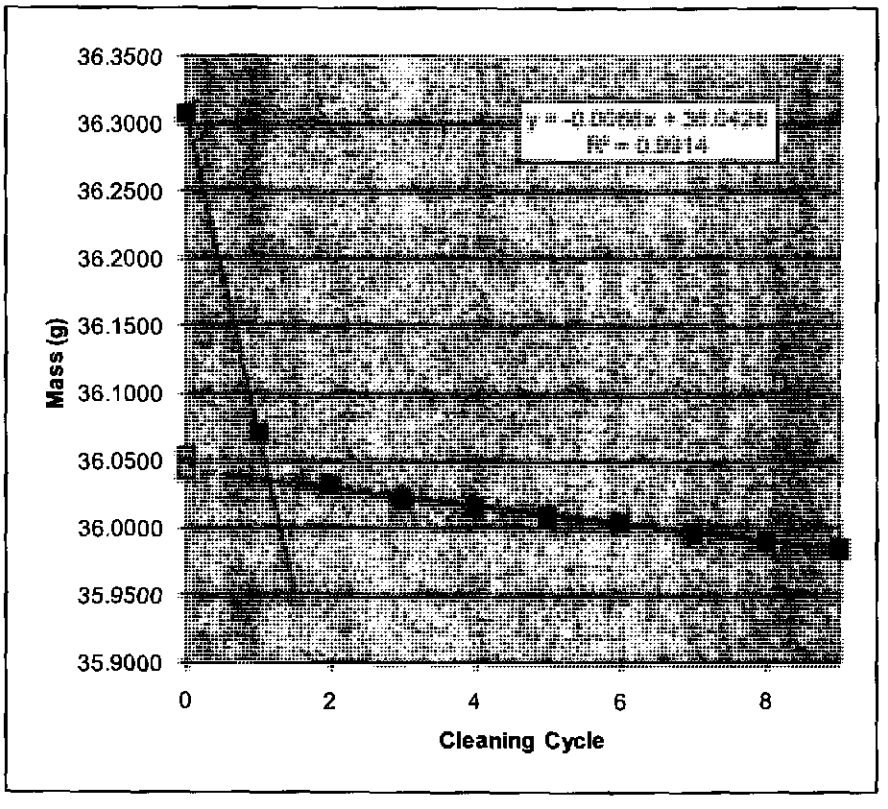
Cleaning Cycle	Wt (g)
0	35.9479
1	35.8519
2	35.8446
3	35.8408
4	35.8387
5	35.8320
6	35.8280
7	35.8242
8	35.8210



Coupon:	L239
Test Matrix:	Pb-Eo-1500-24-2p
Initial wt (g)	36.0527
Removal wt (g)	36.3074

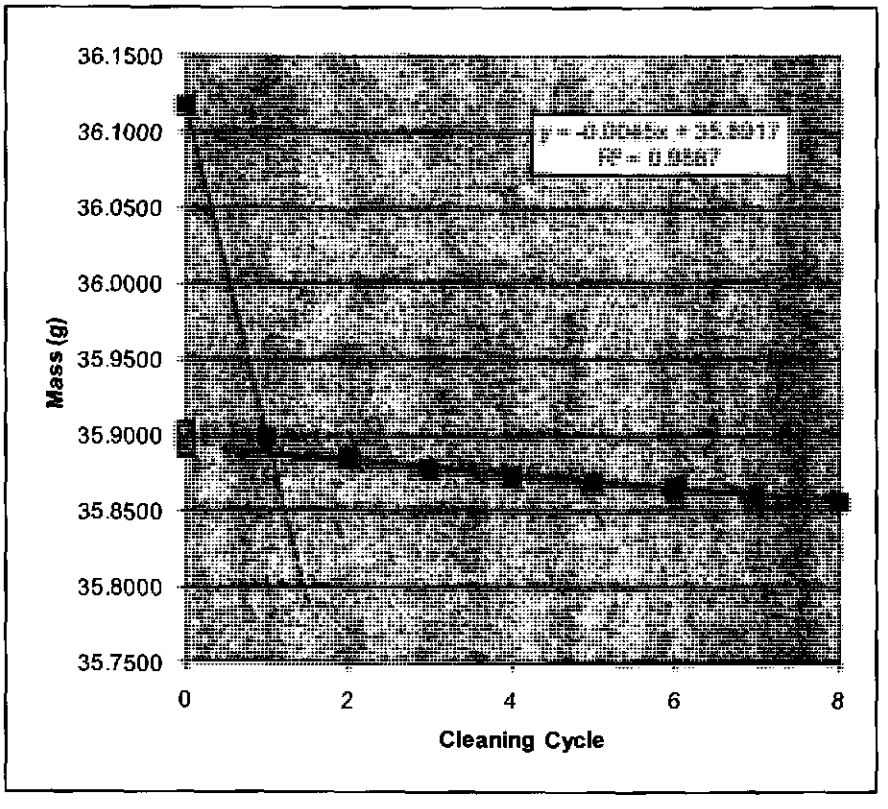
Calculated final wt (g)	36.0426
Total wt loss (g)	0.0101
Total wt loss (mg)	10.1

Cleaning Cycle	Wt (g)
0	36.3074
1	36.0706
2	36.0324
3	36.0212
4	36.0149
5	36.0087
6	36.0032
7	35.9964
8	35.9898
9	35.9845



Coupon:	L240		
Test Matrix:	Pb-Eo-1500-24-3p		
Initial wt (g)	35.9020	**Calculated final wt (g)**	35.8917
Removal wt (g)	36.1171	**Total wt loss (g)**	0.0103
		Total wt loss (mg)	10.3

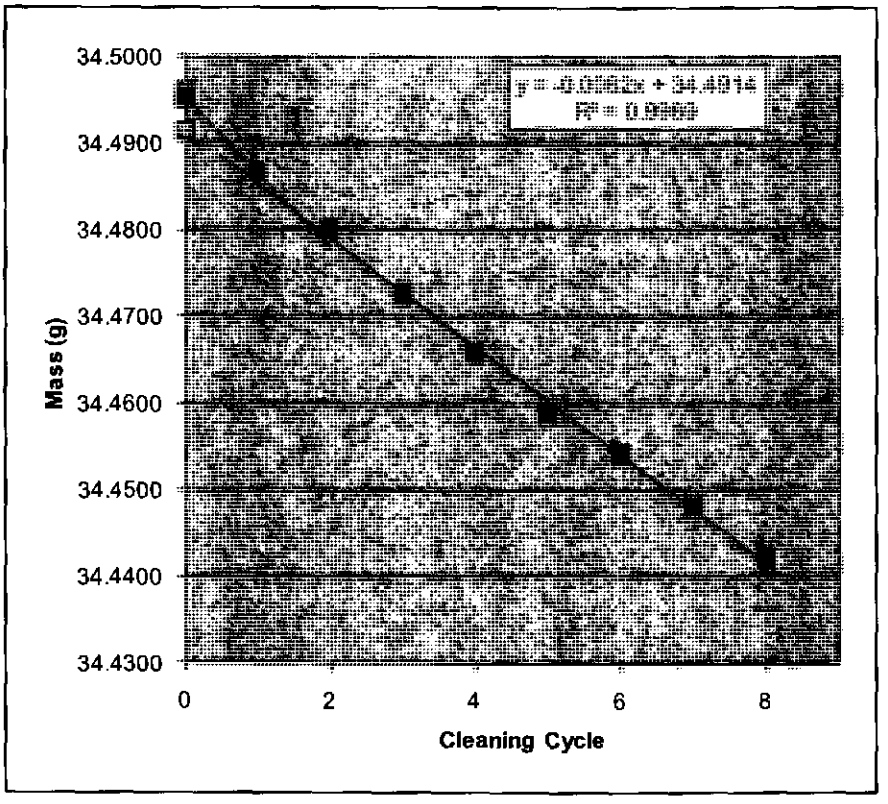
Cleaning Cycle	Wt (g)
0	36.1171
1	35.8988
2	35.8845
3	35.8773
4	35.8727
5	35.8684
6	35.8642
7	35.8608
8	35.8562



