SB20 Report

Determination of regulated elements in discarded laptop computers, LCD monitors, Plasma TVs and LCD TVs

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California Department of Toxic Substances Control

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Executive Summary

At the request of the DTSC Hazardous Waste Management Program (HWMP), the Hazardous Materials Laboratory (HML) arranged for the testing of selected waste electronic devices (e-waste) to determine the total and extractable concentrations of regulated elements for comparison with hazardous waste criteria. Four electronic product types (Laptop Computers, LCD Monitors, Plasma TVs and LCD TVs) were identified, and four devices of each product type (except for LCD Monitors where seven individual devices were examined) of various brands and models were collected by HWMP and submitted for analysis.

A protocol was developed to prepare these samples. Devices were dismantled individually, and components classified into millable parts [plastic casings; glass or plastic LCD panels; Cold Cathode Fluorescence Lamps (CCFLs); printed circuit boards [(PCBoards) without capacitors or batteries], and non-millable parts (capacitors, batteries, metal frames, rods, and other metal parts). The weights of all components were recorded. The entire PCBoards and LCD panels were ground to pass a 2mm sieve and mixed well. Representative sub-samples were digested using EPA Method 3050, or extracted using either the Toxicity Characteristic Leaching Procedure (TCLP), or the California Waste Extraction Test (WET). Data met Quality Assurance requirements. Results were extrapolated to the entire device based on relative weights and with the assumption that non-processed components did not significantly contribute any regulated elements. Because of this assumption, the reported results should be considered as minimum values.

Results indicate that all PCBoards exceeded the Total Threshold Limit Concentration (TTLC) for Copper (Cu), and the Toxicity Characteristic (TC) Limit for Lead (Pb). Plasma TV inner panels exceeded the TTLC, the TC Limit and the Soluble Threshold Limit Concentration (STLC) for Pb. Total Mercury (Hg) in CCFLs did not exceed the TTLC when the entire weight of the device was factored in. However, all CCFLs exceeded the Hg TTLC when examined as stand-alone lamps.

Introduction

At the request of the Hazardous Waste Management Program (HWMP), the Hazardous Materials Laboratory (HML) arranged for the testing of electronic devices as defined in the Electronic Waste Recycling Act of 2003 (SB 20/ SB 50, Sher), to determine the total and soluble concentrations of regulated elements for comparison with hazardous waste criteria in Title 22, Chapter 11, Article 3. Specific tests performed on the electronic devices were digestion with EPA Method 3050 followed by elemental testing, the Toxicity Characteristic Leaching Procedure (TCLP); and the California Waste Extraction Test (WET). The results of these analytical tests were compared to hazardous waste regulatory thresholds: the Total Threshold Limit Concentration (TTLC), the Toxicity Characteristic Limit (TC Limit), and the Soluble Threshold Limit Concentration (STLC), respectively.

Materials and Methods

Four Laptop Computers, seven LCD Monitors, four Plasma TVs, and four LCD TVs of different brands and models were collected by DTSC and submitted for analysis. Two of the Plasma TVs and all four LCD TVs were accompanied by a remote control tool. All devices were shipped to Sequoia Analytical Laboratories in Morgan Hill, California, where work was performed under contract # 02-T2409 with the oversight of DTSC.

Sample Preparation:

The Standard Operating Procedure (HML SOP#916-S) developed for this project is shown in Appendix A-1. In summary, each device was dismantled individually, and components classified into the following groups:

LCD Monitors and LCD TVs:

1) Printed Circuit Boards (PCBoards), without any batteries or capacitors
2) LCD panels
3) Cold Cathode Fluorescent Lamps (CCFLs)
4) Millable plastic components, plastic casings
5) Metal components (metal frames, rods, capacitors and other metal parts)
6) Batteries

Laptop Computers-Top part

1) PCBoards, without any batteries or capacitors
2) LCD panels
3) CCFLs
4) Millable plastic components, plastic casings
5) Metal components (metal frames, rods, capacitors and other metal parts)

Laptop Computers-Bottom part

1) PCBoards, without any batteries or capacitors
2) Millable plastic components, plastic casings
3) Metal components (metal frames, rods, capacitors and other metal parts)

Plasma TVs

1) PCBoards, without any batteries or capacitors
2) LCD outer panels
3) LCD inner panels
4) Millable plastic components, plastic casings
5) Metal components (metal frames, rods, capacitors and other metal parts)
6) Batteries

Remote Control Tools

1) PCBoards, without any batteries or capacitors
2) Millable plastic components, plastic casings

For the purpose of this phase of the study, only PCBoards, LCD panels (inner and outer, where present) and CCFLs were processed and analyzed. The remaining components were weighed and archived for possible future analysis. Table 1 shows the type/brand/model of each device tested, along with the weights of each component tested and the weight of the total device.

With the exception of CCFLs (which were processed according to SOP-914S, Appendix A-2), all components to be processed were cut into small pieces and ground using a heavy duty mill (Retsch, Model #SM-2000) to pass through a 2mm mesh sieve. The 2 mm sieve was used for all analyses (total concentrations, WET and TCLP) to maximize the amounts available for all analytical procedures. Milled samples were thoroughly mixed to achieve homogeneity before removing aliquots for testing.

Sample Digestion for Elemental Testing:

A one gram (1 g) representative sub-sample of the thoroughly mixed sample was digested using EPA Method 3050B, with repeated additions of nitric acid, hydrochloric acid and hydrogen peroxide until the digestion was complete.

Extraction Procedures:

Sub-samples were taken from the milled samples and were extracted using the TCLP and the WET to determine the leachability potential of regulated elements.

TCLP: An aliquot of the sample was extracted as described in EPA Method 1311. Samples (105 g) were extracted with an amount of extraction fluid equal to 20 times the weight of the sample. Extraction fluid #1, consisting of a mixture of acetic acid and sodium hydroxide at pH 4.93 +/- 0.05, was used, since the final pH of the samples after the addition of 1N HCl was <2.0. The extraction vessel containing the sample and the extraction fluid was agitated on a rotary shaker at 30 +/- 2 rpm for 18 +/- 2 hours at ambient temperature. The material in the extraction vessel was then filtered through a glass fiber filter (0.45 micron) and the liquid extract was preserved with nitric acid to 5% by volume until ready for digestion and analysis.

WET: Sample aliquots (50 g) were extracted with a citrate buffer solution (10 times the weight of the sample) at pH 5.0 for 48 hours in a mechanical shaker under anaerobic conditions. Mixtures were centrifuged, filtered through Whatman filter paper #42 and then

passed through 0.45 micron membrane filter. The extracts were preserved by acidifying with nitric acid to 5% by volume before digestion and analysis.

Analytical Procedure:
The above prepared samples were digested with nitric acid, hydrochloric acid, and hydrogen peroxide, as specified in EPA Method 3050B. The digestates were analyzed by Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP–AES, Thermo Jarrell Ash, Model 61E), using EPA Method 6010B. According to this method, digested samples were filtered through 0.45 micron membrane filters, nebulized, and the resulting aerosol transported into the plasma torch. Emission spectra were produced by radio frequency, dispersed by the grating material and the intensities of the emission lines were measured by photosensitive devices.

Hg in CCFLs:
CCFLs were processed according to SOP-914S (Appendix A-2). Briefly, CCFLs were placed in plastic bags, frozen to minimize volatilization of Hg, crushed and homogenized. Aliquots (0.6 g) were analyzed for Hg by EPA Method 7471A.

Statistical Evaluation of Data
Arithmetic means, standard deviations and coefficients of variation (CV%) were computed for each group of devices. The upper confidence level (UL) for the mean (1-sided, 90^{th} percentile) was calculated assuming normally distributed data. Normality was also assumed in order to calculate the required sample size to detect a statistically significant difference between the mean and the relevant regulatory limit at a 95% confidence level. To determine whether a component (as a group) exceeded the regulatory limit, both the UL should be greater than the regulatory limit and the required sample size should be equal to or smaller than the sample size employed.

Results and Discussion

Data Management
The elemental concentrations measured in the processed portions of the devices were converted to concentrations in the entire device by using the relative weights (Table 1), with the assumption that the unmilled portion of each device (including batteries, capacitors and metal components) did not contain any of the regulated elements. Because of this assumption, the reported results should be considered as minimum values.

Analytical results are shown in Tables 2-5. All samples were analyzed for EPA Method 3050 concentrations, TCLP-extractable elements and WET-extractable elements, with the exception of two LCD PCBoards (samples LCD3 and LCD4) which were not extracted for TCLP analysis because of insufficient weight. These results are shown as not analyzed, “NA” in the respective tables. Data below the reporting limit are shown as not detected, “ND”.

Tables 2-5 show results for individual samples plus the arithmetic mean (average) of all samples in the component group, the per cent coefficient of variation (CV %) and the upper confidence level (UL) for the mean (1-sided, 90^{th} percentile). Entries in bold face (individual

result, mean or UL) indicate results exceeding the respective regulatory thresholds (shown in the top row of the Table).

Quality Assurance

Quality Control (QC) results for Total Concentrations are shown in Appendix B (Table QC-I). Samples were digested and analyzed separately in seven batches. Samples of various components, such as Plasma TVs glass panel, LCD-TV panels and Remote Control PCBoards were used as Matrix Spikes and Matrix Spike Duplicates (MS/MSD). These samples were spiked with all the elements at 50 mg/kg concentrations, while the Laboratory Control Samples (LCSs) were spiked at the same level (50 mg/L) in de-ionized water. Plastic chip blanks were milled in between the actual samples to assess any carry over from high concentrations in samples. None of the elements were detectable in the plastic chip blanks indicating that the milling system was free of cross contamination. In all the batches, recoveries of LCS ranged from 85.4% to 106%. Recoveries in MS/MSD, however, varied from element to element because some of the elements such as Pb, Cu, Zn, Sb, Ba, and Ag were present at very high concentrations compared to the amount spiked. Nevertheless, overall recoveries ranged from 72.8% to 158% except for one batch in which recoveries from 39.2 to 184 % were observed, perhaps due to matrix interferences (Remote Control PCBoard sample).

All CCFLs were processed and analyzed for Total Hg in four batches. Samples were spiked at 2 mg/Kg (MS and MSD) but due to very high concentration of Hg in the samples, the MS and MSD were not recovered. LCSs were prepared by adding 8 ug/L in DI water; recoveries ranged from 88.0 to 101 %. Eight of the samples were processed in triplicate and one in duplicate. Results of the replicate analyses are shown on Table 5.

For WET-extractable elements, samples were analyzed in six batches with Method Blanks and LCSs. MS/MSDs were run on different samples such as two Plasma TV panels, one LCD TV panel and three LCD monitor panels (Appendix B, Table QC-II). These samples, and an equal number of LCSs, were spiked with all the elements at a concentration of 2 mg/L. LCS recoveries varied from 90 % to 110% and all Method Blanks were below detection. MS and MSD were recovered within the range of 68% to 118%. The recovery of Pb in one of the batches, however, was not reported because of the high concentration in the sample in comparison to the spiked amount.
WET-extracted non-CCFL samples were run in six batches for Hg. LCSs as well as MS and MSD were spiked at 200 ug/L. For all batches, LCS recovery varied from 92% to 99%, while MS and MSD recoveries ranged from 76% to 100%.

TCLP analysis was batched into five sets of samples with Method Blanks and LCSs (Appendix B, Table QC-III). MS/MSDs were performed on samples such as Plasma TV – PCBoard, LCD TV panel and a laptop LCD panel. Samples and LCSs were spiked at 0.8 mg/L with the seven regulated elements. None of the elements was detected in Method Blanks, and LCS recoveries ranged from 94% to 110%. MS and MSD recoveries varied from 76.2 to 115 %, except for Pb in one of the batches where the recovery was not reported due to high Pb concentration in the sample. Two batches of QC were analyzed for Hg and the

LCS and the LCD glass panel samples were spiked at 8 ug/L. The LCS recovery was 89.2% and 89.8%. MS and MSD recoveries ranged from 56% to 110 % with 20.4 % RPD.

Sample homogeneity
To assess the homogeneity of the samples subjected to analysis, one sample was run in duplicate and another was run in triplicate. Table 6 shows the individual results, their mean and relative percent difference (RPD) for duplicate analyses, and standard deviation and %CV for triplicate analyses. Triplicate analysis was performed on one sample (PlasmaTV3, outer glass) and the only elements above the detection limit (Cr and Cu) had %CVs equal to 22.4% and 25.5%, respectively. Pb was measurable in two of the replicates, but was below detection in the third replicate. Half of the detection limit was used in that case to generate the third measurement and the summary statistics (40.9% CV). Another sample (PlasmaTV1, outer glass) was analyzed in duplicate. The RPDs for Cu and Cr (the only elements measured above their detection limits) were 40% and 24%, respectively. The particular samples were selected a priori for replicate analyses, without prior indication of expected concentrations. Most elements were below detection or at very low concentrations, contributing to elevated %CVs.

In an earlier investigation, the same sample preparation and analysis techniques were used to measure regulated elements in discarded consumer electronic products (DTSC, 2004). To assess homogeneity and reproducibility of the processed samples in that study, several samples were analyzed in triplicate with satisfactory results. For the major elements in those products (Cu, Sb and Pb), the average CV% were 23%, 32% and 36%, respectively. The process, therefore, produces reasonably homogeneous results.

