DECONTAMINATION ACCEPTANCE CRITERIA

Buildings No. 1 and 2

These floors will be scarified to a depth of 0.6 cm in accordance with EPA guidance, Table 1, method A(1)(b). Water mist will be used, as needed, to control airborne particulates, and all openings will be sealed to further minimize the possibility of particulates leaving the buildings. GCC plans to use electric scarifiers units that are designed to collect dust as they are operated, to greatly minimize particulate generation.

The scarified surfaces will be inspected to assure compliance with the "clean debris surface" criterion.

The walls (and vertical surfaces of berms that are not possible to scarify) will be cleaned using the pressure washing method, with hot water and Simple Green, in accordance with EPA guidance, Table 1, method A(1)(e). The cleaned surfaces will be inspected to assure a "clean debris surface." Any obviously stained areas will be cored to a depth of 0.6 cm and the samples individually tested for the hazardous waste characteristics (D001 through D043), F001 and F002 (Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane). Samples will be preserved in accordance with MA DEP requirements.

PCB Decontamination and Sample Collection Procedure (Building No.1 staging area and central storage bay)

PCB wastes received at GCC were temporarily stored in proper U.S. DOT containers and these wastes were never removed from the containers for consolidation or transfer ("container in/container out"). Decontamination of the two (2) areas, used to stage and store PCB's, will be accomplished by scarifying 0.6 cm of the concrete floor, as described above. All concrete collected from scarifying these two areas will be properly containerized, labeled as PCB wastes (per 40 CFR 761.40) and shipped off-site, pursuant to 40 CFR 761.60 (e.g. TSCA licensed landfill). Once this decontamination is complete, these areas will be sampled, utilizing a grid system per 40 CFR 761.283, for non-point sources- see attached sample location grid diagram. Samples will be collected using a rotary impact hammer drill with a carbide drill bit that is 1 inch in diameter, to generate a fine concrete powder suitable for analysis. The bit will be drilled into the concrete to a minimum depth of ½ inch. The concrete material will be removed with small stainless steel scoopulas or a vacuum system at each sample location. Once the samples have been collected in each grid location, they will be composited following procedures specified in 40 CFR 761.289 (compositing samples). Up to a maximum of 9 sub-samples will be collected for each composite sample in accordance 40 CFR 761.283. An equal volume from each sub-sample will be collected and thoroughly mixed with the other 8 sub-samples for a total of 9 sub-samples. Once samples are collected, caps will be screwed tightly onto containers. A sample label, identifying each specific grid area, will be completed using a water-resistant marker.

Samples will be transported to the laboratory and analyzed for PCB utilizing method 3540C/8082 ("solids").

Tank Farm

Tanks

Excepting numbers 13 and 15, all storage tanks (along with corresponding piping and appurtenances) will be scrapped as provided in MA. DEP's "Matrix for the Closure of RCRA Regulated Tanks at TSDFs." No rinsate testing will be required.

Prior to scrapping the tanks, inside surfaces will be decontaminated using the pressure washing method, with hot water and Simple Green, in accordance with EPA guidance, Table 1, method A(1)(e). Obviously stained outer areas will be cleaned with Simple Green. Cleaned surfaces will be inspected to assure a "clean debris surface."

Secondary Containment

The tank farm secondary containment structure floors and walls (inside) are covered with an impervious layer of "Semstone" high-performance coating (See Attachment 12). Therefore, the effectiveness of pressure washing decontamination of these surfaces will primarily be determined by the USEPA "clean debris surface" visual examination standard. However, samples of the concrete and coating may be taken as described below.

GCC's independent MA PE will view the decontaminated surfaces, without magnification, to determine if they are free of all visible contaminated soil and hazardous waste, except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits will be limited to no more than 5% of each square inch of surface area.

Following the pressure washing operation, GCC's PE will perform a visual examination of tank farm containment surfaces, and mark any areas evidencing degradation of the Semstone coating. These areas will be cored out to a depth of 0.6 cm and the cored material will be analyzed in the same manner as prescribed for the waste storage buildings.

The tank farm secondary containment structures will be deemed "clean" when the surfaces meet the "clean debris surface" visual standard, and any core samples taken meet the same acceptance criteria as the waste storage building core samples. Decontamination procedures will be repeated if necessary until these standards are achieved.