Coupon:	L242
Test Matrix:	Pb-Atm-1500-24-2
Initial wt (g)	34.4960
Removal wt (g)	34.4952

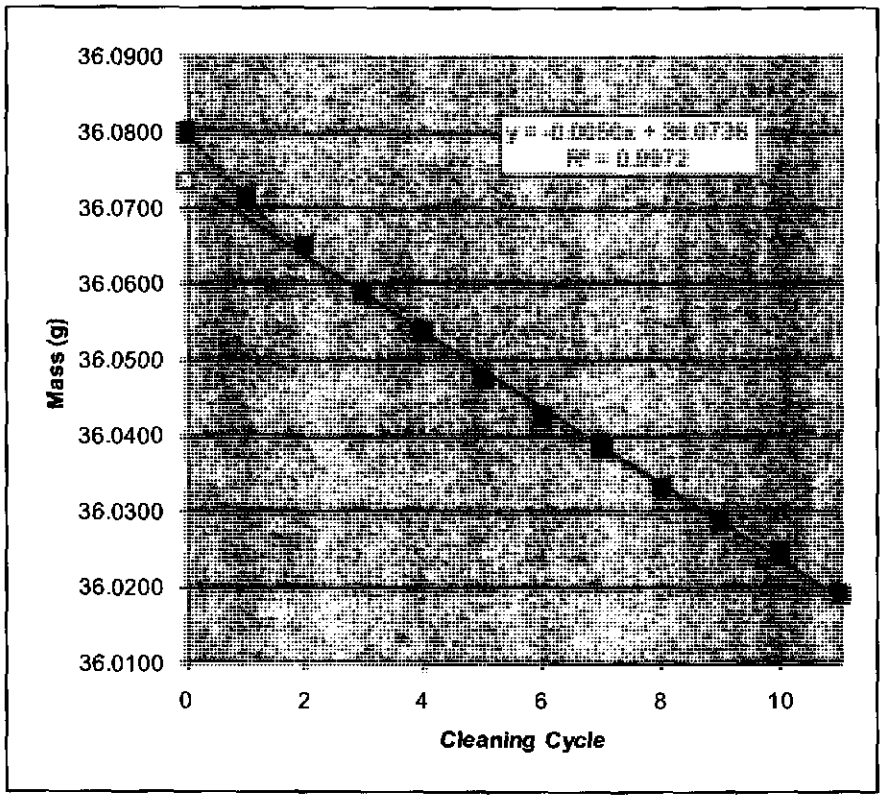
Calculated final wt (g)	34.4914
Total wt loss (g)	0.0046
Total wt loss (mg)	4.6

Cleaning Cycle	Wt (g)
0	34.4952
1	34.4866
2	34.4800
3	34.4725
4	34.4658
5	34.4590
6	34.4542
7	34.4479
8	34.4420



Coupon:	L243		
Test Matrix:	Pb-Atm-1500-24-3		
Initial wt (g)	36.0800	**Calculated final wt (g)**	36.0736
Removal wt (g)	36.0796	**Total wt loss (g)**	0.0064
		Total wt loss (mg)	6.4

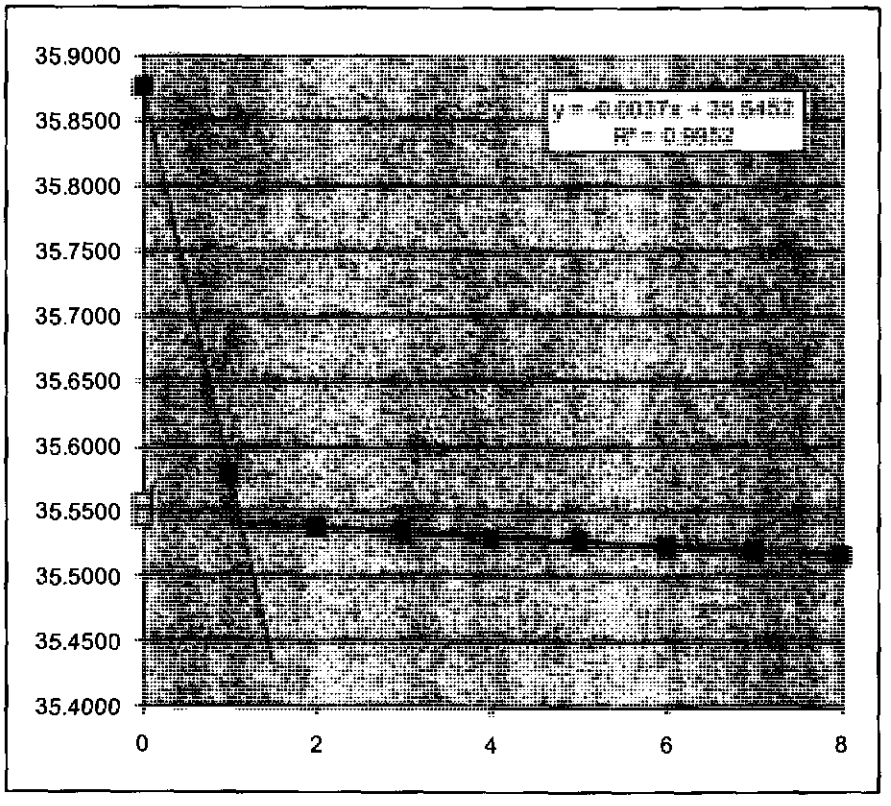
Cleaning Cycle	Wt (g)
0	36.0796
1	36.0713
2	36.0650
3	36.0588
4	36.0535
5	36.0475
6	36.0424
7	36.0382
8	36.0333
9	36.0286
10	36.0244
11	36.0191



Coupon:	L327
Test Matrix:	Pb-G-3500-24-2f
Initial wt (g)	35.5565
Removal wt (g)	35.8763