Total Concentrations
Table 2 shows the results for total concentrations in mg/Kg (extrapolated to the entire device using the relative weights of processed and non-processed portions) for all samples. Regulatory limits (TTLCs) are shown in the top row. It is clear that only a few elements (Sb, Ba, Cr, Cu and Pb) were consistently measured in all samples. Figures 1 and 2 show the mean and 90% UL for Cu and Pb, respectively, for each device and component, with the TTLCs shown for comparison. As shown in Figure 1, all PCBoards clearly exceeded the TTLC for Cu, with Laptop PCBoards and Remote Control PCBoards having the highest concentrations. All panels, on the other hand, had negligible Cu concentrations. Similarly, all Laptop PCBoards and Plasma TV inner panels exceeded the TTLC for Pb. The sample size provided adequate statistical power for these determinations, with the exception of the Remote Control PCBoards. In that case, although the UL exceeded the TTLC, additional samples would be required to confidently assess exceedences.

TCLP
TCLP results (mg/L extrapolated to the entire device) are shown in Table 3. Only Pb could be measured above the reporting limit. The Plasma TV inner panels and all PCBoards exceeded the TCLP for Pb (Figure 3) with adequate statistical power.

WET
Table 4 shows WET-extractable results in mg/L (extrapolated to the entire device). All samples were below the STLCs with the exception of the Plasma TV inner panels which clearly exceeded the STLC. The sample size provided adequate statistical power for these determinations.

CCFLs
Table 5 shows concentrations of Hg in CCFLs and in the entire device based on relative weights. Because of concerns regarding homogeneity of the sub-sample (small amounts, potential for Hg loss through handling) eight of the samples were analyzed in triplicate and one in duplicate. Table 5 shows all measurements. Whenever available, the mean of the three or two replicates was used to express Hg content. There was considerable variability in the replicate measurements with %CVs ranging from 7.6% to 72.6% and an average %CV of 39.1%. Nevertheless, the concentrations of Hg measured in all CCFLs were all above the TTLC of 20 mg/kg. The data indicate that whereas all CCFLs contain Hg above the TTLC (when the lamps are considered by themselves), these concentrations fall below the TTLC when expressed as part of the entire device.

Data Summary
Table 7 shows the various components that determine whether a device exceeds a regulatory criterion. It is clear that inner panels of Plasma TVs exceed all criteria for Pb. All PCBoards exceeded the TTLC for Cu, and many exceeded the TTLC for Pb. The sample size was adequate to make these determinations in all cases, with the exception of the TTLC for Pb in the Remote Control devices. The wide variability observed in that case would require a minimum of 11 samples to assess whether these devices exceed the TTLC.

Conclusions

Based on these data, the following conclusions can be drawn for the particular components tested:

- The CCFLs have high Hg content, exceeding the TTLC. If, however, the CCFLs are not removed but are disposed as part of the entire device, the Hg content of the entire device is below the TTLC.

- The glass panels of the LCD monitors and laptops and the (outer) glass panels of the LCD TVs contain negligible amounts of regulated elements, all below any criteria.

- The inner panels of the Plasma TVs clearly exceed the TTLC, the TC Limit and the STLC for Pb.

- The PCBoards contain the maximum amounts of regulated elements.

- The Cu content of PCBoards was above the TTLC in all devices tested.

References

SB20 and SB 50 (Sher), The Electronic Waste Recycling Act of 2003, http://www.dtsc.ca.gov/HazardousWaste/CRTs/SB20.html

DTSC 2004. E-waste Report. Determination of regulated elements in seven types of discarded consumer electronic products. Hazardous Material Laboratory, California Department of Toxic Substances Control, January 2004

Fig. 1 Total Cu (mg/Kg) measured in component (Panel or PCBoard)
and extrapolated to entire device
TTLC=2500 mg/Kg

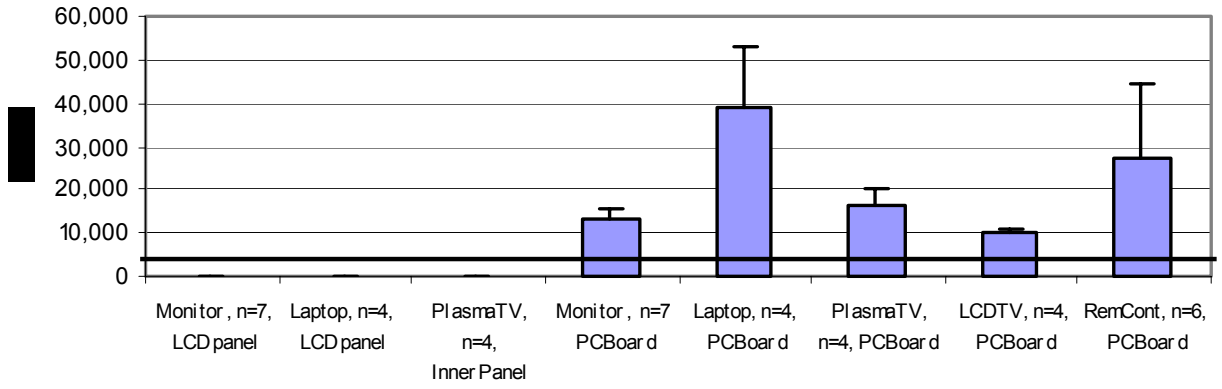

Fig. 2 Total Pb (mg/Kg) measured in component (Panel or PCBoard)
and extrapolated to entire device
TTLC=1000 mg/Kg

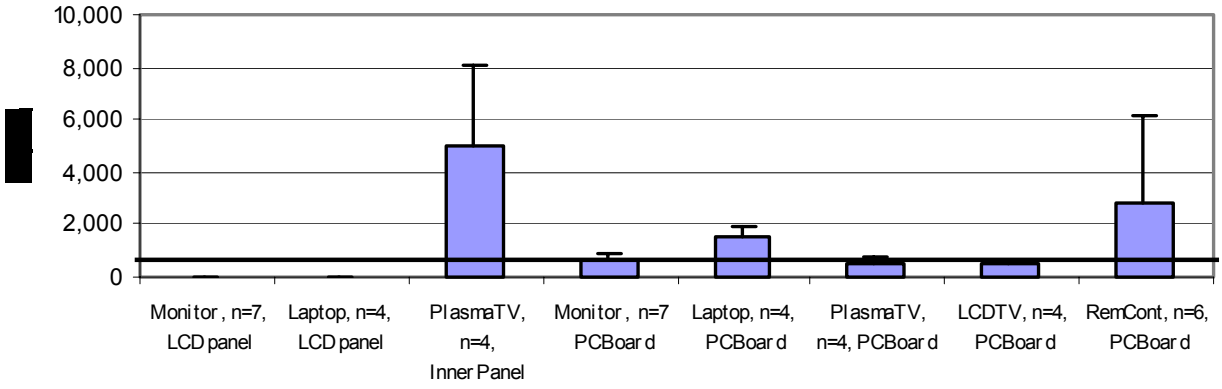

Fig.3. TCLP-extracted Pb measured in component (Panel or PCBoard)
and extrapolated to entire device
TC Limit=5 mg/L

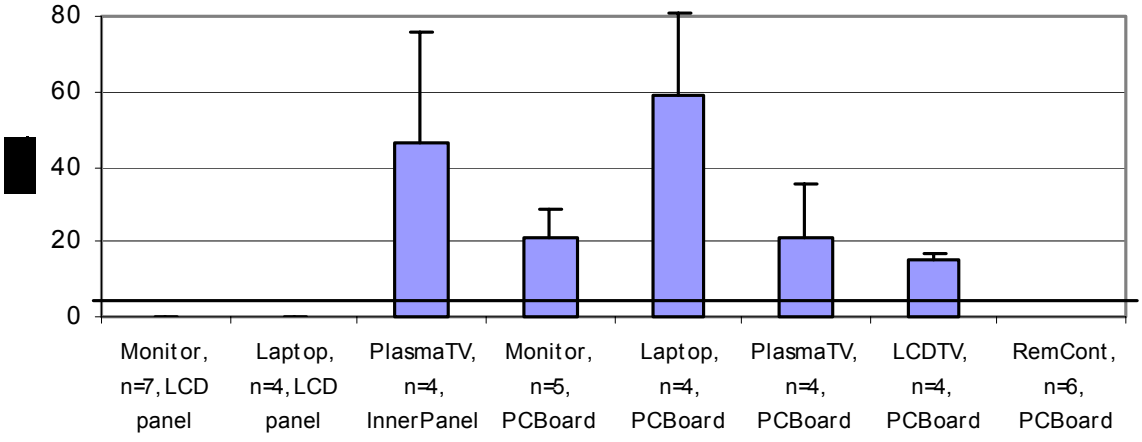

Fig.4. WET-extracted Pb measured in component (Panel or PCBoard)
and extrapolated to entire device
STLC=5 mg/L

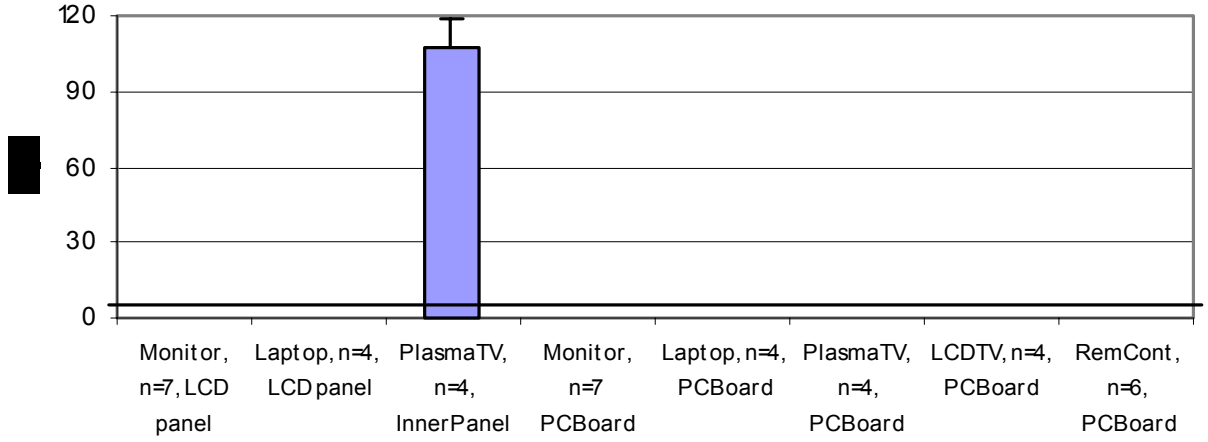

Table 1 Devices tested and weights of components

Type	Brand	Model	Glass panel (outer) (g)	Plastic panel (inner) (g)	CCFL (g)	Rubber Coating (g)	PC Boards (g)	Battery/ Transformer/ Capacitors (g)	Plastic parts (g)	Metal PC boards/ Metals (g)	Remote Control plastic (g)	Remote Control PCboard (g)	Remote Control metal (g)	Total device (g)
LCD-1	NEC	Multi Sync LCD 1810 XtraView	800	NA	9.0	NA	598	0	1,379	2,378	NA	NA	NA	5,165
LCD-2	Mitsubishi	LXA565W	762	NA	3.4	NA	352	0	1,023	2,591	NA	NA	NA	4,731
LCD-3	Mitsubishi	LXA565W	778	NA	3.3	NA	346	0	1,010	2,660	NA	NA	NA	4,997
LCD-4	Sony	SDM-M81	1,770	NA	12.5	NA	66	0	1,682	3,362	NA	NA	NA	6,892
LCD-5	Sony	CPD-M151	935	NA	4.6	NA	290	0	1,286	2,440	NA	NA	NA	4,956
LCD-6	Sony	SOM-X52	746	NA	4.5	NA	236	0	994	2,504	NA	NA	NA	4,576
LCD-7	Sony	SOM-HJ53	691	NA	4.4	NA	243	0	804	1,848	NA	NA	NA	3,596
Laptop-1	Toshiba	Satellite Pro 400CDT	360	NA	1.6	NA	541	42	973	1,015	NA	NA	NA	2,933
Laptop-2	Toshiba	Satellite	347	NA	1.6	NA	503	599	885	721	NA	NA	NA	3,057
Laptop-3	Toshiba	Satellite T 2130CT	384	NA	1.0	NA	468	41	826	642	NA	NA	NA	2,362
Laptop-4	Compaq	Presario 1277	438	NA	NA	NA	296	412	353	1,548	NA	NA	NA	3,047
PlasmaTV1	Sony	PFM0C1	5,670	13,608	NA	412	2,279	551	1,710	15,514	NA	NA	NA	39,745
PlasmaTV2	Sony	PFM-50C1	NA	13,200	NA	799	2,991	1,764	570	16,292	NA	NA	NA	35,615
PlasmaTV3	Panasonic	TY-ST50PX20	5,897	12,457	NA	2,138	3,555	1,847	8,165	31,300	64.15	15.95	1.07	65,417
PlasmaTV4	Samsung	SPN4235	4,300	9,000	NA	1,137	2,492	1,785	2,636	17,090	105	34.50	NA	38,440
LCD TV1	JVC	LT-26WX84	899	707	169	NA	1,095	638	4,006	11,400	92.07	30.42	NA	18,914
LCD TV2	JVC	LT-26WX84	890	714	174	NA	1,157	591	3,994	11,400	92.3	25.10	NA	18,920
LCD TV3	Gateway	GTW-L30M103	1,124	906	251	NA	781	665	2,754	9,600	117.2	36.03	NA	15,938
LCD TV4	Sharp	LC37HV4U	1,819	1,361	177	NA	1,682	678	7,711	16,556	135.1	29	NA	29,985

Table 2.Total Concentrations in mg/kg of entire device. Values above regulatory limits appear in bold face.