Loading/Unloading Areas (includes the main loading dock area at the warehouse, the loading dock at Building no. 2, and the bulk load transfer pit in front of the tank farm piping manifold)

These surfaces will be cleaned using the pressure washing method, with hot water and Simple Green, in accordance with EPA guidance, Table 1, method A(1)(e). The cleaned surfaces will be inspected to assure a "clean debris surface."

Following the pressure washing operation, GCC's PE will perform a visual examination of these areas, and mark any areas evidence of staining. These areas will be cored out to a depth of 0.6 cm and the cored material will be analyzed in the same manner as prescribed for the waste storage buildings.

Acceptance Criteria

The above areas will be deemed "clean" if the concrete sample test results indicate compliance with Massachusetts MCP, Method 1 S-1/GW-1 standards and do not exhibit any characteristics of hazardous waste. Decontamination and sampling procedures, described above, will be repeated if necessary until each specific "clean closure standard" is achieved.

Quality Assurance/Quality Control Samples

Quality Assurance/Quality Control ("QA/QC") samples will be collected in the same manner as other samples. The QA/QC samples will be managed, handled, and documented as they would for "actual" samples. For matrix spike/matrix spike duplicates ("MS/MSD"), matrix duplicates, and blanks, samples will be placed in the same type of containers. Efforts will be made to ensure that MS/MSD, duplicates, and blanks are handled in the same manner as the actual samples.

Blanks

Field Blank - Clean, unused tap water will be collected in new sample containers with appropriate preservatives, labeled, and submitted as a comparison sample. Tap water will be used as a comparison sample because tap water will be used to clean and rinse the areas undergoing closure. Trace constituents that are present in the comparison sample may also be present in the final rinse sample obtained to verify proper decontamination. The presence of constituents in the tap water as generated by the rinsing equipment, not generated by GCC's waste management activities, could falsely indicate that residues remain in the final rinse. Thus, the presence of hazardous constituents in the tap water sample, as determined analytically when compared with the final rinse samples, would indicate that such constituents were not caused by waste management activities, and unneeded repetitions of the cleaning procedures would be avoided. The tap water sample will be analyzed for the same constituents (organic and inorganic), using the same analytical methods specified for rinse water samples in Table 1.

Trip Blank - In addition, deionized water will be placed in appropriate sample containers and transported with other water samples as a trip blank. The deionized water sample will be submitted as a blank for analysis with other water samples. The trip blank will be analyzed for the volatile organic constituents, using the same analytical methods specified for rinse water samples.

Matrix Duplicates – Matrix duplicates will be collected at the rate of 1 in 10 and will be analyzed to check for sampling and analytical reproducibility.

MS/MSD – MS/MSD data provides information regarding the effect of the sample matrix on the digestion and measurement methodology. GCC will collect 1 MS/MSD for every 20 or fewer investigative samples of a given matrix.

Trip Blank – In addition, deionized water will be placed in appropriate sample containers and transported with other water samples as a trip blank. The deionized water sample will be submitted as a blank for analysis with other water samples.

Matrix Duplicates – Matrix duplicates will be collected at the rate of 1 in 10 and will be analyzed to check for sampling and analytical reproducibility

CLEAN CLOSURE CRITERIA

Type of Sample	Analytes	Type of Surface	Regulatory Program	Closure Criteria
Composite	Polychlorinated Biphenyls	Concrete	TSCA	<1 Milligram/Kilogram per composite sample
Visual	"Clean criteria" per "Matrix for the Closure of RCRA Regulated Tanks at TSDFs" document	Steel tanks and piping	MADEP	The surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area. This determination will be made by a independent MA licensed professional engineer"
Visual	"Clean criteria"	Secondary containment in building no. 1 & 2, tank farm concrete secondary containment floor and walls and concrete/asphalt loading/unloading areas	MADEP/ RCRA	The surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area. This determination will be made by a independent MA licensed professional engineer"
Core/grab	D001-D043, F001, F002	Any stained porous surface that does not meet the "clean debris" criteria	MADEP/ RCRA	Compliance with Massachusetts MCP, Method 1 S-1/GW-1 standards and do not exhibit any characteristics of hazardous waste
Swipe	Polychlorinated Biphenyls	Moveable Equipment/Metal (forklift)	TSCA	$<10\ \mu g/100cm^2$