Calculated final wt (g)	35.5452
Total wt loss (g)	0.0113
Total wt loss (mg)	11.3

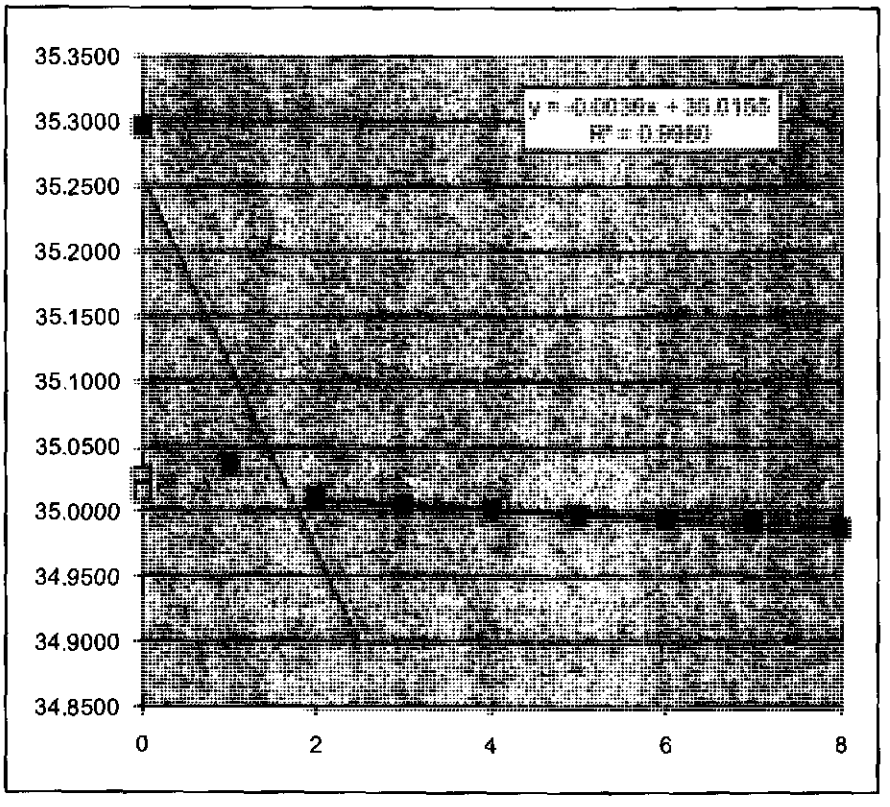
Cleaning Cycle	Wt (g)
0	35.8763
1	35.5780
2	35.5387
3	35.5339
4	35.5299
5	35.5263
6	35.5228
7	35.5198
8	35.5162



Coupon:	L328
Test Matrix:	Pb-G-3500-24-3f
Initial wt (g)	35.0274
Removal wt (g)	35.2962

Calculated final wt (g)	35.0155
Total wt loss (g)	0.0119
Total wt loss (mg)	11.9

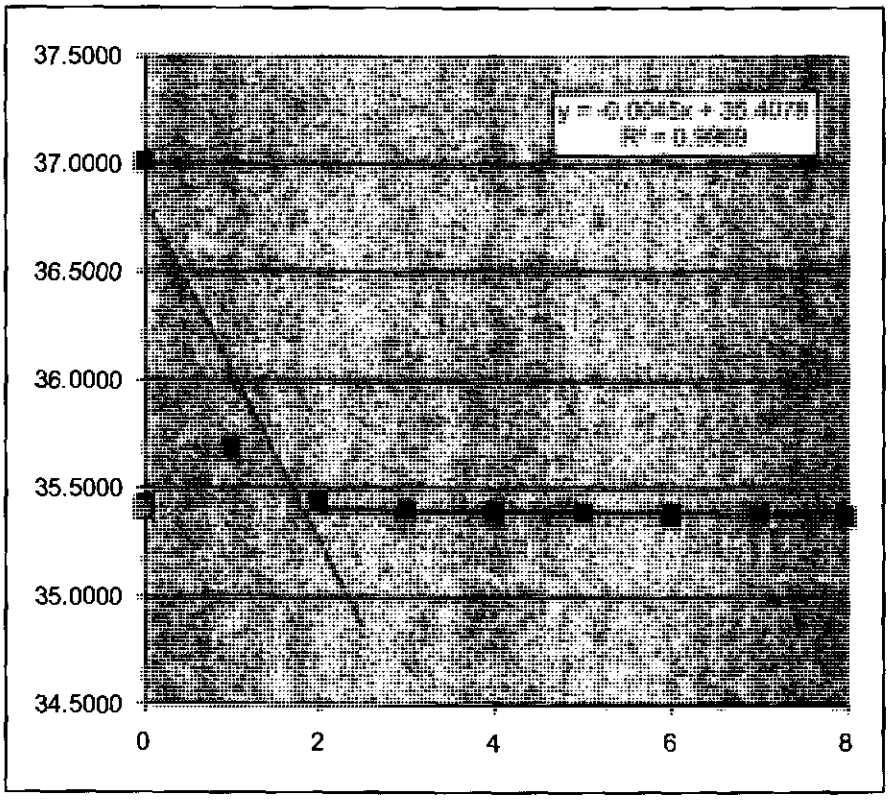
Cleaning Cycle	Wt (g)
0	35.2962
1	35.0360
2	35.0103
3	35.0053
4	35.0009
5	34.9976
6	34.9941
7	34.9905
8	34.9873



Coupon:	L330
Test Matrix:	Pb-G-3500-24-2p
Initial wt (g)	35.4251
Removal wt (g)	37.0113

Calculated final wt (g)	35.4078
Total wt loss (g)	0.0173
Total wt loss (mg)	17.3

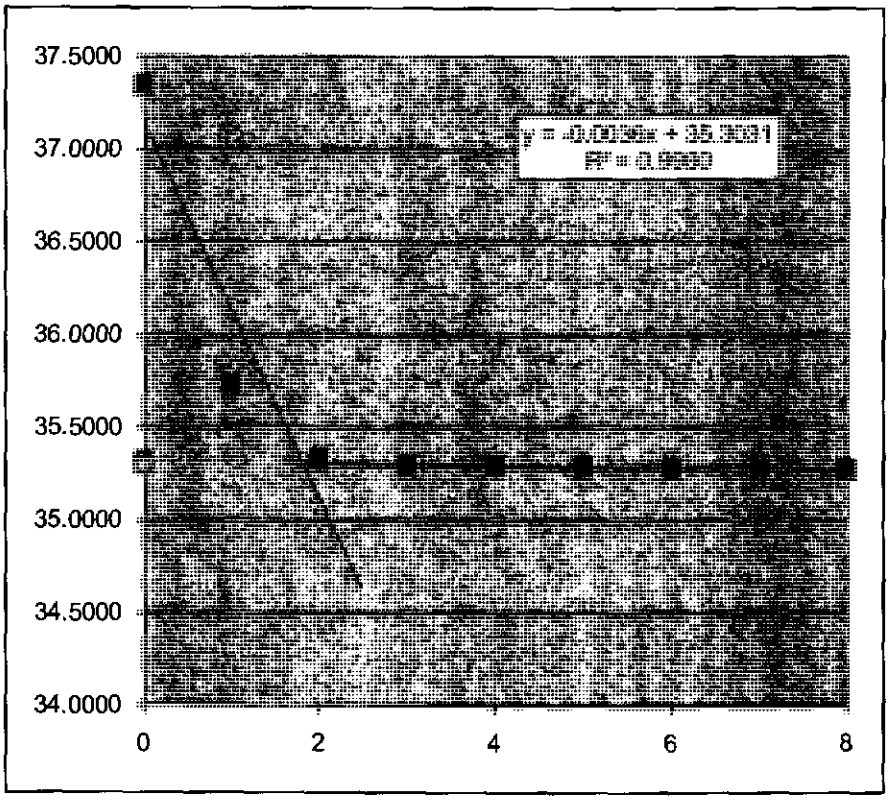
Cleaning Cycle	Wt (g)
0	37.0113
1	35.6893
2	35.4406
3	35.3948
4	35.3897
5	35.3852
6	35.3803
7	35.3760
8	35.3725



Coupon:	L331
Test Matrix:	Pb-G-3500-24-3p
Initial wt (g)	35.3204
Removal wt (g)	37.3510