						500	500	10,000	75	100	2,500	8,000	2,500	1,000	3,500	2,000	100	500	700	2,400	5,000
Collector's Number		Type of Sample	Wt of part	Wt of Device	Factor= Part/Device	Sb	As	Ba	Be	Cd	Cr	Co	**Cu**	**Pb**	Mo	Ni	Se	Ag	Ti	V	Zn
LCD-1	MML0779-01	LCD Panel	800	5,165	0.15	ND	2.2	ND	ND	ND	10.7	ND	94	ND	ND	ND	ND	ND	ND	ND	ND
LCD-2	MML0779-07	LCD Panel	762	4,727	0.16	ND	ND	ND	ND	ND	3.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD-3	MML0779-13	LCD Panel	778	3,719	0.21	ND	ND	ND	ND	ND	7.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD-4	MML0779-19	LCD Panel	1,770	6,892	0.26	ND	3.9	ND	ND	ND	5.9	ND	ND	ND	10	ND	ND	ND	ND	ND	ND
LCD-5	MML0757-01	LCD Panel	935	4,958	0.19	ND	5.1	64	ND	ND	14.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD-6	MML0757-03	LCD Panel	746	4,576	0.16	ND	2.6	0	ND	ND	3.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD-7	MML0757-13	LCD Panel	691	3,596	0.19	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
mean			926	4,805	0.19						8										
sd			380	1,096	0.04						4										
cv%			41	23	18.8						56										
UL			1,138	5,416	0.21						10										
Laptop-1T	AN00853	LCD Panel	360	2,571	0.14	NA	2	54	ND	ND	4	ND	5	ND	4	2	ND	ND	ND	ND	3
Laptop-2T	MML0779-43	LCD Panel	347	3,057	0.11	ND	7	83	ND	ND	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Laptop-3T	MML0779-55	LCD Panel	384	2,362	0.16	ND	4	60	ND	ND	10	ND	ND	ND	ND	ND	ND	3	ND	ND	ND
Laptop-4T	MML0779-67	LCD Panel	438	3,047	0.14	ND	ND	ND	ND	ND	3	ND	345	13	ND	ND	ND	20	ND	ND	ND
mean			382	2,759	0.14		5	66			7										
sd			40	349	0.02		3	15			4										
cv%			11	13	14.4		56	23			59										
UL			420	3,088	0.16		7	80			10										
LCD-1	MML0770-03	PCBoard	598	5,165	0.12	79	ND	394	ND	ND	8	ND	**13,894**	**1,065**	ND	162	ND	35	4	ND	ND
LCD-2	MML0779-09	PCBoard	352	4,727	0.07	39	ND	112	ND	ND	4	6	**13,404**	745	ND	89	ND	42	ND	ND	ND
LCD-3	MML0779-15	PCBoard	346	3,719	0.09	72	ND	428	ND	ND	20	ND	**15,816**	**1,023**	ND	307	ND	50	ND	ND	ND
LCD-4	MML0779-21	PCBoard	66	6,892	0.01	2	0.3	56	ND	ND	ND	ND	**3,447**	60	ND	34	ND	3	ND	ND	ND
LCD-5	MML0757-03	PCBoard	290	4,958	0.06	49	2	240	ND	ND	3	ND	**16,402**	404	ND	170	ND	29	ND	ND	ND
LCD-6	MML0757-09	PCBoard	236	4,576	0.05	35	ND	274	ND	ND	52	ND	**13,429**	723	ND	114	ND	18	ND	ND	ND
LCD-7	MML0757-15	PCBoard	243	3,596	0.07	135	2	257	ND	ND	ND	ND	**15,535**	648	ND	135	ND	41	ND	ND	ND
mean			305	4,805	0.07	59		251			17		**13,132**	667		145		31			
sd			161	1,096	0.03	42		135			20		**4,439**	349		85		16			
cv%			53	23	49.8	72		54			119		34	52		59		53			
UL			394	5,416	0.09	82		325			29		**15,548**	857		191		40			
Laptop-1B	MML0779-27	PCBoard	541	2,571	0.21	337	ND	505	ND	ND	12	ND	**44,189**	**1,515**	ND	1,326	ND	101	ND	ND	ND
Laptop-2B	MML0779-39	PCBoard	503	3,057	0.16	142	ND	872	ND	ND	9	ND	**36,199**	**1,333**	ND	790	ND	97	ND	ND	ND
Laptop-3B	MML0779-51	PCBoard	468	2,362	0.20	277	ND	674	ND	ND	9	ND	**57,460**	**2,180**	ND	1,030	ND	48	ND	ND	ND
Laptop-4B	MML0779-63	PCBoard	296	3,047	0.10	117	ND	544	ND	ND	30	ND	**16,515**	**1,069**	43	952	ND	20	ND	ND	ND
mean			452	2,759	0.17	218		649			15		**38,591**	**1,524**		1,024		67			
sd			108	349	0.05	106		165			10		**17,131**	474		224		39			
cv%			24	13	30.3	49		26			67		44	31		22		59			
UL			554	3,088	0.22	305		784			23		**52,621**	**1,912**		1,208		99			

Table 2.Total Concentrations in mg/kg of entire device. Values above regulatory limits appear in bold face.

						500	**500**	**10,000**	**75**	**100**	**2,500**	**8,000**	**2,500**	**1,000**	**3,500**	**2,000**	**100**	**500**	**700**	**2,400**	**5,000**
Collector's Number		Type of Sample	Wt of part	Wt of Device	Factor= Part/Device	Sb	As	Ba	Be	Cd	Cr	Co	**Cu**	**Pb**	Mo	Ni	Se	Ag	Ti	V	Zn
PlasmaTV1		Outer Panel	5,670	39,745	0.14	ND	ND	ND	ND	ND	ND	ND	257	ND	ND	ND	ND	ND	ND	ND	ND
PlasmaTV2		Outer Panel	NA	35,615	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PlasmaTV3		Outer Panel	5,897	65,353	0.09	ND	ND	ND	ND	ND	ND	ND	153	6	ND	ND	ND	ND	ND	ND	ND
PlasmaTV4		Outer Panel	4,300	38,439	0.11	ND	ND	ND	ND	ND	ND	ND	157	15	ND	ND	ND	ND	ND	ND	ND
mean													189								
sd													59								
cv%													31								
UL													253								
PlasmaTV1		Inner panel	13,608	39,745	0.34	ND	ND	51	ND	ND	48	19	55	**8,560**	ND	24	ND	72	ND	ND	33
PlasmaTV2		Inner panel	13,200	35,615	0.37	ND	ND	44	ND	ND	34	11	122	**7,783**	ND	16	ND	52	ND	ND	48
PlasmaTV3		Inner panel	12,457	65,353	0.19	ND	ND	ND	ND	ND	4	ND	**ND**	419	ND	ND	ND	27	ND	ND	ND
PlasmaTV4		Inner panel	9,000	38,439	0.23	ND	ND	16	ND	ND	19	ND	1	**3,044**	ND	9	ND	28	ND	ND	63
mean			12,066	44,788	0.28			37			26		59	**4,951**		16		45			48
sd			2,099	13,818	0.09			19			19		61	**3,882**		7		22			15
cv%			17	31	30.2			51			73		103	78		45		48			31
UL			14,046	57,818	0.37			58			42		126	**8,131**		24		62			60
PlasmaTV1		PCBoards	2,279	39,745	0.06	13	1.2	149	ND	ND	5	ND	**16,055**	631	ND	46	ND	17	ND	ND	ND
PlasmaTV2		PCBoards	2,991	35,615	0.08	19		529	ND	ND	5	ND	**22,675**	747	ND	445	ND	13	ND	ND	ND
PlasmaTV3		PCBoards	3,555	65,353	0.05	19		92	ND	ND	ND	ND	**11,423**	76	ND	87	ND	14	ND	ND	ND
PlasmaTV4		PCBoards	2,492	38,439	0.06	32	1.5	136	ND	ND	4	4	**14,911**	713	ND	ND	ND	ND	ND	ND	ND
mean			2,829	44,788	0.07	21		227					**16,266**	542							
sd			568	13,818	0.01	8		203					**4,705**	314							
cv%			20	31	20.4	39		90					29	58							
UL			3,365	57,818	0.08	28		393					**20,119**	799							
LCD TV1	MNC0812-01	Outer Panel	899	18,915	0.05	ND	1	16	ND	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD TV2	MNC0812-11	Outer Panel	890	18,920	0.05	ND	1	16	ND	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD TV3	MNC0812-21	Outer Panel	1,124	15,938	0.07	ND	ND	ND	ND	ND	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD TV4	MCN0167-19	Outer Panel	1,819	29,715	0.06	4	ND	25	ND	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
mean			1,183	20,872	0.06						3										
sd			438	6,060	0.01						1										
cv%			37	29	20.1						39										
UL			1,596	26,587	0.07						4										
LCD TV1	MNC0812-02	Inner panel	703	18,915	0.04		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD TV2	MNC0812-12	Inner panel	714	18,920	0.04		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD TV3	MNC0812-22	Inner panel	906	15,938	0.06		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD TV4	MCN0167-20	Inner panel	1,361	29,715	0.05		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
mean			921	20,872	0.04																
sd			308	6,060	0.01																
cv%			33	29	20.7																
UL			1,211	26,587	0.05																

Table 2.Total Concentrations in mg/kg of entire device. Values above regulatory limits appear in bold face.

						500	**500**	**10,000**	**75**	**100**	**2,500**	**8,000**	**2,500**	**1,000**	**3,500**	**2,000**	**100**	**500**	**700**	**2,400**	**5,000**
Collector's Number		Type of Sample	Wt of part	Wt of Device	Factor= Part/Device	Sb	As	Ba	Be	Cd	Cr	Co	**Cu**	**Pb**	Mo	Ni	Se	Ag	Ti	V	Zn
LCD TV1	MNC0812-04	PCBoards	1,095	18,915	0.06	41	1	272	ND	ND	4	ND	**9,841**	411	ND	45	ND	28	ND	ND	ND
LCD TV2	MNC0812-14	PCBoards	1,157	18,920	0.06	41	ND	330	ND	ND	7	ND	**11,009**	673	ND	153	ND	33	ND	ND	ND
LCD TV3	MNC0812-24	PCBoards	781	15,938	0.05	98	1	269	ND	ND	3	2	**9,797**	588	ND	294	ND	12	ND	ND	ND
LCD TV4	MCN0167-21	PCBoards	1,682	29,715	0.06	21	ND	249	ND	ND	2	ND	**8,491**	623	ND	68	ND	18	ND	ND	ND
mean			1,179	20,872	0.06	50		280			4		**9,785**	574		140		23			
sd			374	6,060	0.01	33		35			2		1,029	114		113		10			
cv%			32	29	9.2	66		12			56		11	20		81		43			
UL			1,531	26,587	0.06	81		309			6		**10,627**	667		232		30			
LCD TV1	MNC0812-10	RemotePCB	30	123	0.25	ND	ND	ND	ND	ND	ND	ND	**71,967**	ND	ND	ND	ND	13	ND	ND	ND
LCD TV2	MNC0812-20	RemotePCB	25	117	0.21	ND	ND	ND	ND	ND	ND	ND	**5,131**	ND	ND	ND	ND	38	ND	ND	ND
LCD TV3	MNC0812-30	RemotePCB	36	153	0.24	ND	ND	ND	ND	ND	ND	ND	**63,499**	800	ND	753	ND	14	ND	ND	ND
LCD TV4	MCN0167-25	RemotePCB	29	164	0.18	34	6	ND	ND	ND	15	ND	**9,355**	**1,306**	ND	300	ND	55	ND	ND	ND
PlasmaTV3	MNC0167-07	RemotePCB	16	81	0.196	45	ND	ND	ND	ND	ND	ND	**12,570**	255	ND	216	ND	110	ND	ND	ND
PlasmaTV4	MNC0167-16	RemotePCB	35	105	0.329	180	ND	2,800	ND	ND	60	200	**18,071**	**8,871**	ND	**6,900**	ND	340	ND	ND	ND
mean			243	3,904	0.21								**27,317**	**2,808**		2,042		86			
sd			568	10,002	0.08								**27,986**	**4,065**		**3,247**		117			
cv%			234	256	38.99								102	145		159		136			
UL			632	10,748	0.26								**44,181**	**6,137**		**4,702**		156			

Table 3.TCLP in mg/L of entire device. Values above regulatory limits appear in bold face.