REVISIONS TO AIR MONITORING OPERATIONS DURING FULL SCALE CLOSURE

1. Electric scarifies that are designed to collected dust as they are operated will be employed to scarify the floors. Utilization of electric scarifiers will allow all building openings to be sealed. In addition, water mist will be used to control dust inside the building. This technique and associated controls will eliminate any dust from existing the building during cleaning operations. Therefore, the air monitoring program outlined in the Draft Closure Plan will be followed, and no additional air monitoring will be required.

2. The following is a brief explanation of the air monitoring that will be conducted during the full scale cleaning of the facility: Air monitoring will be performed during potentially invasive decontamination operations, in order to detect any potentially adverse impact on the abutting school or residences. Monitoring will be performed by Prime Engineering personnel

A. RESULTS OF PILOT STUDY

On June 26, 2012, a Pilot Study was conducted to assess the adequacy of the screening/sampling and to establish a list of compounds of concern (COC) for the closure operations. A copy of the Pilot Study Report has previously been submitted under separate cover. Results of the Pilot Study indicate that the proposed screening/sampling will be more than adequate to detect the identified COC at levels that are protective of human health.

In addition to establishing the adequacy of the screening/sampling, the Pilot Study was also successful in establishing a list of primary COCs that should be sampled for. During the Pilot Study, samples were collected and analyzed for all compounds licensed for storage at the GCC facility [ie. Semi-Volatile Organic Compounds (SVOCs), heavy metals, pesticides and Volatile Organic Compounds (VOCs)]. Based on the results of the Pilot Study, several VOCs were identified as COCs for the closure operations (Table 1).

B. MONITORING DURING FULL SCALE CLOSURE OPERATIONS

a. Continuous Fence Line Monitoring using PID and Aerosol Monitor

During all invasive operations, Prime Engineering will conduct real time weather, VOC, and particulate monitoring at the fence-line between the facility and the downwind receptors. A weather station will be used to monitor meteorological parameters including: wind speed, wind direction, temperature, humidity and atmospheric pressure. A PID (Model ppbRAE 3000) will be employed to continuously monitor for the presence of volatile organic compounds. Particulate monitors (portable Dustrak ™II aerosol monitors) placed at key locations (i.e. 1 upwind and 2 downwind of the work zone) will be used to conduct realtime continuous particulate monitoring. The monitors will also be equipped with a visual and audible alarm that will indicate if project specific action levels have been exceeded.

PID, particulate and meteorological monitoring will be conducted until all potentially invasive decontamination work has been completed.

b. Snapshot PID Monitoring

Real time air monitoring for VOCs will be conducted intermittently using a PID (Model ppb RAE 3000) along the fence line between the facility and abutting properties at the down-wind location. Sampling locations will be selected based on anticipated activities and wind directions.

c. Confirmatory Fence Line Air Sampling

Prime Engineering will collect ambient air samples from the fence line between the facility and the potential downwind receptors while "invasive" decontamination activities are underway. Each ambient air sample will be collected over a typical work-shift, in laboratory supplied summa canisters. The samples will be shipped under chain of custody to a MassDEP certified laboratory for TO-15 analysis of selected volatile organic compounds (VOC's). The samples will be analyzed with a 48-hour turn-around-time.

A total of 3 fence line ambient air samples will be collected during the "invasive" activities. Air samples will be collected during the first shift (8-hr. period) when power washing of the tanks is conducted, during the first shift when scarifying is conducted, and during the first shift when power washing the tank farm secondary containment is conducted. During each sampling event an upwind and downwind sample will be collected.

C. PROJECT ACTION LEVELS

Action levels have been set for all of the compounds licensed for storage at the facility. The action levels established for the closure project were developed to be protective of human health and represent extremely conservative levels that may pose a concern to human health over much longer periods of exposure. Exceedance of an established action level does not represent an unacceptable risk to human health, but rather an early warning that operations must be adjusted to reduce emissions off-Site. A summary of the action levels for each of the compounds is presented in Table 2. As discussed, sampling and analysis conducted during the Pilot Study was used to establish the list of compounds of concern (COCs) for the Closure Project. As part of the Pilot Study, samples were collected and analyzed for all compounds licensed for storage at the Facility. Compounds detected above the laboratory method detection limits were retained as COCs.