Calculated final wt (g)	35.3031
Total wt loss (g)	0.0173
Total wt loss (mg)	17.3

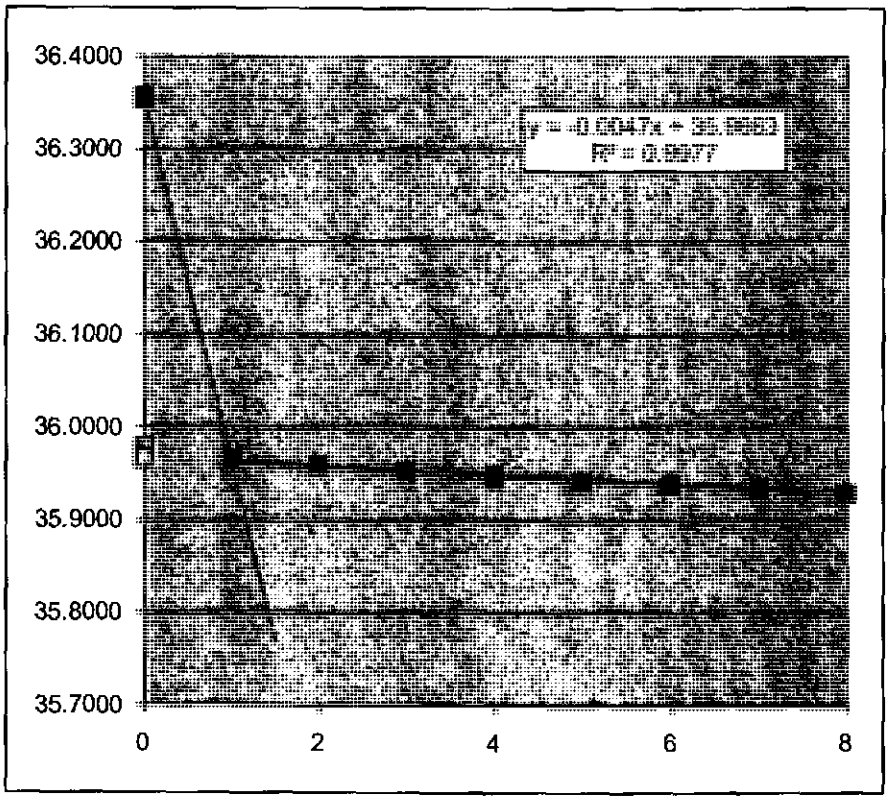
Cleaning Cycle	Wt (g)
0	37.3510
1	35.7313
2	35.3256
3	35.2925
4	35.2884
5	35.2847
6	35.2816
7	35.2782
8	35.2740



Coupon:	L333
Test Matrix:	Pb-Go-3500-24-2f
Initial wt (g)	35.9784
Removal wt (g)	36.3554

Calculated final wt (g)	35.9663
Total wt loss (g)	0.0121
Total wt loss (mg)	12.1

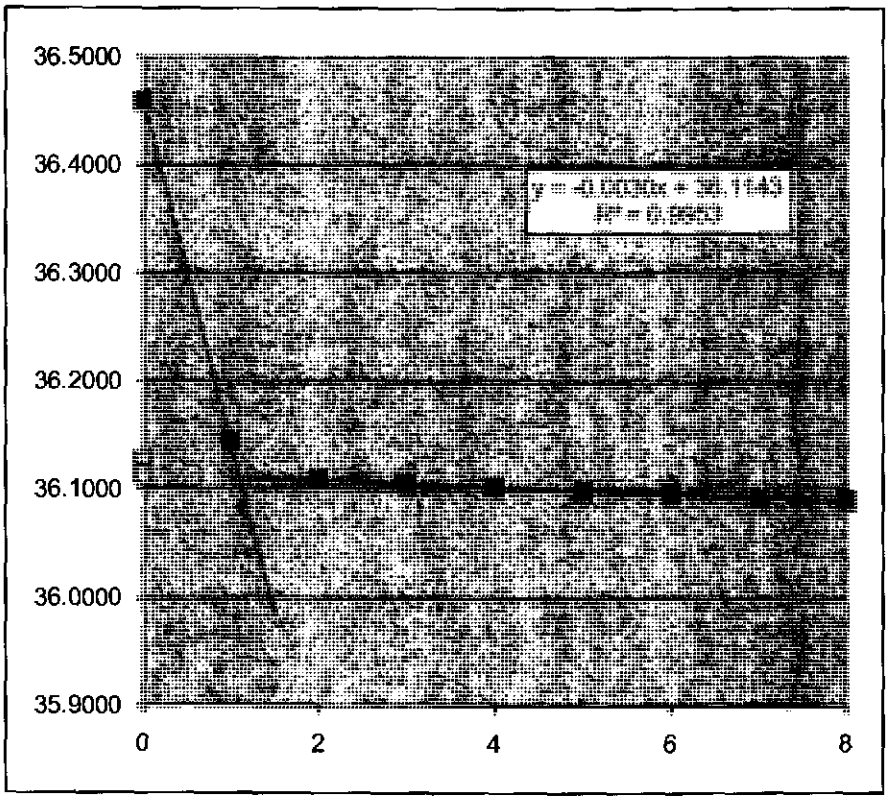
Cleaning Cycle	Wt (g)
0	36.3554
1	35.9652
2	35.9575
3	35.9518
4	35.9469
5	35.9422
6	35.9378
7	35.9327
8	35.9290



Coupon:	L334
Test Matrix:	Pb-Go-3500-24-3f
Initial wt (g)	36.1270
***Removal* wt (g)**	36.4592

Calculated final wt (g)	36.1143
Total wt loss (g)	0.0127
Total wt loss (mg)	12.7

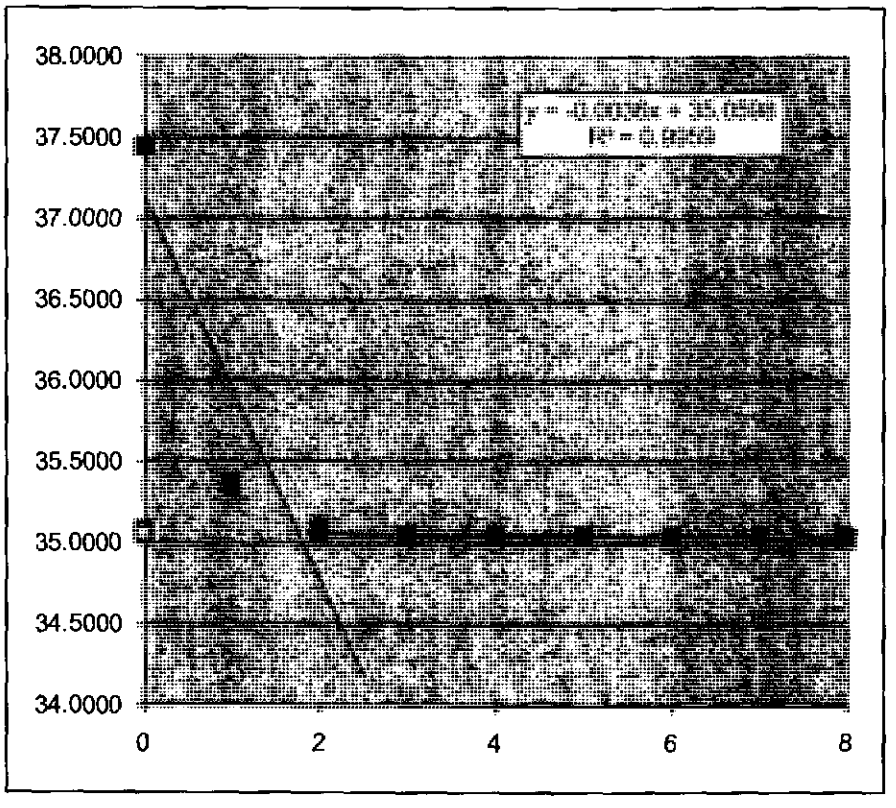
Cleaning Cycle	Wt (g)
0	36.4592
1	36.1443
2	36.1089
3	36.1050
4	36.1016
5	36.0988
6	36.0965
7	36.0930
8	36.0904