						5	100	1	5	5	1	5
Collector's Number		Type of Sample	Wt of part	Wt of Device	Factor= Part/Device	As	Ba	Cd	Cr	Pb	Se	Ag
LCD-1	MML0779-01	LCD Panel	800	5,165	0.155	ND	ND	ND	ND	ND	ND	ND
LCD-2	MML0779-07	LCD Panel	762	4,727	0.161	ND	ND	ND	ND	ND	ND	ND
LCD-3	MML0779-13	LCD Panel	778	4,797	0.162	ND	ND	ND	ND	ND	ND	ND
LCD-4	MML0779-19	LCD Panel	1,770	6,892	0.257	ND	ND	ND	ND	ND	ND	ND
LCD-5	MML0757-01	LCD Panel	935	4,958	0.188	ND	0.07	ND	0.002	ND	ND	ND
LCD-6	MML0757-03	LCD Panel	746	4,576	0.163	0.02	0.06	ND	ND	ND	ND	ND
LCD-7	MML0757-13	LCD Panel	691	3,596	0.192	0.02	ND	ND	ND	ND	ND	ND
mean			926	4,959	0.18							
sd			380	989	0.04							
cv%			41	20	19.56							
UL			1,132	5,497	0.20							
Laptop-1T	MML0779-25	LCD Panel	360	2,571	0.140	ND	ND	ND	ND	ND	ND	ND
Laptop-2T	MML0779-43	LCD Panel	347	3,057	0.114	ND	ND	ND	ND	ND	ND	ND
Laptop-3T	MML0779-55	LCD Panel	384	2,362	0.163	ND	ND	ND	ND	ND	ND	ND
Laptop-4T	MML0779-67	LCD Panel	438	3,047	0.144	ND	ND	ND	ND	1.72	ND	ND
mean			382	2,759	0.140							
sd			40	349	0.020							
cv%			11	13	14.4							
UL			415	3,045	0.16							
LCD-1	MML0770-03	PCBoard	598	5,165	0.116	ND	ND	ND	ND	0.16	ND	ND
LCD-2	MML0779-09	PCBoard	352	4,727	0.074	ND	ND	0.04	ND	**27.55**	ND	ND
LCD-3	MML0779-15	PCBoard	346	4,797	0.072	NA	NA	NA	NA	NA	NA	NA
LCD-4	MML0779-21	PCBoard	66	6,892	0.010	NA	NA	NA	NA	NA	NA	NA
LCD-5	MML0757-03	PCBoard	290	4,958	0.059	0.01	0.20	ND	0.004	**18.74**	ND	ND
LCD-6	MML0757-09	PCBoard	236	4,576	0.052	ND	0.19	ND	0.001	**30.47**	ND	ND
LCD-7	MML0757-15	PCBoard	243	3,596	0.068	ND	0.24	0.003	0.003	**26.34**	ND	ND
mean			305	4,959	0.06					**21**		
sd			161	989	0.03					**12**		
cv%			53	20	49.27					59		
UL			392	5,497	0.08					**29**		
Laptop-1B	MML0779-27	PCBoard	541	2,571	0.210	ND	ND	ND	ND	**76**	ND	ND
Laptop-2B	MML0779-39	PCBoard	503	3,057	0.165	ND	ND	0.03	ND	**58**	ND	ND
Laptop-3B	MML0779-51	PCBoard	468	2,362	0.198	ND	ND	0.03	ND	**81**	ND	ND
Laptop-4B	MML0779-63	PCBoard	296	3,047	0.097	ND	ND	ND	ND	**22**	ND	ND
mean			452	2,759	0.168					**59**		
sd			108	349	0.051					**27**		
cv%			24	13	30.3					45		
UL			541	3,045	0.21					**81**		
PlasmaTV1		Outer Panel	5,670	39,745	0.143	ND	ND	ND	ND	ND	ND	ND
PlasmaTV2		Outer Panel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PlasmaTV3		Outer Panel	5,897	65,353	0.090	ND	ND	ND	ND	0.05	ND	ND
PlasmaTV4		Outer Panel	4,300	38,439	0.112	ND	ND	ND	ND	0.07	ND	ND
mean			5,289	47,846	0.11							
sd			864	15,176	0.03							
cv%			16	32	23							
UL			6,230	60,275	0.14							

Table 3.TCLP in mg/L of entire device. Values above regulatory limits appear in bold face.

						5	100	1	5	5	1	5
Collector's Number		Type of Sample	Wt of part	Wt of Device	Factor= Part/Device	As	Ba	Cd	Cr	Pb	Se	Ag
PlasmaTV1		Inner panel	13,608	39,745	0.342	ND	0.31	ND	ND	**29**	ND	ND
PlasmaTV2		Inner panel	13,200	35,615	0.371	ND	0.63	ND	ND	**27**	ND	ND
PlasmaTV3		Inner panel	12,457	65,353	0.191	ND	0.53	ND	ND	**101**	ND	ND
PlasmaTV4		Inner panel	9,000	38,439	0.234	ND	0.19	ND	ND	**28**	ND	ND
mean			12,066	44,788	0.28		0.4			**46**		
sd			2,099	13,818	0.09		0.2			**36**		
cv%			17	31	30		49			**78**		
UL			13,785	56,105	0.35		0.6			76		
PlasmaTV1		PCBoards	2,279	39,745	0.057	ND	0.21	ND	ND	**13**	ND	ND
PlasmaTV2		PCBoards	2,991	35,615	0.084	ND	0.34	ND	ND	**42**	ND	ND
PlasmaTV3		PCBoards	3,555	65,353	0.054	ND	0.21	ND	ND	1	ND	ND
PlasmaTV4		PCBoards	2,492	38,439	0.065	ND	0.23	ND	ND	**27**	ND	ND
mean			2,829	44,788	0.07		0.25			**21**		
sd			568	13,818	0.01		0.06			**18**		
cv%			20	31	20		24			84		
UL			3,295	56,105	0.08		0.30			**35**		
LCD TV1	MNC0812-01	Outer Panel	899	18,915	0.05	ND	0.02	ND	ND	ND	ND	ND
LCD TV2	MNC0812-11	Outer Panel	890	18,920	0.05	ND	0.02	ND	ND	ND	ND	ND
LCD TV3	MNC0812-21	Outer Panel	1,124	15,938	0.07	ND	0.00	ND	ND	ND	ND	ND
LCD TV4	MCN0167-19	Outer Panel	1,819	29,715	0.06	ND	0.04	ND	ND	0.01	ND	ND
mean			1,183	20,872	0.06							
sd			438	6,060	0.01							
cv%			37	29	20							
UL			1,541	25,835	0.07							
LCD TV1	MNC0812-02	Inner panel	703	18,915	0.04	ND	ND	ND	ND	ND	ND	ND
LCD TV2	MNC0812-12	Inner panel	714	18,920	0.04	ND	ND	ND	ND	ND	ND	ND
LCD TV3	MNC0812-22	Inner panel	906	15,938	0.06	ND	ND	ND	ND	ND	ND	ND
LCD TV4	MCN0167-20	Inner panel	1,361	29,715	0.05	ND	ND	ND	ND	ND	ND	ND
mean			921	20,872	0.04							
sd			308	6,060	0.01							
cv%			33	29	21							
UL			1,173	25,835	0.05							
LCD TV1	MNC0812-04	PCBoards	1,095	18,915	0.06	ND	0.20	ND	ND	**14**	ND	ND
LCD TV2	MNC0812-14	PCBoards	1,157	18,920	0.06	ND	0.23	ND	ND	**15**	ND	ND
LCD TV3	MNC0812-24	PCBoards	781	15,938	0.05	ND	0.16	ND	ND	**17**	ND	ND
LCD TV4	MCN0167-21	PCBoards	1,682	29,715	0.06	ND	0.16	ND	ND	**16**	ND	ND
mean			1,179	20,872	0.06		0.2			**15**		
sd			374	6,060	0.01		0.04			1		
cv%			32	29	9		18.7			9		
UL			1,485	25,835	0.06		0.2			**17**		

Table 4. WET-extractable elements in mg/L of entire device. Values above regulatory limits appear in bold face.

						15	**5**	**100**	**175**	**1**	**5**	**80**	**25**	**5**	**350**	**20**	**1**	**5**	**7**	**24**	**250**	**0.2**
Collector's Number		Type of Sample	Wt of part	Wt of Device	Factor= Part/Device	Sb	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Mo	Ni	Se	Ag	Ti	V	Zn	Hg
LCD-1	MML0779-01	LCD Panel	800	5,165	0.155	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD-2	MML0779-07	LCD Panel	762	4,727	0.161	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD-3	MML0779-13	LCD Panel	778	4,797	0.162	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD-4	MML0779-19	LCD Panel	1,770	6,892	0.257	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD-5	MML0757-01	LCD Panel	935	4,958	0.188	ND	ND	0.21	ND	ND	0.01	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD-6	MML0757-03	LCD Panel	746	4,576	0.163	ND	ND	0.18	ND	ND	0.004	ND	0.07	ND	ND	ND	ND	ND	ND	ND	0.02	ND
LCD-7	MML0757-13	LCD Panel	691	3,596	0.192	ND	ND	ND	ND	ND	ND	ND	0.08	ND	ND	0.02	ND	ND	ND	ND	0.02	ND
mean			926	4,959	0.18																	
sd			380	989	0.04																	
cv%			41	20	19.56																	
UL			1,132	5,497	0.20																	
Laptop-1T	MML0779-25	LCD Panel	360	2,571	0.140	ND	ND	0.50	ND	ND	0.11	ND	0.18	ND	0.15	ND	ND	ND	ND	ND	0.13	ND
Laptop-2T	MML0779-43	LCD Panel	347	3,057	0.114	ND	ND	ND	ND	ND	ND	ND	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND
Laptop-3T	MML0779-55	LCD Panel	384	2,362	0.163	ND	ND	ND	ND	ND	ND	ND	0.20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Laptop-4T	MML0779-67	LCD Panel	438	3,047	0.144	0.03	ND	ND	ND	ND	ND	ND	0.78	6.04	ND	ND	ND	ND	ND	ND	ND	ND
mean			382	2,759	0.140								0.322									
sd			40	349	0.020								0.304									
cv%			11	13	14.4								94.2									
UL			415	3,045	0.157								0.57									
LCD-1	MML0770-03	PCBoard	598	5,165	0.116	1.03	ND	2.08	ND	ND	ND	ND	ND	0.28	ND	ND	ND	ND	0.06	ND	1.62	ND
LCD-2	MML0779-09	PCBoard	352	4,727	0.074	0.73	ND	1.19	ND	0.07	ND	ND	ND	0.28	ND	0.97	ND	ND	ND	ND	21.6	ND
LCD-3	MML0779-15	PCBoard	346	4,797	0.072	0.69	ND	0.72	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.08	ND
LCD-4	MML0779-21	PCBoard	66	6,892	0.010	0.08	ND	0.20	ND	ND	ND	ND	ND	0.96	ND	ND	ND	ND	ND	ND	0.16	ND
LCD-5	MML0757-03	PCBoard	290	4,958	0.059	ND	ND	1.23	ND	ND	0.01	ND	ND	1.23	ND	0.12	ND	ND	ND	ND	0.47	ND
LCD-6	MML0757-09	PCBoard	236	4,576	0.052	ND	ND	1.19	ND	ND	0.01	0.01	0.004	0.11	ND	0.07	ND	ND	ND	ND	0.51	ND
LCD-7	MML0757-15	PCBoard	243	3,596	0.068	ND	ND	0.95	ND	0.01	0.01	0.05	0.01	0.23	ND	0.44	ND	ND	ND	ND	2.43	ND
mean			305	4,959	0.06	0.633		1.1						0.5		0.401					4	
sd			161	989	0.03	0.398		0.6						0.5		0.412					8	
cv%			53	20	49.27	62.9		53.1						90		102.8					196	
UL			392	5,497	0.081	0.96		1.39						0.76		0.74					8.23	

Table 4. WET-extractable elements in mg/L of entire device. Values above regulatory limits appear in bold face.