The following is a summary of the established action levels and the basis for each:

- *Fence line PID Monitoring* - A sustained (approximately 15 seconds) reading of equal to or greater than 3 ppb total organic vapors (TOVs). This level was established as the lowest allowable risk based threshold of any of the volatile COCs identified during the Pilot Study (i.e., Methyl Ethyl Ketone). A summary of the action levels for each compound permitted for storage at the facility as well as all COCs identified during the Pilot Study is presented in Table 2. If TOVs are detected above the action level on the fence-line PID, the second PID will be used to check the accuracy of the reading. If confirmed, the work will be halted. The source will be corrected or operations modified as necessary (by use of engineering controls, etc.), to reduce concentrations to acceptable levels upon resuming operations.

- *Fence-line aerosol monitoring* - During the Pilot Study ambient air samples were collected and analyzed for pesticides, heavy metals, and semi-volatile organic compounds. No pesticides, heavy metals, or SVOCs were identified above their respective method detection limit. Based on these results, it was determined that the dust generated during the Pilot Study did not contain elevated constituents of any of the compounds stored at the Site, and the USEPA National Ambient Air Quality Standard (NAAQ) for dust (150 µg/m3) would be a suitable action level for the closure activities. However, to be more conservative, a 15 minute time weighted average (TWA) of 60 micrograms per cubic meter (µg/m3) for PM10 (particles that are 10 microns or less) was established as the action level. If particulates are detected above action levels, work will be halted. The source will be corrected or operations modified as necessary (by use of engineering controls, etc.), to reduce concentrations to acceptable levels upon resuming operations.

- *Confirmatory Sampling* - The results of the fence line TO-15 analysis for the three downwind ambient air samples will be compared to the action levels summarized in Table 2. If any of the TO-15 analytes are detected above the respective action levels, closure operations will be halted, and MassDEP will be consulted for further instructions. Work will not resume without MassDEP approval. If VOCs are not detected above action levels, no further TO-15 sampling is proposed.

TABLE 1

CONTAMINANTS OF CONCERN
AT THE
GENERAL CHEMICAL FACILITY

Preliminary Compound of Concern	CAS Number	Action Level (µg/m3)	Action level Basis
Ethylbenzene	100-41-4	1000	IH Risk Calc.
n-Butane	106-97-8	200	IH Risk Calc.[1]
toluene	108-88-3	4950	IH Risk Calc.
n-Hexane	110-54-3	700	EPA RfC
Cyclohexane	110-82-7	6000	EPA RfC
tetrachloroethylene	127-18-4	13	IH Risk Calc.
m,p-Xylene	1330-20-7	100	IH Risk Calc.
xylene	1330-20-7	297	IH Risk Calc.
n-Heptane	142-82-5	200	IH Risk Calc.[1]
cis-1,2-Dichloroethene	156-59-2	10	EPA RfC
acetone	67-64-1	792	IH Risk Calc.
Benzene	71-43-2	16	IH Risk Calc.
1,1,1,-trichloroethane	71-55-6	5148	IH Risk Calc.
2-methylpentane	73513-43-6	200	IH Risk Calc.[1]
Chloromethane	74-87-3	90.0	EPA RfC
methylene chloride	75-09-2	300	ASTDR MRL
Freon 22	75-45-6	50000	EPA RfC
trichlorofluoromethane	75-69-4	130	EPA RSL
Dichlorodifluoromethane	75-71-8	200	EPA RfD
Freon TF	76-13-1	5358000	EPA RfC
Methyl ethyl ketone	78-93-3	10	IH Risk Calc.
Trichloroethylene	79-01-6	74	IH Risk Calc.
2,3-dimethylbutane	79-29-8	200	IH Risk Calc.[1]
Propane	80-05-7	200	IH Risk Calc.[1]
3-methylpentane	96-14-0	200	IH Risk Calc.[1]

MADEP, IH Risk Calc. - Massachusetts Department of Environmental Protection (MADEP) imminent hazard calculation using MADEP shortforms is the preferred screening level. The IH level is protective of daily human inhalation exposure for up to 5 years, including sensitive individuals such as children, the elderly, and those with pre-existing illnesses.