Coupon:	L337
Test Matrix:	Pb-Go-3500-24-2p
Initial wt (g)	35.0805
Removal wt (g)	37.4454

Calculated final wt (g)	35.0598
Total wt loss (g)	0.0207
Total wt loss (mg)	20.7

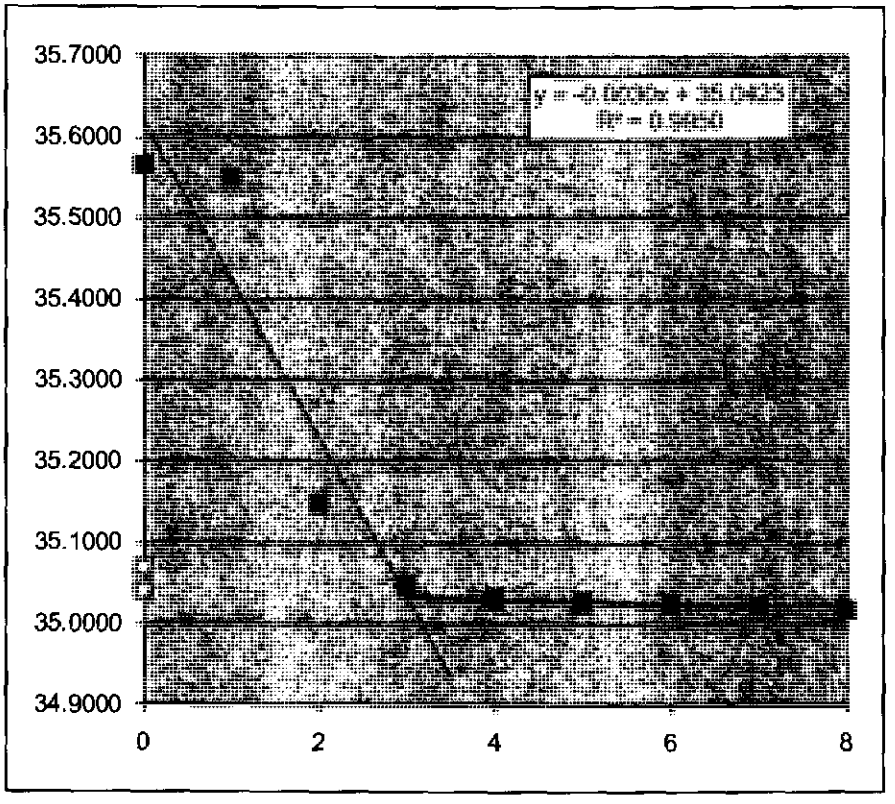
Cleaning Cycle	Wt (g)
0	37.4454
1	35.3519
2	35.0803
3	35.0498
4	35.0451
5	35.0418
6	35.0382
7	35.0350
8	35.0317



Coupon:	L339
Test Matrix:	*Pb-Go-3500-24-3p*
Initial wt (g)	35.0693
Removal wt (g)	35.5649

Calculated final wt (g)	35.0423
Total wt loss (g)	0.0270
Total wt loss (mg)	27.0

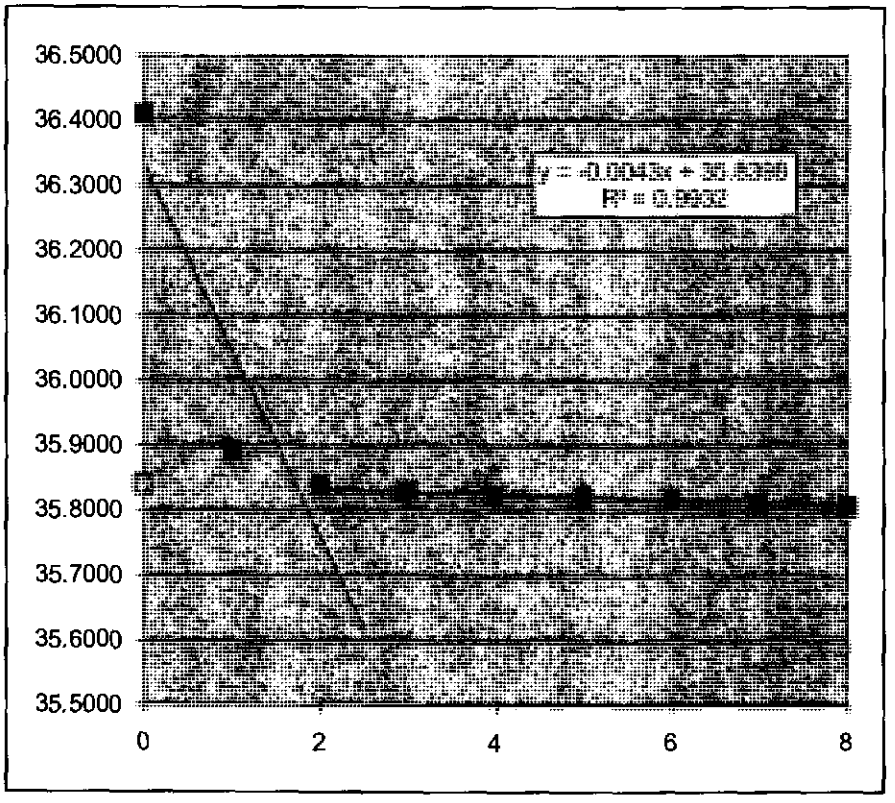
Cleaning Cycle	Wt (g)
0	35.5649
1	35.5487
2	35.1479
3	35.0466
4	35.0305
5	35.0266
6	35.0242
7	35.0209
8	35.0182



Coupon:	L341
Test Matrix:	Pb-E-3500-24-2f
Initial wt (g)	35.8415
Removal wt (g)	36.4098