						15	**5**	**100**	**175**	**1**	**5**	**80**	**25**	**5**	**350**	**20**	**1**	**5**	**7**	**24**	**250**	**0.2**
Collector's Number		Type of Sample	Wt of part	Wt of Device	Factor= Part/Device	Sb	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Mo	Ni	Se	Ag	Ti	V	Zn	Hg
Laptop-1B	MML0779-27	PCBoard	541	2,571	0.210	2.95	ND	3.37	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.01	ND
Laptop-2B	MML0779-39	PCBoard	503	3,057	0.165	1.81	ND	2.14	ND	22.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.97	ND
Laptop-3B	MML0779-51	PCBoard	468	2,362	0.198	2.77	ND	2.38	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.96	ND
Laptop-4B	MML0779-63	PCBoard	296	3,047	0.097	0.60	ND	2.14	ND	ND	ND	ND	ND	0.30	ND	ND	ND	ND	ND	ND	12.63	ND
mean			452	2,759	0.168	2		3													5	
sd			108	349	0.051	1		1													6	
cv%			24	13	30.3	53		23													119	
UL			541	3,045	0.21	3		3													9	
PlasmaTV1		Outer Panel	5,670	39,745	0.143	ND	ND	ND	ND	ND	ND	ND	1.85	ND	ND	ND	ND	ND	ND	ND	0.74	ND
PlasmaTV2		Outer Panel	NA	35,615	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PlasmaTV3		Outer Panel	5,897	65,353	0.090	ND	ND	ND	ND	ND	ND	ND	1.08	ND	ND	ND	ND	ND	ND	ND	ND	ND
PlasmaTV4		Outer Panel	4,300	38,439	0.112	ND	ND	ND	ND	ND	ND	ND	1.68	0.16	ND	ND	ND	ND	ND	ND	0.02	0.56
mean			5,289	44,788	0.115								1.54									
sd			864	13,818	0.026								0.40									
cv%			16	31	22.9								26.3									
UL			6,232	59,866	0.14								1.98									
PlasmaTV1		Inner panel	13,608	39,745	0.342	ND	ND	1.6	ND	ND	ND	ND	0.24	**96**	ND	ND	ND	ND	ND	ND	0.45	ND
PlasmaTV2		Inner panel	13,200	35,615	0.371	ND	ND	2.6	ND	ND	ND	ND	0.15	**93**	ND	ND	ND	ND	ND	ND	0.59	ND
PlasmaTV3		Inner panel	12,457	65,353	0.191	ND	ND	3.0	ND	ND	ND	ND	0.07	**116**	ND	0.05	ND	ND	ND	ND	3.62	ND
PlasmaTV4		Inner panel	9,000	38,439	0.234	ND	ND	1.0	ND	ND	ND	ND	0.03	**122**	ND	0.07	ND	ND	ND	ND	3.75	ND
mean			12,066	44,788	0.284			2.1					0.123	**107**							2.101	
sd			2,099	13,818	0.086			0.9					0.092	**15**							1.829	
cv%			17	31	30.2			44					75.0	14							87.0	
UL			13,785	56,105	0.35			3					0.20	**119**							3.60	
PlasmaTV1		PCBoards	2,279	39,745	0.057	0.23	ND	1.43	ND	ND	ND	ND	0.003	0.09	ND	ND	ND	ND	ND	ND	ND	ND
PlasmaTV2		PCBoards	2,991	35,615	0.084	0.36	ND	1.85	ND	ND	ND	ND	0.003	0.08	ND	ND	ND	ND	ND	ND	1.34	ND
PlasmaTV3		PCBoards	3,555	65,353	0.054	0.50	ND	1.41	ND	ND	ND	ND	0.004	0.04	ND	0.05	ND	ND	ND	ND	1.58	0.28
PlasmaTV4		PCBoards	2,492	38,439	0.065	0.26	ND	1.43	ND	ND	ND	ND	0.003	0.15	ND	0.08	ND	ND	ND	ND	6.03	ND
mean			2,829	44,788	0.065	0.34		1.53					0.003	0.1							2.983	
sd			568	13,818	0.013	0.12		0.21					0.001	0.05							2.640	
cv%			20	31	20.4	36		13.8					24.5	51.7							88.5	
UL			3,295	56,105	0.08	0.44		1.70					0.004	0.1							5.15	

Table 4. WET-extractable elements in mg/L of entire device. Values above regulatory limits appear in bold face.

						15	**5**	**100**	**175**	**1**	**5**	**80**	**25**	**5**	**350**	**20**	**1**	**5**	**7**	**24**	**250**	**0.2**
Collector's Number		Type of Sample	Wt of part	Wt of Device	Factor= Part/Device	Sb	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Mo	Ni	Se	Ag	Ti	V	Zn	Hg
LCD TV1	MNC0812-01	Outer Panel	899	18,915	0.048	ND	ND	0.14	ND	ND	ND	ND	0.024	0.01	ND	ND	ND	ND	ND	ND	0.03	ND
LCD TV2	MNC0812-11	Outer Panel	890	18,920	0.047	ND	ND	0.13	ND	ND	ND	ND	0.014	ND	ND	ND	ND	ND	ND	ND	0.02	ND
LCD TV3	MNC0812-21	Outer Panel	1,124	15,938	0.071	ND	ND	ND	ND	ND	ND	ND	0.085	0.01	ND	ND	ND	ND	ND	ND	0.01	ND
LCD TV4	MCN0167-19	Outer Panel	1,819	29,715	0.061	0.03	ND	0.18	ND	ND	ND	ND	0.001	0.02	ND	ND	ND	ND	ND	ND	ND	ND
mean			1,183	20,872	0.057			0.2					0.03	0.01							0.019	
sd			438	6,060	0.011			0.0					0.04	0.004							0.010	
cv%			37	29	20.1			15.9					120	31.6							51.4	
UL			1,541	25,835	0.07			0.18					0.1	0.02							0.03	
LCD TV1	MNC0812-02	Inner panel	703	18,915	0.04	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD TV2	MNC0812-12	Inner panel	714	18,920	0.04	ND	ND	ND	ND	ND	ND	ND	0.03	0.01	ND	ND	ND	ND	ND	ND	ND	ND
LCD TV3	MNC0812-22	Inner panel	906	15,938	0.06	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD TV4	MCN0167-20	Inner panel	1,361	29,715	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
mean			921	20,872	0.044								0.02									
sd			308	6,060	0.009								0.01									
cv%			33	29	20.7								77									
UL			1,173	25,835	0.05								0.03									
LCD TV1	MNC0812-04	PCBoards	1,095	18,915	0.06	1.04	ND	1.56	ND	ND	0.01	ND	0.004	0.08	ND	ND	ND	ND	ND	ND	3.07	ND
LCD TV2	MNC0812-14	PCBoards	1,157	18,920	0.06	1.04	ND	1.77	ND	ND	0.02	0.03	0.01	0.08	ND	0.09	ND	ND	ND	ND	6.12	ND
LCD TV3	MNC0812-24	PCBoards	781	15,938	0.05	1.13	ND	1.18	ND	ND	0.01	0.00	0.01	0.08	ND	0.07	ND	ND	ND	ND	3.58	ND
LCD TV4	MCN0167-21	PCBoards	1,682	29,715	0.06	0.34	ND	1.25	ND	ND	0.01	0.07	0.01	0.04	ND	0.10	ND	ND	ND	ND	4.64	ND
mean			1,179	20,872	0.056	0.9		1.4			0.01	0.04	0.01	0.1		0.09					4.4	
sd			374	6,060	0.005	0.4		0.3			0.005	0.03	0.001	0.020		0.01					1.3	
cv%			32	29	9.2	41.4		19.4			45.1	90	20.4	28.3		14					31.0	
UL			1,485	25,835	0.06	1.2		1.7			0.01	0.06	0.01	0.1		0.10					5.5	

Table 5 **Concentrations of Hg (mg/kg) in CCFL and in entire device. Values above regulatory limits appear in bold face.**

TTLC			20								
CCFL	**ID**	**CCFL WT (g)**	**Hg in CCFL (mg/Kg)**	**Dupl 1**	**Dupl 2**	**Mean**	**SD**	**%CV**	**DEVICE WT (g)**	**Factor= Part/Device**	**Hg in DEVICE (mg/Kg)**
LCD1	MML0779-02	8.99	**110**	**984**	**878**	**657**	**477**	72.6	5,165	0.00174	1.14
LCD2	AN00852	3.4	**337**			**337**			4,727	0.00072	0.24
LCD3	MML0779-14	3.33	**520**	**745**	**306**	**524**	**220**	41.9	4,797	0.00069	0.36
LCD4	MML0779-20	12.50	**32**	**72**	**38.2**	**47**	**22**	45.4	6,892	0.00181	0.09
LCD5	MML0757-02	4.57	**43**	**59.4**	**147**	**83**	**56**	67.3	4,958	0.00092	0.08
LCD6	MML0757-08	4.54	**48**	**20.8**	**40.3**	**36**	14	38.6	4,576	0.00099	0.04
LCD7	MML0757-14	4.40	**230**	**63**	**132**	**142**	**84**	59.2	3,596	0.00122	0.17
LAPTOP1	AN00853	1.59	**220**			**220**			2,933	0.00054	0.12
LAPTOP2	MML0779-44	1.62	**300**	**349**	**329**	**326**	**25**	7.6	3,057	0.00053	0.17
LAPTOP3	MML0779-56	0.99	**440**	**438**		**439**			2,362	0.00042	0.18
LAPTOP4	NA	NA	NA						NA	NA	NA
PlasmaTV1	NA	NA	NA						NA	NA	NA
PlasmaTV2	NA	NA	NA						NA	NA	NA
PlasmaTV3	NA	NA	NA						NA	NA	NA
PlasmaTV4	NA	NA	NA						NA	NA	NA
LCD TV1	MNC0812-03	169	**660**	**313**	**321**	**431**	**198**	45.9	18,915	0.00893	3.85
LCD TV2	MNC0812-13	173	**250**	**118**	**251**	**206**	**77**	37.1	18,920	0.00914	1.89
LCD TV3	MNC0812-23	251	**190**	**156**	**98.5**	**148**	**46**	31.2	15,938	0.01573	2.33
LCD TV4	MCN0167-18	177	**440**	**444**	**735**	**540**	**169**	31.3	29,715	0.00597	3.22
Average						**296**	**126**	43.5			

]

Table 6. Duplicate analysis for Total metals in selected components

					500	500	10,000	75	100	2,500	8,000	2,500	1,000	3,500	2,000	100	500	700	2,400	5,000
Collector's Number		Type of Sample	Wt of part	Wt of Device	Factor= Part/Device	Sb	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Mo	Ni	Se	Ag	Ti	V	Zn
PlasmaTV1		Outer Glass	5,670	39,745	0.143						11		257								
PlasmaTV1 RE		Outer Glass	5,670	39,745	0.143						14		171								
mean											12		214								
RPD											23.5		40.0								
PlasmaTV3		Outer Glass	5,897	65,353	0.090						16		153	5.5				42			
PlasmaTV3RE1		Outer Glass	5,897	65,353	0.090						12		144	4.9							
PlasmaTV3RE2		Outer Glass	5,897	65,353	0.090						11		226	2.3							
mean											13		174	4.2							
sd											3		45	1.7							
cv%											22.4		25.5	40.9							

TABLE 7. Summary Table. Values above regulatory limits appear in bold face.

Test	Element	Regulatory Limit		Device	Component	n	mean	sd	UL	Req N	Conclusions
TTLC	Cu	2,500	mg/kg								
				LCDMonitor	LCD panel	7	ND				
				Laptop	LCD panel	4	ND				
				PlasmaTV	Inner panel	4	59	61	126	0.1	
				LCDMonitor	PCBoard	7	**13,132**	**4,439**	**15,548**	0.5	Exceeds TTLC=2,500 mg/kg
				Laptop	PCBoard	4	**38,591**	**17,131**	**52,621**	0.6	Exceeds TTLC=2,500 mg/kg
				PlasmaTV	PCBoard	4	**16,266**	**4,705**	**20,119**	0.3	Exceeds TTLC=2,500 mg/kg
				LCDTV	PCBoard	4	**9,785**	1,029	**10,627**	0.1	Exceeds TTLC=2,500 mg/kg
				RemCont	PCBoard	6	**27,317**	**27,986**	**44,181**	3.4	Exceeds TTLC=2,500 mg/kg
TTLC	Pb	1,000	mg/kg								
				LCDMonitor	LCD panel	7	ND				
				Laptop	LCD panel	4	ND				
				PlasmaTV	Inner panel	4	**4,951**	**3,882**	**8,131**	2.6	Exceeds TTLC=1,000 mg/kg
				LCDMonitor	PCBoard	7	667	349	857	2.9	
				Laptop	PCBoard	4	**1,524**	474	**1,912**	2.2	Exceeds TTLC=1,000 mg/kg
				PlasmaTV	PCBoard	4	542	314	799	1.3	
				LCDTV	PCBoard	4	574	114	667	0.2	
				RemCont	PCBoard	6	**2,808**	**4,065**	**6,137**	**11.0**	Additional samples needed
TCLP	Pb	5	mg/L								
				LCDMonitor	LCD panel	7	ND				
				Laptop	LCD panel	4	ND				
				PlasmaTV	Inner panel	4	**46**	**36**	**76**	2.1	Exceeds TCLimit=5 mg/L
				LCDMonitor	PCBoard	5	**21**	**12**	**29**	1.4	Exceeds TCLimit=5 mg/L
				Laptop	PCBoard	4	**59**	**27**	**81**	0.6	Exceeds TCLimit=5 mg/L
				PlasmaTV	PCBoard	4	**21**	**18**	**35**	3.4	Exceeds TCLimit=5 mg/L
				LCDTV	PCBoard	4	**15**	1	**17**	0.1	Exceeds TCLimit=5 mg/L
WET	Pb	5	mg/L								
				LCDMonitor	LCD panel	7	ND				
				Laptop	LCD panel	4	ND				
				PlasmaTV	Inner panel	4	**107**	**15**	**119**	0.1	Exceeds STLC=5 mg/L
				LCDMonitor	PCBoard	7	0.5	0.5			
				Laptop	PCBoard	4	0.3	0.3			
				PlasmaTV	PCBoard	4	0.1	0.05			
				LCDTV	PCBoard	4	0.1	0.02			

Appendix A 1

Procedural SOP No. 916-S

Preparation of consumer electronic devices containing Liquid Crystal Displays (LCDs) for Metals, California Waste Extraction Test and Toxicity Characteristic Leaching Procedure

1 Scope and Application

1.1 This procedure is applicable to the preparation of samples of consumer electronic devices containing liquid crystal displays (LCDs) to determine the total metal content, California Waste extraction test (WET) and Toxicity Characteristic Leaching Procedure (TCLP) extractable metals in various components. For Hg testing in cold cathode fluorescent lamps (CCFLs) use HML, SOP No. 914-S.