ATSDR Int. MRL - If no Intermediate MADEP, IH Risk Calc. is available, the screening level is the Agency for Toxic Substances and Disease Registry Intermediate Minimal Risk Level (MRL). The MRL is protective of daily human inhalation exposure for up to a year, including sensitive individuals such as children, the elderly, and those with pre-existing illnesses.

ATSDR Chronic MRL or EPA RfC - If no Intermediate MRL is available, the screening level is the ATSDR Chronic MRL or the EPA Reference Concentration (RfC). The chronic MRL and the RfC are protective of daily human inhalation exposure over a lifetime, including sensitive individuals.

IRIS RfD - If none of the above are available, the EPA Integrated Risk Information System (IRIS) Reference Dose is the screening level. The RfD are protective of daily exposure human exposure over a lifetime, including sensitive individuals.

1 - RfC's were not available for several of the COC. Several of the COC are compounds typically present in gasoline. For these compounds, RfCs were established using collective concentrations of specified ranges of aliphatic and/or aromatic hydrocarbons. This method is disccussed in great detail in the MADEP document entitled, Characterizing Risks Posed by Petroleum Contaminated Sites: Implementation of the MADEP VPH/EPH Approach"

TABLE 2

ACTION LEVELS FOR ALL COMPOUNDS LICENSED FOR STORAGE AT THE GENERAL CHEMICAL FACILITY

Preliminary Compound of Concern	CAS Number	Action Level (µg/m3)	Action Level (ppm)	Screening	Response	PID Screening (ppbv)
ethyl benzene	100-41-4	700	161	PID	0.51	316
1, 4 Dichlorobenzene	106-46-7	18	3	PID	0.5	6
n-Butane	106-97-8	200	84	PID	1.2	70
1, 2 Dichloroethane	107-06-2	5	1	PID	0.6	2
methyl isobutyl ketone	108-10-1	2970	725	PID	0.6	1209
toluene	108-88-3	4950	1314	PID	0.51	2577
Chlorobenzene	108-90-7	20	4	PID	0.39	11
n-Hexane	110-54-3	700	199	PID	0.54	368
2-ethoxyethanol	110-80-5	200	54	PID	1.3	42
Cyclohexane	110-82-7	6000	1744	PID	0.64	2725
tetrachloroethylene	127-18-4	13	2	PID	0.31	6
xylene	1330-20-7	297	68	PID	0.4	171
ethyl acetate	141-78-6	900	250	PID	3.5	71
n-Heptane	142-82-5	200	49	PID	0.6	81
cis-1,2-Dichloroethene	156-59-2	10	3	PID	0.8	3
carbon tetrachloride	56-23-5	8	1	PID	1.7	1
Diethyl Ether	60-29-7	200	66	PID	1.7	39
methanol	67-56-1	500	382	PID	2.5	153
acetone	67-64-1	792	334	PID	1.4	238
Chloroform	67-66-3	5	1	PID	3.5	0.3
n-butanol	71-36-3	100	33	PID	1.4	24
Benzene	71-43-2	16	5	PID	0.6	8
1,1,1,-trichloroethane	71-55-6	5148	944	PID	1	944
2-methylpentane	73513-43-6	200	28	PID	NR[7]	28
Chloromethane	74-87-3	90	44	PID	0.74	59
Vinyl chloride	75-01-4	14	5	PID	0.6	9
methylene chloride	75-09-2	300	86	PID	0.89	97
carbon disulfide	75-15-0	200	64	PID	0.44	146
1, 1 Dichloroethylene.	75-35-4	198	50	PID	0.8	62
Freon 22	75-45-6	50000	13669	PID	NR[7]	13669
trichlorofluoromethane	75-69-4	130	23	PID	ND	15
Dichlorodifluoromethane	75-71-8	200	40	PID	NR[7]	40
Freon TF	76-13-1	5358000	699454	PID	NR[7]	699454
1,1,2-trichloro-1,2, 2,-trif.	76-14-2	9900	1647	PID	ND	1098
isobutanol	78-83-1	300	99	PID	1.5	66
Methyl ethyl ketone	78-93-3	10	3	PID	1.1	3
1,1,2-trichloroethane	79-00-5	8	1	PID	0.9	2
Trichloroethylene	79-01-6	74	14	PID	0.43	32
2,3-dimethylbutane	79-29-8	200	57	PID	ND	38
2-nitropropane	79-46-9	20	5	PID	2.6	2
Propane	80-05-7	200	21	PID	ND	14
Hexachlorobutadiene	87-68-3	1	0.1	PID	1	0.1
1,2-Dichlorobenzene	95-50-1	600	99.8	PID	0.38	262.7
3-methylpentane	96-14-0	200	57	PID	ND	38