Calculated final wt (g)	35.8398
Total wt loss (g)	0.0017
Total wt loss (mg)	1.7

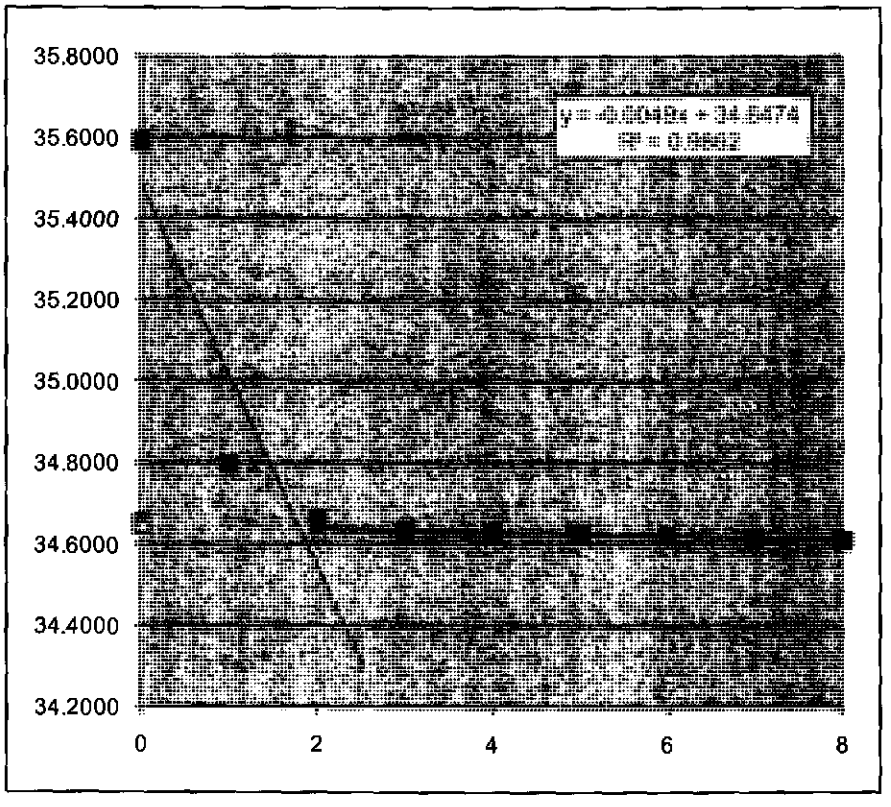
Cleaning Cycle	Wt (g)
0	36.4098
1	35.8884
2	35.8380
3	35.8279
4	35.8218
5	35.8177
6	35.8143
7	35.8099
8	35.8057



Coupon:	L342
Test Matrix:	Pb-E-3500-24-3f
Initial wt (g)	34.6500
Removal wt (g)	35.5908

Calculated final wt (g)	34.6474
Total wt loss (g)	0.0026
Total wt loss (mg)	2.6

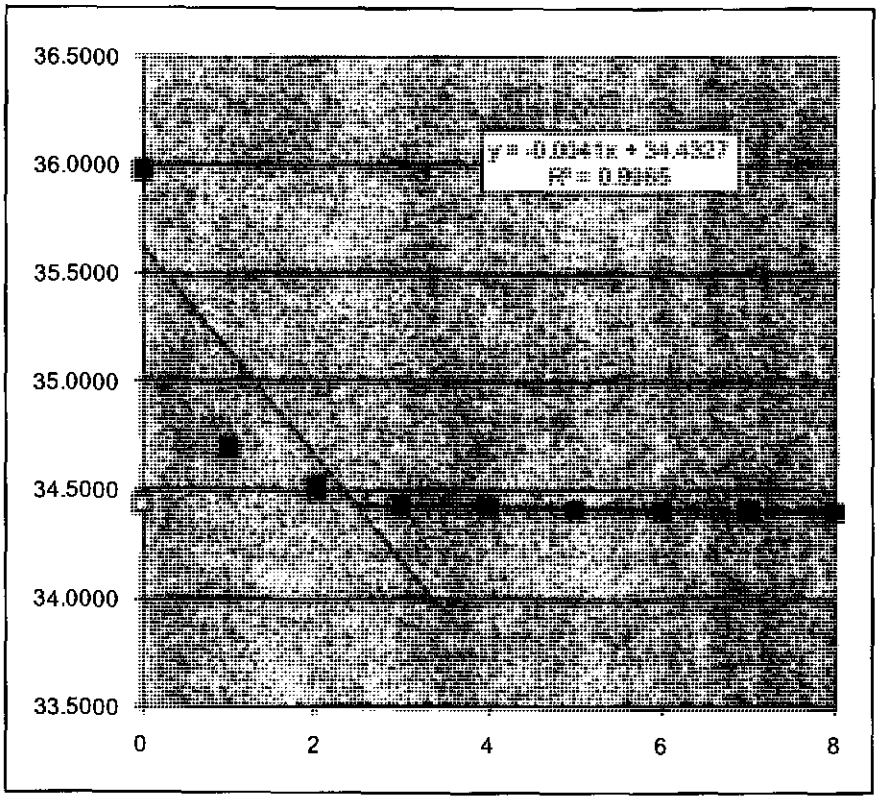
Cleaning Cycle	Wt (g)
0	35.5908
1	34.7944
2	34.6536
3	34.6345
4	34.6271
5	34.6221
6	34.6177
7	34.6138
8	34.6094



Coupon:	L344
Test Matrix:	Pb-E-3500-24-2p
Initial wt (g)	34.4406
Removal wt (g)	35.9744

Calculated final wt (g)	34.4327
Total wt loss (g)	0.0079
Total wt loss (mg)	7.9

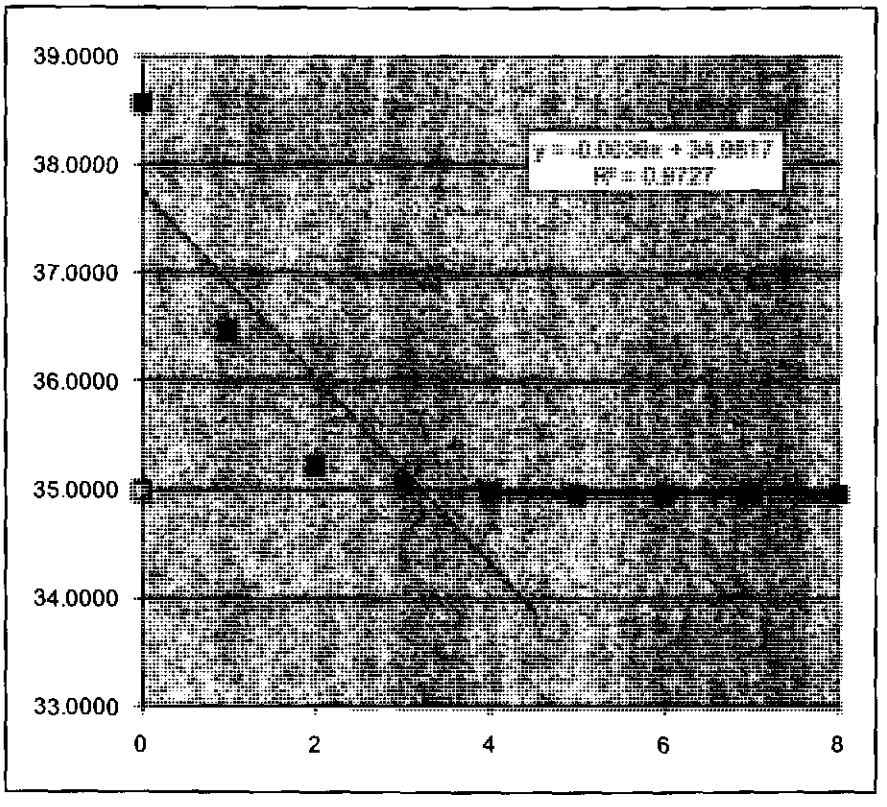
Cleaning Cycle	Wt (g)
0	35.9744
1	34.6895
2	34.5117
3	34.4248
4	34.4167
5	34.4117
6	34.4077
7	34.4038
8	34.4001