1.2 This SOP describes the procedure to disassemble waste products, segregate components, and prepare samples prior to extraction or digestion procedures for subsequent analyses.

1.3 This procedure is recommended for use by laboratory assistants and/or technicians working under the close supervision of chemists experienced in the sample preparation requirements for inorganic analyses, and by chemists working independently.

2 Summary

2.1 Two product types of consumer electronic devices are identified: laptop computers and liquid crystal display (LCD) monitors.

2.2 The total weight of each device (sample) is recorded on Form 1. The samples are then photographed, disassembled and segregated into six major component fractions for subsequent preparation and possible analysis. These fractions are:

- 2.2.1 LCD panel
- 2.2.2 Cold Cathode Fluorescent Lamp (CCFL)
- 2.2.3 Printed circuit board
- 2.2.4 Plastics
- 2.2.5 Metal fractions
- 2.2.6 Batteries

Appendix A 1

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- 2.2.4 Plastics
- 2.2.5 Metal fractions
- 2.2.6 Batteries

Each component fraction is photographed, weighed and stored in separate labeled containers.

2.3 The required component fraction of a sample is shredded, milled to pass through a No.18 (1 mm) sieve, mixed for homogeneity, and then representatively sub-sampled to obtain aliquots for analysis.

Note: A No.10 (2 mm) sieve may be used for total, WET and TCLP if a No.18 (1 mm) is not available.

2.4 Particle size reduction is achieved by grinding to the required mesh size. An appropriate shredder and mill or grinder is used for this process (Retsch, Model #SM-2000, or equivalent).

2.5 Interferences from carryover from one sample to another must be minimized by thoroughly cleaning the equipment as needed. All containers must be clean and free of organic and inorganic substances. Small milling or grinding units may be cleaned as described in HML SOP 704-S.

3 Safety

3.1 Sample preparation should be performed in a well ventilated room.

3.2 Nitrile gloves may be worn for hand protection, but they must not come in contact with the sample, or the interior of the sample containers, to avoid any organic and inorganic contamination.

3.3 Use safety glasses or goggles when shredding, milling or grinding the samples.

3.4 The operator may wear a dust mask and coveralls if necessary during the process.

3.5 The work area (counters, balances, mills, equipment, tools) should be kept clean at all times.

3.6 Operating instructions must be followed while using the shredder and/or the grinder.

4 Apparatus and Materials

4.1 Hand tools: screwdrivers, electric drill/saw, cutters and pliers, etc.

4.2 Rotary mill or an automatic grinder capable of grinding hard plastics and printed circuit boards.

4.3 Sieve No. 18 (1 mm).

4.4 Electric cutter or a shredding machine capable of reducing particle size of the material into small pieces.

4.5 Top loading balance 20 Kg capacity (accurate to +/-1.0 g).

4.6 Top loading balance 1 Kg capacity (accurate to +/- 0.2 g).

4.7 Dust masks, face shields or eye goggles.

4.8 Nitrile gloves.

4.9 Teflon or glass containers of appropriate size for storing the prepared samples.

4.10 Liquid nitrogen

4.11 De-ionized water

4.12 Nitric acid, 5 percent

4.13 Acetone

5 Disassembly/Separation Procedure

5.1 Remove all external electrical cords and computer cables.

5.2 Label each sample, photograph, weigh and record weight using Form 1.

5.3 Unhinge and separate computer laptop samples into two samples, the LCD panel (i.e. the top part) and the Computer Processing Unit (i.e. the bottom part). Note: This may require disassembly and reassembly of the top portion of the laptop. Keep all component fractions of top and bottom parts separately. Assign suffix “B” for bottom and “T” for top parts to the ID number assigned to the device. From this point forward the top part (the LCD panel) will be analyzed as an LCD device sample.

5.4 Dismantle each sample and separate into its major component fractions, namely:
- 5.4.1 LCD panel
- 5.4.2 Cold Cathode Fluorescent Lamp (CCFL)
- 5.4.3 Printed circuit board
- 5.4.4 Plastics
- 5.4.5 Metal fractions
- 5.4.6 Batteries

5.5 Remove extraneous material, like nuts, screws, loose wires, and metal brackets and include with the metal component fraction.

5.6 Cold Cathode Fluorescent Lamp (CCFL) component fractions are photographed, weighed and prepared in accordance with SOP 914-S and analyzed.

5.7 Printed circuit board fractions are photographed, weighed and stored in properly identified containers.

5.8 Plastic components are photographed, weighed and stored in properly identified containers.

5.9 Metal components (including metal brackets, screws and wires) are photographed, weighed and stored in properly identified containers.

5.10 Batteries are weighed and stored separately.

6 Size Reduction Procedure

6.1 The entire sample component fraction slated for analysis (i.e., LCDs or circuit boards) is size-reduced by cutting/shredding and milling.

6.2 The milling equipment is fitted with a 1 mm sieve (2 mm sieve may be substituted) and the entire sample component fraction is processed.

6.3 Clean the shredder (wear mask and/or goggles) after processing each component fraction. Inspect to ensure the shredder is completely free of particles.

6.4 Process at least 10g of plastic chips, or other equipment blank material, for analysis to check for cross-contamination.

6.5 Collect the sieved sample, record weight on Form 1 and store in a properly labeled container.

6.6 Appropriate aliquots of the milled material are taken for metals, TCLP and WET determinations.

7 Quality Control

7.1 Although most of the QC requirements are defined in the respective analytical procedures, at a minimum, the following quality checks are required.

7.2 A sample batch is defined as a group of 10 samples [excluding LCS (laboratory control sample), MS (matrix spike) and MSD (matrix spike duplicate)] or less, that is processed together and that is comprised of similar component fractions (i.e. circuit board fractions or LCD Panel fractions).

7.3 A sample batch must consist of samples of the same matrix processed and digested/extracted and analyzed at the same time. Any other type of matrix QC included with the samples is not acceptable.

7.4 Each batch shall contain one method blank. The blank shall contain all reagents processed with that batch.

7.5 Each batch must include a replicate (sample duplicate).

7.6 Each batch shall contain an MS and an MSD.

7.7 Each batch shall contain a method standard or LCS containing all elements/compounds of concern.

7.8 Either the LCS or the MS/MSD (or both) must be prepared from secondary source standards. (i.e., the source must differ from the calibration standards by lot # at a minimum.)

8 References

8.1 California Code of Regulations, Title 22, Section 66261.20

8.2 HML, SOP 914-S

8.3 HML, SOP 704-S

8.4 Toxicity Characteristic Leaching Procedure, Federal Register, Method 1311, SW-846.

8.5 Test Methods for Evaluating Wastes: Physical/Chemical methods, US Environmental Protection Agency, Office of Solis Waste, Washington, DC, SW-846, Vol.1A, 3rd Edition, Update III.

9 Acknowledgement

This procedure was developed by the Hazardous Materials Laboratory, and the Waste Identification and Recycling Unit of the Department of Toxic Substances Control. For more information please contact Jarnail Garcha at (510) 540-3468.

Form 1. Weights of entire device and components in grams

HML or LAB ID#	Collector's ID#	Device (before disassembly)	Glass Panel	CCFL	PC Boards	Plastics	Metals	Batteries	Sum of Components	NOTES

Appendix A 2

Procedural SOP No. 914-S

Preparation of Cold Cathode Fluorescent Lamps for Mercury Testing, including WET and TCLP

1. Scope and Application

This SOP is applicable to the preparation of cold cathode fluorescent lamps (CCFL) for mercury analysis using EPA Method 7470A, 7471A, EPA Method 1311 for TCLP, and HML Method 910-M for WET. CCFLs are commonly used in liquid crystal display (LCD) electronic devices.

2. Safety

2.1. Protective nitrile gloves and a face shield should always be worn while crushing the samples.

2.2. Crushing of the samples should always be carried out in the hood.

2.3. Samples should be wrapped in double heavy duty tear resistant plastic bags before crushing.

3. Materials and Equipment

3.1. Heavy duty hydraulic press, 40000 lb RAM force, 4" RAM (Pasadena Hydraulics, Inc.), or equivalent.

3.2. Polypropylene tear resistant plastic bags that can withstand 165 g dart test per ASTM D1709-85 (1.5 X 2 ft).

3.3. Rubber Mallet or hammer.

3.4. Sieves – No.18 mesh (1 mm opening) and No. 10 (2 mm opening).

3.5. Glass containers.

3.6. Freezer (-12 ^{0} C).

3.7. Scissors or Wire cutter.

3.8. Mortar and Pestle.

4. Procedure:

4.1. For Total Mercury , TCLP and WET Determinations

4.1.1. Cut the end cap wiring attached to the lamp with the scissors or a wire cutter. Record the weight and store separately or save the wiring with the metal fraction of the device, if appropriate, as described in HML SOP 916-S. Store samples at minus 12^0 C.

4.1.2. Weigh and record the weight of each lamp (or all lamps for a composite sample, if TCLP and or WET analysis is required) along with the end caps.

4.1.3. Place the lamp with the end caps intact into a double heavy duty polypropylene plastic bag. For longer lamps use extra long bags. Leave the sample containing bag in a freezer for one hour.

Note: Do not remove the end caps or break the sample before freezing.

4.1.4. Take the frozen sample (in the plastic bag) out of the freezer and break the lamp initially with a rubber mallet or a hammer into small pieces, then crush the lamp under the hydraulic press (if necessary).

4.1.5. Transfer the crushed samples from the plastic bag into a mortar and grind with the pestle until all the materials pass through the 1mm sieve for total Hg analysis, and use the 2mm sieve for WET & TCLP. Weigh and set aside the visible small end cap copper wire pieces.

4.1.6 Weigh and transfer the sieved sample into a glass container and store at -12^0 C.

4.1.7. Take an aliquot of 0.2 to 1.0 gram of the above prepared sample for total Hg analysis by EPA Method 7471A (or use the entire sample if necessary, to meet the detection limit criteria for this analysis). Test sub-samples in triplicate.

4.1.8. If enough sample material is available, take an aliquot of the sample from step 4.1.6 of the above procedure for WET and TCLP analysis.

4.1.9. Five to ten grams of sample may be used for WET and /or TCLP, based on sample availability. Add a proportionate amount of extracting fluids to the sample and perform WET and/or TCLP extractions as outlined in HML Method 910-S and EPA Method 1311, respectively, and determine Hg concentrations by EPA Method 7470A.

Important Note: For WET and TCLP, use extraction vessels that can accommodate the sample and the extraction fluid with as little head space as possible to avoid any loss of Hg due to dissipation or evaporation.
Digest the extracts right after the extraction. Mercury may dissipate or evaporate in the head space if the extracts are stored for an extended period of time.

5. References

5.1. California Code of Regulations, Title 22, Vol. 29, Article 11, Sections 66699, 66700.

5.2. Toxicity Characteristic Leaching Procedure, Federal Register, Method 1311, SW-846.

5.3. Test Methods for Evaluating Wastes: Physical/Chemical Methods, US Environmental Protection Agency, Office of Solid Waste Washington, DC, SW846, Vol. 1A, 3rd Edition, Update III.

6. Acknowledgement

This procedure was developed by the Inorganic Section of the Hazardous Materials Laboratory, Department of Toxic Substances. For more information please contact Jarnail Garcha at (510) 540-3468.