Notes:

1. Response factors from RAE Systems Technical Note TN-106, based on an 11.7 eV lamp calibrated with isobutylene
2. PID Screening Value = Action Level (ug/m^3) / Response Factor
3. For purposes of the initial Pilot Study it was assumed that each compound would be present at a concentration of 20 mg/kg in the dust generated during Closure Activities.
4. Corr. Total Dust Conc. (ug/m3) = [Action Level (ug/m^3) x 1,000,000 mg/kg] / Assumed Conc. In Dust
5. Concentration (PPBv) = Concentration (ug/m^3) * 24.46/MW @ 25^{o}C
6. Compound identified in pilot study
7. NR - No response, the ionization energy is greter than 11.7 eV. The response factor for these compounds was assumed to be 1
8. ND - No data available, the ionization energy is undocumented. The response factor for these compounds was assumed to be 1.5

<u>GCC DECONTAMINATION TIMELINE</u>

Monday, July 23, 2012 – Friday, July 27, 2012

- Non-invasive cleaning *(inside buildings)*
    - Lab & miscellaneous equipment, etc.
    - Hand cleaning equipment with Simple Green
- Cut, remove (already flushed), clean (if necessary, inside the building), and scrap ancillary piping

Monday, July 30, 2012 – Saturday, August 4, 2012

- Power washing & cleaning inside of all tanks (except 13 & 15)

Monday, August 6, 2012 – Wednesday, August 8, 2012

- Tank farm dismantling & removal
- Scarify building 1 & building 2 floor

Thursday, August 9, 2012 – Saturday, August 11, 2012

- Power wash tank farm secondary containment/floor
- Power wash bulk tank truck loading/unloading area
- Power wash container loading/unloading area
- Scarify building 1 & building 2 floor (continued)

Monday, August 13, 2012 – Wednesday, August 15, 2012

- PCB sampling of building / staging area & central storage bay
- Power washing walls and berms of building 1 & building 2
- Complete any unfinished action items

** note: expected hours are 6:00 AM to 10:00 PM (no later than midnight)*
** note: any operations expected to produce excessive noise will be conducted between 8:00 AM – 5:00 PM*

Updated 7/23/2012

ATTACHMENT 6
PCB DECONTAMINATION AND ACCEPTANCE CRITERIA

Buildings No. 1 and 2

PCB wastes received at GCC were temporarily stored in proper U.S. DOT containers and these wastes were never removed from the containers for consolidation or transfer (“container in/container out”).

These floors will be scarified to a depth of 0.6 cm in accordance with EPA guidance, Table 1, method A(1)(b). Water mist will be used, as needed, to control airborne particulates, and all openings will be sealed to further minimize the possibility of particulates leaving the buildings. GCC plans to use electric scarifiers units that are designed to collect dust as they are operated, to greatly minimize particulate generation. All concrete collected from scarifying these two areas will be properly containerized, labeled as PCB wastes (per 40 CFR 761.40) and shipped off-site, pursuant to 40 CFR 761.61(b) (e.g. TSCA licensed facility). Once this decontamination is complete, these areas will be sampled, utilizing a grid system per 40 CFR 761.283, for non-point sources- see attached sample location grid diagram (Exhibit 1). Samples will be collected (see Exhibit 2) using a rotary impact hammer drill with a carbide drill bit that is 1 inch in diameter, to generate a fine concrete powder suitable for analysis. The bit will be drilled into the concrete to a maximum depth of ½ inch. The concrete material will be removed with small stainless steel scoopulas or a vacuum system at each sample location. Once the samples have been collected in each grid location, they will be composited following procedures specified in 40 CFR 761.289 (compositing samples). Up to a maximum of 9 sub-samples will be collected for each composite sample in accordance 40 CFR 761.283. An equal volume from each sub-sample will be collected and thoroughly mixed with the other 8 sub-samples for a total of 9 sub-samples. Once samples are collected, caps will be screwed tightly onto containers. A sample label, identifying each specific grid area, will be completed using a water-resistant marker. Samples will be transported to the laboratory and analyzed for PCB utilizing method 3540C/8082 (“solids”).