Coupon:	L345
Test Matrix:	Pb-E-3500-24-3p
Initial wt (g)	34.9862
Removal wt (g)	38.5610

Calculated final wt (g)	34.9817
Total wt loss (g)	0.0045
Total wt loss (mg)	4.5

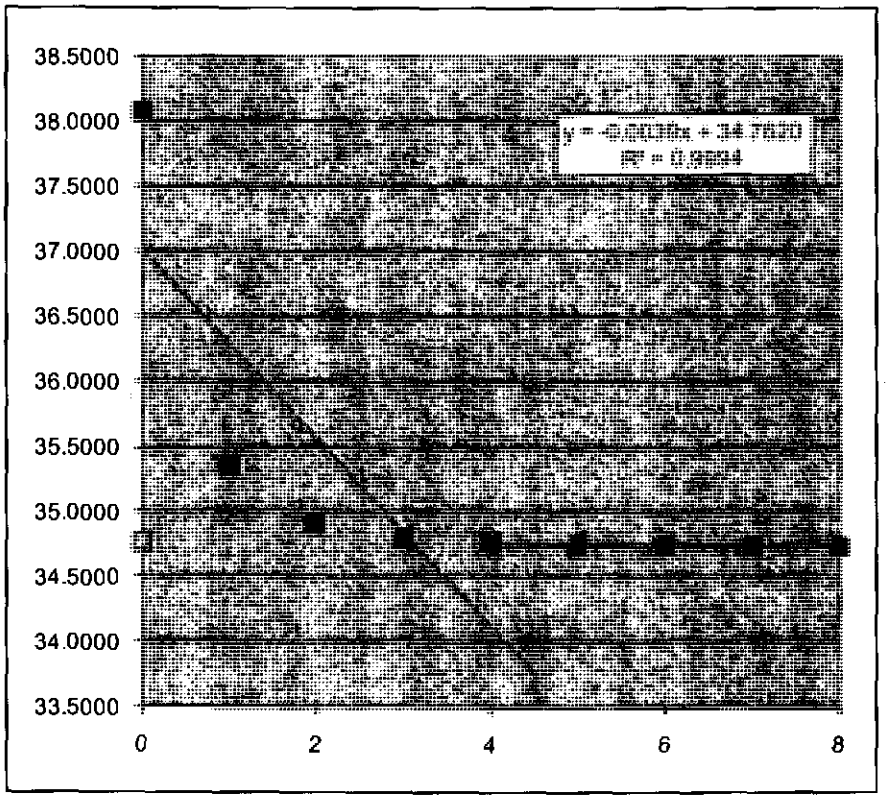
Cleaning Cycle	Wt (g)
0	38.5610
1	36.4633
2	35.2238
3	35.0412
4	34.9773
5	34.9642
6	34.9598
7	34.9555
8	34.9536



Coupon:	L347
Test Matrix:	Pb-Eo-3500-24-1f
Initial wt (g)	34.7670
Removal wt (g)	38.0717

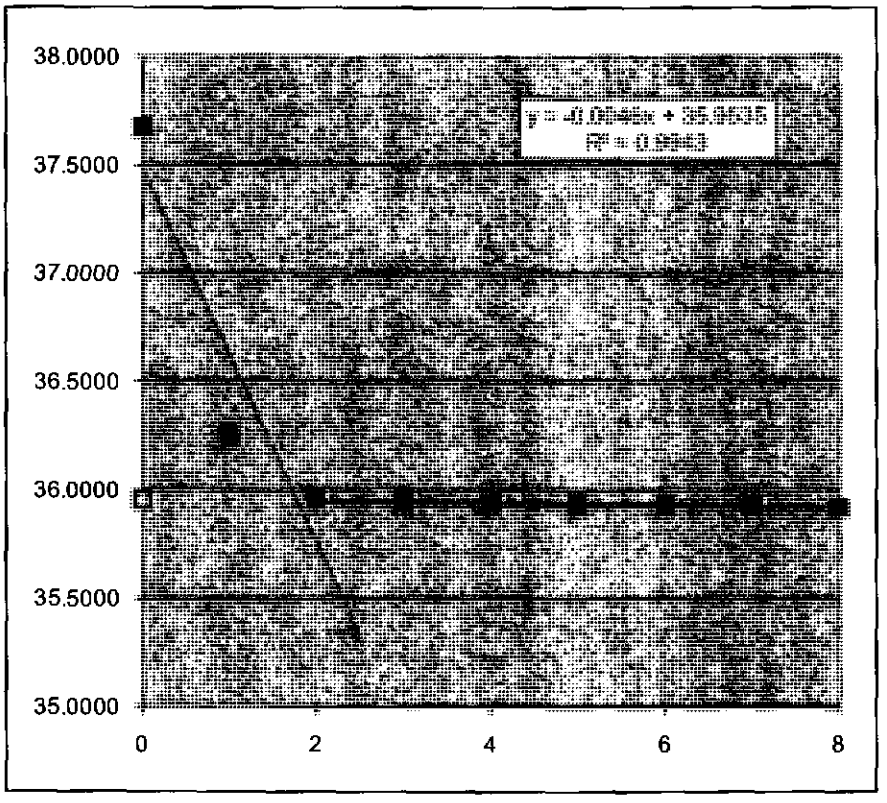
Calculated final wt (g)	34.7620
Total wt loss (g)	0.0050
Total wt loss (mg)	5.0

Cleaning Cycle	Wt (g)
0	38.0717
1	35.3570
2	34.8958
3	34.7902
4	34.7500
5	34.7427
6	34.7387
7	34.7351
8	34.7310



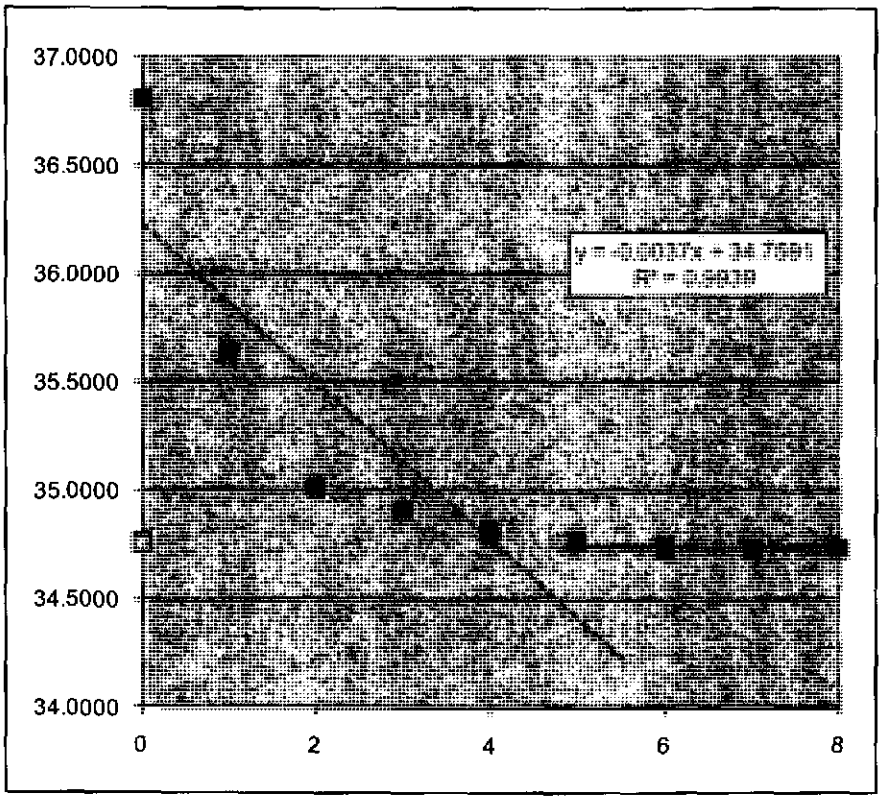
Coupon:	L348		
Test Matrix:	Pb-Eo-3500-24-2f		
Initial wt (g)	35.9570	**Calculated final wt (g)**	35.9535
Removal wt (g)	37.6736	**Total wt loss (g)**	0.0035
		Total wt loss (mg)	3.5