Appendix B. Table QC-I: Quality Control for Total Concentrations

Collector's ID		Sb	Ar	Ba	Be	Cd	Cr	Co	Cu	Pb	Mo	Ni	Se	Ag	Th	V	Zn
LCD-1	Blank A13030-BLK9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD Panel	LCS (50 mg/Kg)	49.5	46.4	48.4	43.0	48.8	50.2	49.9	52.7	49.6	46.4	50.5	45.1	49.9	48.0	49.7	49.5
MMLO779-01	% RECOVERY	99	92.8	96.8	86	97.6	100	99.8	105	99.2	92.8	101	90.2	99.8	96.0	99.4	99
Spike level	Source Result	9.60	14.0	89.0	ND	ND	69	0.68	610	ND	2.00	32	ND	ND	ND	ND	17.0
50 mg/Kg	Matrix Spike 1	63.4	75.3	224	43.9	47.9	120	50.7	266	61.8	48.1	83.3	49.7	47.7	45.0	50.4	82.4
	Matrix Spike 2	61.6	67.9	183	43.6	46.7	124	49.7	142	50.7	48.8	82.5	47.4	47.4	44.7	49.9	71.6
	% REC. 1	108	123	270	87.8	95.8	102	100	NR	124	92.2	103	99.4	95.4	90.0	101	131
	% REC. 2	104	108	188	87.2	93.4	110	98	NR	101	93.6	101	94.8	94.8	89.4	99.8	109
	RPD	2.88	10.3	20.1	0.686	2.54	3.28	1.99	60.8	19.7	1.44	0.965	4.74	0.631	0.669	0.997	14
LCD-2	Blank 4A14014-BLK3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD Panel	LCS (50 mg/Kg)	48.9	48.2	48.6	44.1	48.1	50.4	50.8	48.5	50	48.3	50.4	47.4	49.6	49.3	50.4	49.4
MMLO779-7	% RECOVERY	97.8	96.4	97.2	88.2	97.4	101	102	97	100	96.6	101	94.8	99.2	98.6	101	98.8
Spike level	Source Result	5.2	ND	190	ND	ND	24	ND	26	ND	1.3	10	ND	ND	ND	ND	ND
50 mg/Kg	Matrix Spike 1	43.8	47.7	244	44.5	47.3	76.6	50.9	67.4	49.7	48.4	60.6	48.8	48.6	45.3	50.6	53.1
	Matrix Spike 2	43.7	48	341	42.6	47	76.8	50.3	82.3	47.9	47.4	60.6	47.3	47.1	42.3	49.1	53.4
	% REC. 1	77.2	95.4	108	89	94.6	105	102	82.8	99.4	94.2	101	97.6	97.2	90.6	101	106
	% REC. 2	77	96	302	85.2	94	106	101	112	95.8	92.2	101	94.6	94.2	84.6	98.2	107
	RPD	0.229	0.627	33.2	4.36	0.636	0.261	1.19	19.8	3.69	2.09	0	3.12	3.13	6.85	3.01	0.563
LCD-5	Blank 4C01012-BLK1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glass Panel	LCS (50 mg/Kg)	46.7	45.5	47.9	42.7	46.9	48.4	48.2	47.8	47.5	45.0	47.7	44.4	48.3	48.2	48.1	47.5
MNB0757-01	% RECOVERY	93.4	91.0	95.8	85.4	93.8	96.8	96.4	95.6	95.0	90.0	95.4	88.8	96.6	96.4	96.2	95.0
Spike level:	Source Result	ND	27.0	340	ND	ND	76	0.94	14	ND	7.60	33	ND	ND	ND	ND	ND
50 mg/Kg	Matrix Spike 1	36.4	93.5	658	43.8	45.6	125	48.8	61.2	46.8	53.1	81.7	46.5	47.2	43.2	48.5	48.4
	Matrix Spike 2	36.5	86.2	556	42.8	45.4	115	48.3	58.4	46.2	52.2	76.7	45.2	46.9	44.2	47.7	48.6
	% REC. 1	72.8	133	636	87.6	91.2	98.0	95.7	94.4	93.6	91.0	97.4	93.0	94.4	86.4	97.0	96.8
	% REC. 2	73.0	118	432	85.6	90.8	78.0	94.7	88.8	92.4	89.2	87.4	90.4	93.8	88.4	95.4	97.2
	RPD	0.274	8.12	16.8	2.31	0.44	8.33	1.03	4.68	1.29	1.71	6.31	2.84	0.638	2.29	1.66	0.412
Plasma TV-1	Blank 4C16012-BLK1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glass Panel Outer	LCS (50 mg/Kg)	47	47	47.8	42.7	47.8	49	48.6	47.5	48.5	46	48.8	46	49.1	47.2	48.6	48
MNB0739-01	% RECOVERY	94	94	95.6	85.4	95.6	98	97.2	95	97	92	97.6	92	98.2	94.4	97.2	96
Spike level	Source Result	14.0	ND	ND	ND	ND	75	2.00	1800	ND	2.20	35	ND	ND	ND	ND	130
50 mg/Kg	Matrix Spike	53.2	48.7	50.2	43.2	46.7	117	51.8	1660	49.5	48.6	80.8	44.2	48.3	45.8	48.6	203
	Matrix Spike Duplicate	53.8	49.8	50.6	43.4	47.3	137	51.1	1540	50.3	49.5	91.4	45.8	49.1	46.8	49.5	182
	% REC. 1	78.4	97.4	100	86.4	93.4	84	99.6	NR	99	92.8	91.6	88.4	96.6	91.6	97.2	146
	% REC. 2	79.6	99.6	101	86.8	94.6	124	98.2	NR	101	94.6	113	91.6	98.2	93.6	99	104
	RPD	1.12	2.23	0.794	0.462	1.28	15.7	1.36	7.5	1.6	1.83	12.3	3.56	1.64	2.16	1.83	10.9
Plasma TV-4	Blank 4C16033-BLK1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glass Panel Inner	LCS (50 mg/Kg)	48.4	47.1	48.1	43.9	48	49.8	49.3	46.5	50.2	47.9	49.4	45.9	49.1	46.9	49.3	48.6
MNC0167-12	% RECOVERY	96.8	94.3	96.2	87.8	96	99.6	98.6	93	100	95.8	98.8	91.8	98.2	93.8	98.6	97.2
Spike level	Source Result	ND	ND	21	ND	ND	26	ND	ND	4300	ND	14	ND	84	ND	ND	90
50 mg/Kg	Matrix Spike	163	51.2	848	45.1	51.8	100	53.2	61.4	57.4	51.2	70.8	47.7	51.4	51.2	51.6	53.6
	Matrix Spike Duplicate	178	53.4	909	45.9	52	105	53.4	69.2	58	52.2	73	51.6	51.4	50.9	51.8	54.4
	% REC. 1	326	102	NR	90.2	104	148	106	123	NR	102	114	95.4	NR	102	103	NR
	% REC. 2	356	107	NR	91.8	104	158	107	138	NR	104	118	103	NR	102	104	NR
	RPD	8.8	4.21	6.94	1.76	0.385	4.88	0.375	11.9	1.04	1.93	3.06	7.85	0	0.588	0.387	1.48

Appendix B. Table QC-I: Quality Control for Total Concentrations - Continuation

Collector's ID		Sb	Ar	Ba	Be	Cd	Cr	Co	Cu	Pb	Mo	Ni	Se	Ag	Th	V	Zn
LCD-TV1	Blank 4D12019-BLKB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glass Panel	LCS (50 mg/Kg)	49	50.2	51.1	48.8	51.4	52.3	52.1	53	52.4	49.4	51.9	49.4	50.8	52.5	51.8	52.2
Outer	% RECOVERY	98.6	100	102	97.6	103	105	104	106	105	98.8	104	98.8	102	105	104	104
MNC0812-01	Source Result	ND	28	340	ND	ND	57	ND	34	ND	1.6	22	ND	ND	ND	ND	ND
Spike level	Matrix Spike	40.3	82.3	507	45.3	46.7	97.6	48.3	100	51.2	46	68.6	45.9	47	47.1	48.3	54.4
50 mg/L	Matrix Spike Dup	41.1	83	490	46.2	48	111	48.9	103	51.2	46.6	71.2	45.4	47.5	47.7	48.4	55.7
	% REC. 1	80.6	109	334	90.6	93.4	81.2	96.6	132	102	88.8	93.2	91.8	94.0	94.2	96.6	109
	% REC. 2	82.2	110	300	92.4	96.0	108	97.8	138	102	90.0	98.4	90.8	95.0	95.4	96.8	111
	RPD	1.97	0.847	3.41	1.97	2.75	12.8	1.23	2.96	0	1.3	3.72	1.1	1.06	1.27	0.207	2.36
LCD-TV3	Blank 4d23023-BLK1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD RemCont	LCS (50 mg/Kg)	47.2	45.1	47.7	45.9	47.4	48	47.9	47.2	47.6	44.9	47.7	44.5	47.9	47	47.8	47.7
PC Board	% RECOVERY	94.4	90.2	95.4	91.8	94.8	96	95.8	94.4	95.2	89.8	95.4	89	95.8	94	95.6	95.4
MNC0812-30	Source Result	23	ND	140	0.57	ND	17	12	270000	3400	ND	3200	ND	58	ND	ND	2400
Spike level	Matrix Spike 1	46.8	21	146	44.8	41.4	61.3	57.5	304000	4970	21.9	2740	28	83.2	38.5	ND	12900
50 mg/L	Matrix Spike 2	54.7	32.3	519	42.9	43.4	71.4	60.2	58500	6950	19.6	5530	20.6	150	42.9	ND	4020
	% REC. 1	47.6	42	12	88.5	82.8	88.6	91.0	NR	NR	43.8	NR	56	50.4	77		NR
	% REC. 2	63.4	64.6	758	84.7	86.8	109	96.4	NR	NR	39.2	NR	41.2	184	85.8		NR
	RPD	15.6	42.4	112	4.33	4.72	15.2	4.59	135	33.2	11.1	67.5	30.5	57.3	10.8		105

Appendix B. Table QC-II: Quality Control for WET-extractable Elements

Collector's ID		Al	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Mo	Ni	Se	Ag	Th	V	Zn
LCD TV-4	Blank 4C15006-BLK1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CCFL	LCS (2 mg/Kg)	2.02	1.98	1.95	1.9	1.99	1.99	1.98	1.96	1.98	1.99	2	2.03	1.96	2.1	1.97	2.01
	% RECOVERY	101	99	97.5	97	99.5	99.5	99	98	99	99.5	100	102	98	104.0	98.5	100
Spike level	Source Result	ND	ND	6.9	ND	ND	0.064	0.06	0.41	250	ND	0.05	ND	ND	ND	ND	2
2 mg/L	Matrix Spike	1.9	1.7	9.27	1.84	1.99	1.96	1.94	2.33	242	1.88	1.93	1.61	1.89	1.9	1.87	3.59
	Matrix Spike Duplicate	1.95	2.05	8.94	1.85	1.96	1.99	1.96	2.35	241	1.9	1.94	2.04	1.96	1.97	1.91	3.51
	% REC. 1	95	85	118	92	95	94.8	94	96	-400	94	94	80.5	94.5	92.5	93.5	99.5
	% REC. 2	97.5	102	102	92.5	98	96.3	95	97	NR	95	94.5	102	98	98.5	95.5	95.5
	RPD	3.6	18.7	3.62	0.542	3.11	1.52	1.03	0.855	0.414	1.06	0.517	23.6	3.64	6.28	2.12	2.25
LCD-5	Blank 4C02004-BLK1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glass Panel	LCS (2 mg/Kg)	1.88	1.83	1.86	1.88	1.92	1.93	1.92	1.85	1.93	1.89	1.94	1.85	1.88	1.90	1.90	1.93
MNB0757-01	% RECOVERY	94.0	91.5	93.0	94.0	96.0	96.5	96.0	92.5	96.5	94.5	97	92.5	94.0	95.0	95.0	96.5
Spike level:	Source Result	ND	0.12	1.1	ND	ND	0.034	0.017	0.17	ND	ND	0.058	ND	ND	ND	ND	0.037
2 mg/L	Matrix Spike 1	1.92	2.0	2.95	1.89	1.9	1.96	1.93	2.03	1.95	1.88	1.98	2.00	1.37	1.92	1.89	1.95
	Matrix Spike Duplicate	1.91	1.79	2.96	1.89	1.90	1.95	1.93	2.03	1.92	1.88	1.98	1.92	1.36	1.94	1.89	1.95
	% REC. 1	96.0	93.0	92.5	94.5	95.5	96.3	95.6	93.0	97.5	94.0	96.10	100	68.5	96.0	94.5	95.6
	% REC. 2	95.5	83.5	93	94.5	95	95.8	95.6	93.0	96.0	94.0	96.1	96.0	68.0	97.0	94.5	95.6
	RPD	0.522	10.1	0.338	0	0.525	0.512	0	0	1.55	0	0	4.08	0.733	1.04	0	0
Plasma TV-1	Blank 4C18004-BLK1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glass Panel Outer	LCS (2 mg/Kg)	2.02	1.95	1.99	1.99	2.04	2.04	2.03	1.98	1.91	2.01	2.04	2.08	2.02	2.05	2.01	2.04
MNB0739-01	% RECOVERY	101	97.5	99.5	99.5	102	102	102	99	95.5	100	102	104	101	102	100	102
Spike level	Matrix Spike	2	2.05	1.96	1.94	1.98	2.03	2.12	14.5	2.17	2.04	2.06	2.01	1.93	1.98	1.95	6.9
2 mg/L	Matrix Spike Duplicate	2.03	1.94	1.98	1.95	1.99	2.04	2.12	14.6	2.15	2.04	2.05	2.02	1.94	2.05	1.97	6.9
	% REC. 1	100	102	95.2	97	98.6	98.7	99	75	107	98.6	99.6	100	95.4	99	97	85
	% REC. 2	102	97	96.2	97.5	99.1	99.2	99	80	106	98.6	99.2	101	95.8	102	98	85
	RPD	1.49	5.51	1.02	0.514	0.504	0.491	0	0.687	0.926	0	0.487	0.496	0.517	3.47	1.02	0
Plasma TV-4	Blank 4C22011-BLK1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glass Panel Inner	LCS (2 mg/Kg)	1.99	1.98	1.94	1.97	1.97	2	1.99	1.96	1.88	1.95	2.01	1.96	1.94	1.93	1.98	1.99
MNC0167-12	% RECOVERY	99.5	99	97	98.5	98.5	100	99.5	98	94	97.5	100	98	97	96.5	99	99.5
Spike level	Source Result	nd	nd	4.3	nd	nd	0.035	0.015	0.13	520	nd	0.31	nd	0.015	nd	0.02	16
2 mg/L	Matrix Spike	1.82	1.89	6.31	1.87	1.89	1.94	1.92	1.99	540	1.87	2.23	1.72	1.85	1.8	1.89	18.2
	Matrix Spike Duplicate	1.91	1.79	6.04	1.91	1.91	1.97	1.95	2	535	1.93	2.25	1.84	1.88	1.87	1.93	17.3
	% REC. 1	91	94.5	100	93.5	94.5	95.2	95.2	93	1000	93.5	96	86	91.8	90	93.5	110
	% REC. 2	95.5	89.5	87	95.5	95.5	96.8	96.8	93.5	750	96.5	97	92	93.2	93.5	95.5	65
	RPD	4.83	5.43	4.37	2.12	1.05	1.53	1.55	0.501	0.93	3.16	0.893	6.74	1.61	3.81	2.09	5.07
LCD 1	Blank 4A19009-BLK1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LCD Panel	LCS (2 mg/Kg)	2.00	2.21	1.97	2.0	2.04	2.03	1.97	2.00	1.96	1.98	2.02	1.97	1.99	2.05	1.97	2.03
MMLO779-01	% RECOVERY	100	110	98.5	98.5	102	102	98.5	100	98.0	99.0	101	98.5	99.5	102	98.5	102
Spike level	Source Result	1.7	ND	1.5	ND	ND	ND	0.64	ND	ND	ND	ND	ND	0.041	ND	0.15	ND
2 mg/L	Matrix Spike	3.55	2.08	3.43	1.95	1.99	2.02	2.57	2.02	2.01	1.98	2.10	1.49	1.98	2.03	2.13	1.96
	Matrix Spike Dup	3.69	2.08	3.54	1.97	2.01	2.06	2.63	2.05	2.10	1.99	2.14	1.51	2.11	1.96	2.17	1.98
	% REC. 1	92.5	104	96.5	97.5	99.5	101	96.5	101	100	99.0	105	74.5	97	102.0	98.0	99.0
	% REC. 2	99.5	104	102	98.5	100	103	99.5	102	105	99.5	107	75.5	103	98.0	99.0	101
	RPD	3.87	0	3.16	1.02	1	1.96	2.31	1.47	4.38	0.504	1.89	1.33	6.36	3.51	1.02	1.86