The PCB staging and storage areas will meet “clean closure”, based on each composite sample PCB concentration < 1 mg/kg (see below table). Any areas that contain > 1 mg/kg PCB concentration, will be scarified again by removing approximately another 1/8”. All concrete collected from re-scarifying will be properly containerized, labeled as PCB wastes (per 40 CFR 761.40) and shipped off-site, pursuant to 40 CFR 761.61(b) (e.g. TSCA licensed facility). Grab samples will be obtained (no compositing), as described above and retested. This step will be repeated until the applicable area(s) are < 1 mg/kg PCB.

Moveable Equipment-All movable equipment (e.g. Forklift metal forks) will be wipe tested to determine the PCB concentration and if the wipe tests indicates > 10 ug/100 cm2, this equipment will be decontaminated in accordance with 40 CFR 761.79

Quality Assurance/Quality Control Samples

Quality Assurance/Quality Control ("QA/QC") samples will be collected in the same manner as other samples. The QA/QC samples will be managed, handled, and documented as they would for "actual" samples. For matrix spike/matrix spike duplicates ("MS/MSD"), matrix duplicates, and blanks, samples will be placed in the same type of containers. Efforts will be made to ensure that MS/MSD, duplicates, and blanks are handled in the same manner as the actual samples.

Blanks

Field Blank - Clean, unused tap water will be collected in new sample containers with appropriate preservatives, labeled, and submitted as a comparison sample. Tap water will be used as a comparison sample because tap water will be used to clean and rinse the areas undergoing closure. Trace constituents that are present in the comparison sample may also be present in the final rinse sample obtained to verify proper decontamination. The presence of constituents in the tap water as generated by the rinsing equipment, not generated by GCC's waste management activities, could falsely indicate that residues remain in the final rinse. Thus, the presence of hazardous constituents in the tap water sample, as determined analytically when compared with the final rinse samples, would indicate that such constituents were not caused by waste management activities, and unneeded repetitions of the cleaning procedures would be avoided. The tap water sample will be analyzed for the same constituents (organic and inorganic), using the same analytical methods specified for rinse water samples in Table 1.

Trip Blank - In addition, deionized water will be placed in appropriate sample containers and transported with other water samples as a trip blank. The deionized water sample will be submitted as a blank for analysis with other water samples. The trip blank will be analyzed for the volatile organic constituents, using the same analytical methods specified for rinse water samples.

Matrix Duplicates – Matrix duplicates will be collected at the rate of 1 in 10 and will be analyzed to check for sampling and analytical reproducibility.

MS/MSD – MS/MSD data provides information regarding the effect of the sample matrix on the digestion and measurement methodology. GCC will collect 1 MS/MSD for every 20 or fewer investigative samples of a given matrix.

Trip Blank – In addition, deionized water will be placed in appropriate sample containers and transported with other water samples as a trip blank. The deionized water sample will be submitted as a blank for analysis with other water samples.