Cleaning Cycle	Wt (g)
0	37.6736
1	36.2412
2	35.9557
3	35.9406
4	35.9346
5	35.9296
6	35.9255
7	35.9213
8	35.9171



Coupon:	L350		
Test Matrix:	Pb-Eo-3500-24-2p		
Initial wt (g)	34.7657	**Calculated final wt (g)**	34.7591
Removal wt (g)	36.8030	**Total wt loss (g)**	0.0066
		Total wt loss (mg)	6.6

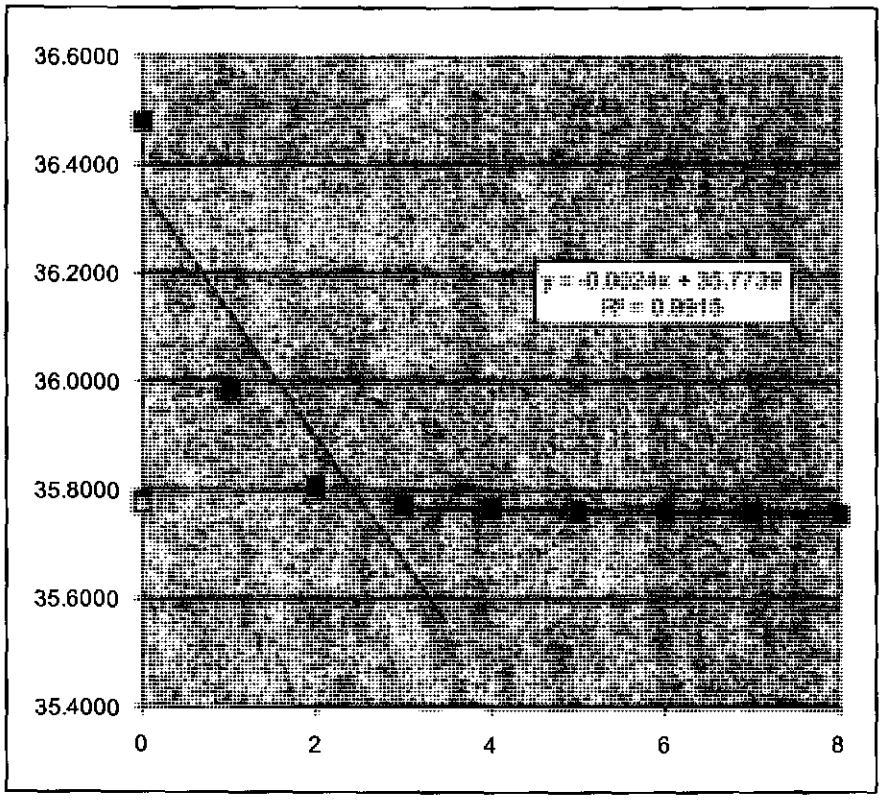
Cleaning Cycle	Wt (g)
0	36.8030
1	35.6345
2	35.0163
3	34.9083
4	34.8125
5	34.7585
6	34.7371
7	34.7329
8	34.7297



Coupon:	L353
Test Matrix:	Pb-Eo-3500-24-3p
Initial wt (g)	35.7837
Removal wt (g)	36.4810

Calculated final wt (g)	35.7739
Total wt loss (g)	0.0098
Total wt loss (mg)	9.8

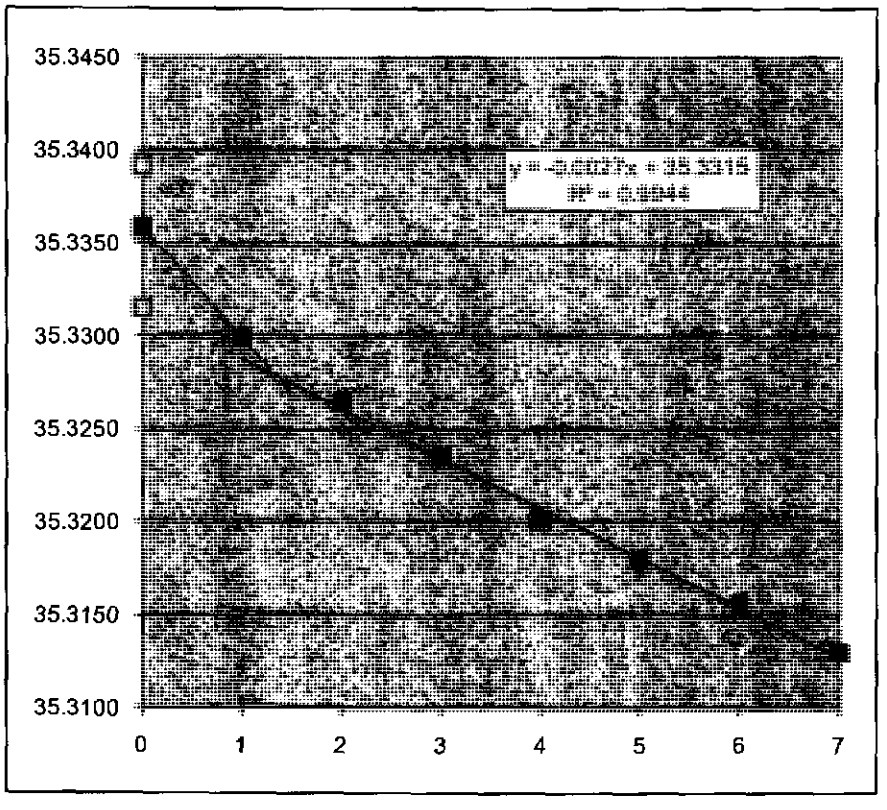
Cleaning Cycle	Wt (g)
0	36.4810
1	35.9851
2	35.8066
3	35.7731
4	35.7647
5	35.7618
6	35.7591
7	35.7570
8	35.7551



Coupon:	L356
Test Matrix:	Pb-Atm-3500-24-2
Initial wt (g)	35.3392
Removal wt (g)	35.3358

Calculated final wt (g)	35.3315
Total wt loss (g)	0.0077
Total wt loss (mg)	7.7

Cleaning Cycle	Wt (g)
0	35.3358
1	35.3299
2	35.3265
3	35.3235
4	35.3201
5	35.3179
6	35.3155
7	35.3130
8	35.3108



Coupon:	L357
Test Matrix:	Pb-Atm-3500-24-3
Initial wt (g)	35.4526
Removal wt (g)	35.4535

Calculated final wt (g)	35.4492
Total wt loss (g)	0.0034
Total wt loss (mg)	3.4

Cleaning Cycle	Wt (g)
0	35.4535
1	35.4469
2	35.4436
3	35.4410
4	35.4387
5	35.4362
6	35.4322
7	35.4298
8	35.4278