Appendix B. Table QC-II: Quality Control for WET-extractable Elements - Continuation

Collector's ID		Al	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Mo	Ni	Se	Ag	Th	V	Zn
LCD-TV1	Blank 4D12002-BLK1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glass Panel	LCS (2 mg/Kg)	1.89	1.97	1.92	1.93	1.94	1.96	1.96	1.95	2.18	1.93	1.97	1.80	1.91	2.02	1.92	1.97
Outer	% RECOVERY	94.5	98.5	96.0	96.5	97.0	98.0	98.0	97.5	109	96.5	98.5	90.0	95.5	101	96.0	98.5
MNC0812-01	Source Result	ND	0.20	3.00	ND	ND	0.042	0.012	0.52	0.23	ND	0.088	ND	0.0076	ND	ND	0.54
Spike level:	Matrix Spike 1	1.98	2.14	4.87	1.98	1.97	2.05	2.01	2.47	2.26	1.98	2.10	1.95	1.39	2.00	1.98	2.52
2 mg/L	Matrix Spike 2	1.99	2.26	4.87	2.00	1.98	2.05	2.02	2.47	2.27	2.00	2.13	2.00	1.42	2.04	1.99	2.53
	% REC. 1	99.0	97.0	93.5	99.0	98.5	100	99.9	97.5	102	99.0	101	97.5	69.1	100	99.0	99.0
	% REC. 2	99.5	103	93.5	100	99.0	100	100	97.5	102	100	102	100	70.6	102	99.5	99.5
	RPD	0.504	5.45	0.00	1.01	0.506	0.00	0.496	0.00	0.442	1.01	1.42	2.53	2.14	1.98	0.504	0.396

Appendix B. Table QC-III: Quality Control for TCLP-extractable Elements

Collector's ID		As	Ba	Cd	Cr	Pb	Se	Ag
LCD-1	Blank 4A14026-BLK1	ND	ND	ND	ND	ND	ND	ND
LCD Panel	LCS(0.800 mg/L)	0.2	4	0.02	0.4	1	0.2	0.4
MML0779-01	% RECOVERY	105	97.2	106	106	106	98.6	105
Spike Level	Source Result	ND	0.4	ND	ND	ND	ND	ND
0.800 mg/L	Matrix Spike 1	0.806	1.21	0.79	0.786	0.841	0.748	0.748
	Matrix Spike 2	0.88	1.27	0.836	0.834	0.879	0.809	0.789
	% REC. 1	101	101	98.8	98.2	105	93.5	93.5
	% REC. 2	110	109	104	104	110	101	98.6
	RPD	8.78	4.84	5.66	5.93	4.42	7.84	5.34
LCD-5	Blank 4C01013-BLK1	ND	ND	ND	ND	ND	ND	ND
Glass Panel	LCS (0.800 mg/Kg)	0.874	0.761	0.809	0.791	0.792	0.798	0.782
MNB0757-01	% RECOVERY	109	95.1	101	98.9	99	99.8	97.8
Spike Level	Source Result	ND	0.35	ND	0.01	0.02	ND	ND
0.800 mg/L	Matrix Spike 1	0.866	1.10	0.803	0.791	0.791	0.818	0.784
	Matrix Spike 2	0.918	1.13	0.825	0.807	0.818	0.823	0.804
	% REC. 1	108	93.8	100	97.6	96.4	102	98.0
	% REC. 2	115	97.5	103	99.6	99.8	103	100
	RPD	5.83	2.69	2.7	2	3.36	0.609	2.52
Plasma TV 2	Blank 4C19024-BLK1	ND	ND	ND	ND	ND	ND	ND
PC Board	LCS(0.800 mg/L)	0.86	0.752	0.797	0.794	0.792	0.819	0.780
MNB0739-09	% RECOVERY	108	94.0	99.6	99.2	99.0	102	97.5
Spike Level	Source Result	ND	1.7	ND	0.016	74	ND	ND
0.800 mg/L	Matrix Spike 1	0.826	2.46	0.79	0.80	77.1	0.785	0.769
	Matrix Spike 2	0.766	2.36	0.747	0.758	73.9	0.738	0.726
	% REC. 1	103	95	98.8	98	387	98.1	96.1
	% REC. 2	95.8	82.5	93.4	92.8	NR	92.2	90.8
	RPD	7.54	4.15	5.60	5.39	4.24	6.17	5.75
Laptap-2T	Blank 4A14026-BLK1	ND	ND	ND	ND	ND	ND	ND
LCD Panel	LCS (0.800 mg/Kg)	0.882	0.815	0.852	0.832	0.846	0.834	0.811
MML0779-43	% RECOVERY	110	102	106	104	106	104	101
Spike Level	Source Result	ND	0.74	ND	ND	0.13	ND	ND
0.800 mg/L	Matrix Spike 1	0.858	1.41	0.784	0.772	0.906	0.73	0.74
	Matrix Spike 2	0.847	1.35	0.755	0.744	0.861	0.709	0.709
	% REC. 1	107	83.7	98.0	96.5	97.0	91.2	92.5
	% REC. 2	106	76.2	94.4	93	91.4	88.6	88.6
	RPD	1.29	4.35	3.77	3.69	5.09	2.92	4.28
LCD TV1	Blank 4D14025-BLK1	ND	ND	ND	ND	ND	ND	ND
Glass Panel	LCS (0.800 mg/Kg)	0.800	0.763	0.764	0.773	0.784	0.785	0.757
MNC0812-01	% RECOVERY	100	95.4	95.5	96.6	98.0	98.1	94.6
Spike Level	Source Result	ND	0.43	ND	0.0063	0.061	ND	ND
0.800 mg/L	Matrix Spike 1	0.77	1.17	0.702	0.715	0.766	0.753	0.693
	Matrix Spike 2	0.86	1.30	0.781	0.795	0.85	0.857	0.768
	% REC. 1	96.2	92.5	87.8	88.6	88.1	94.1	86.6
	% REC. 2	108	109	97.6	98.6	98.6	107	96
	RPD	11	10.5	10.7	10.6	10.4	12.9	10.3

Appendix B. Table QC-IV: Quality Control for Total Hg in CCFL

Collector's ID	TOTAL Hg	
LCD-4	Blank4A22017-BLK1	ND
CCFL	LCS (spiked 8.0ug/L)	8.07
MML0779-20	%Recovery	101
Spike Level	Source Results	32000
2000ug/Kg	Matrix Spike	39200
	Matrix Spike Duplicate	56500
	% REC. 1	360
	% REC. 2	NR
	RPD	NR
LCD TV-4	Blank 4C16018-BLK1	ND
CCFL	LCS (8.0ug/L)	7.74
MNC0167-18	% Recovery	96.8
Spike Level	Source Result	440000
2000ug/Kg	Matrix Spike	521000
	Matrix Spike Duplicate	506000
	% REC. 1	NR
	% REC. 2	NR
	RPD	2.92
LCD-5	Blank 4C01022-BLK1	ND
CCFL	LCS (2000 ug/L)	1980
MNB0757-02	% RECOVERY	99.0
Spike Level	Source Result	43000
2000ug/Kg	Matrix Spike 1	69100
	Matrix Spike 2	114000
	% REC. 1	NR
	% REC. 2	NR
	RPD	NR

Collector's ID	Total Hg	
LCD-7	Blank4D16020-BLK1	ND
CCFL	LCS (Spike 8.0 ug/L)	7.04
MNC-0812-23	% Recovery	88
Spike Level	Source results	190000
667 ug/Kg	Matrix Spike	144000
	Matrix Spike Duplicate	58700
	% REC. 1	NR
	% REC. 2	NR
	RPD	NR

* = QB02 - The method blank contains this analyte at a concentration above the method reporting limit. This should be considered in evaluating the date for its intended purpose.

Appendix B. Table QC-V: Quality Control for Hg in non CCFL components

Collector's ID	**TCLP-extractable Hg**	
LCD-5	Blank 4C01033-BLK1	ND
Glass Panel	LCS(8 ug/L)	7.14
MNB0757-01	% RECOVERY	89.2
Spike Level	Source Result	ND
8 ug/L	Matrix Spike 1	8.76
	Matrix Spike 2	7.86
	% REC. 1	110
	% REC. 2	98.2
	RPD	10.8
LCD-5	Blank 4D14026-BLK1	ND
Glass Panel	LCS(8.0 ug/L)	7.18
MNC0812-01	% RECOVERY	89.8
Spike Level	Source Result	ND
8.0ug/L	Matrix Spike 1	5.5
	Matrix Spike 2	4.48
	% REC. 1	68.8
	% REC. 2	56.0
	RPD	20.4

Collector's ID	**WET-extractable Hg**	
LCD-5	Blank 4C01034-BLK1	ND
Glass Panel	LCS (200 ug/L)	205
MNB0757-01	% RECOVERY	102
Spike level	Source Result	2.1
200 mg/L	Matrix Spike 1	208
	Matrix Spike 2	164
	% REC. 1	103
	% REC. 2	81.0
	RPD	23.7
Plasma TV-1	Blank 4C18004-BLK1	ND
Glass Panel Outer	LCS (200 ug/L)	184
MNB0739-01	% RECOVERY	92
Spike level	Source Result	3.1
200 mg/L	Matrix Spike	190
	Matrix Spike Duplicate	187
	% REC. 1	93.4
	% REC. 2	92
	RPD	1.59
Plasma TV-4	Blank 4C23034-BLK1	ND
Glass Panel Inner	LCS (200 ug/L)	198
MNC0167-12	% RECOVERY	99
Spike level	Source Result	0.042
200 mg/L	Matrix Spike	196
	Matrix Spike Duplicate	201
	% REC. 1	98
	% REC. 2	100
	RPD	2.52

Collector's ID	**WET-extractable Hg**	
LCD-1	Blank 4A19032-BLK1	ND
LCD Panel	LCS (200 ug/L)	198
MML0779-01	% RECOVERY	99
Spike level	Source Result	ND
200 mg/L	Matrix Spike	200
	Matrix Spike Duplicate	201
	% REC. 1	100
	% REC. 2	100
	RPD	0.5
LCD-3	Blank 4A23003-BLK1	ND
printed circuit boa	LCS (4.0ug/L)	3.96
MML0779-15	% RECOVERY	99
Spike level	Source Result	ND
200 mg/L	Matrix Spike	193
	Matrix Spike Duplicate	183
	% REC. 1	96.5
	% REC. 2	91.5
	RPD	5.32
LCD-5	Blank 4D15015-BLK1	ND
Glass Pnel Outer	LCS (200 ug/L)	198
MNC0812-01	% RECOVERY	99
Spike level	Source Result	1
200 mg/L	Matrix Spike	156
	Matrix Spike Duplicate	153
	% REC. 1	77.5
	% REC. 2	76
	RPD	1.94