Matrix Duplicates – Matrix duplicates will be collected at the rate of 1 in 10 and will be analyzed to check for sampling and analytical reproducibility

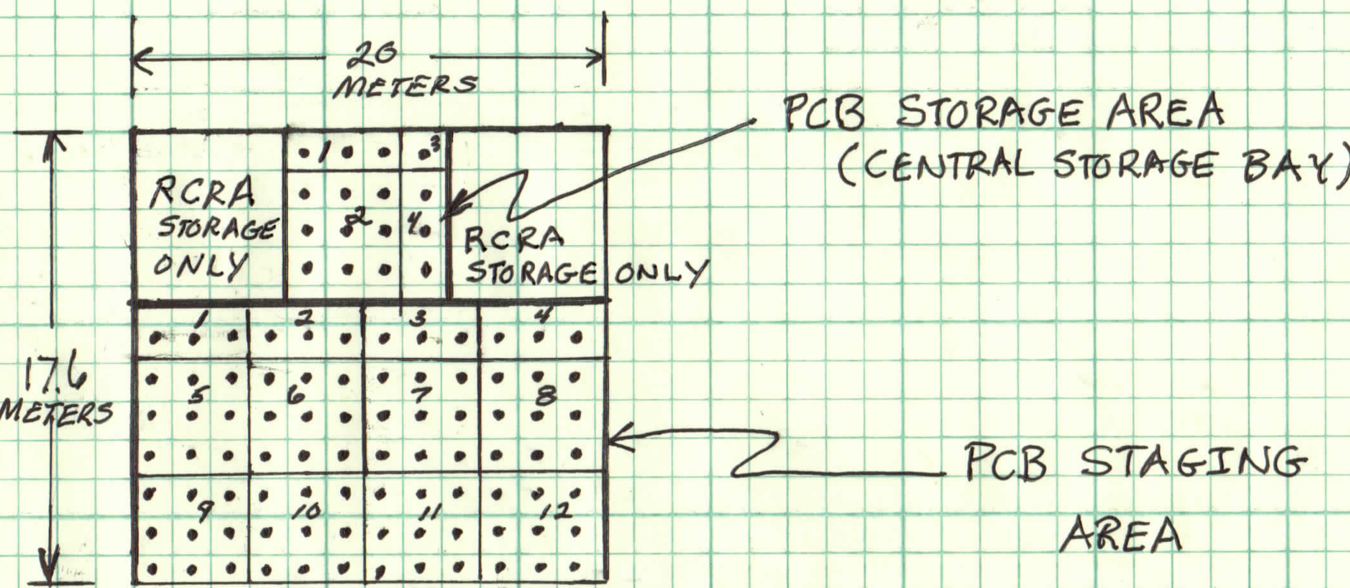
PCB CLEAN CLOSURE CRITERIA

Type of Sample	Analytes	Type of Surface	Regulatory Program	Closure Criteria
Composite	Polychlorinated Biphenyls	Concrete	TSCA	<1 Milligram/Kilogram per composite sample
Swipe	Polychlorinated Biphenyls	Moveable Equipment/Metal Forks (forklift)	TSCA	$<10\ \mu g/100cm^2$

BUILDING No. 1 - PCB SAMPLING GRID 7/23/11

NOTE: 1 BLOCK = 1.5 METERS

NON-POINT SOURCE



• = SAMPLE POINT

PCB STORAGE BAY

16 SAMPLES ⇒ 4 Samples

PCB STAGING AREA

84 Samples ⇒ 12 COMPOSITES

STANDARD OPERATING PROCEDURE FOR SAMPLING POROUS SURFACES FOR POLYCHLORINATED BIPHENYLS (PCBs)

The Office of Environmental Measurement and Evaluation
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Revision Page

Date	Rev#	Summary of Changes	Sections
12/97	1	Initial Approval, draft	
3/20/08	2	Major update, only for PCBs, added TSCA sampling	All sections
7/17/08	3	Disposal of dust filter and decon of vac hose	11.0 and 14.0
5/04/11	4	Vacuum Trap Design and Clean-out	9.4

Table of Contents

1.0 Scope and Application

1.1 This Standard Operating Procedure (SOP) is suitable for collection of a porous matrix sample for analysis of Polychlorinated Biphenyls (PCBs).

1.2 This SOP describes sampling techniques for both hard and soft porous surfaces.

1.2.1 Hard surfaces, and most soft surfaces, can be sampled using an impact hammer drill to generate a uniform, finely ground, powder to be extracted and analyzed for PCBs. This procedure is primarily geared at providing enough sample quantity for two analyses. Hard porous surfaces include concrete, brick, asphalt, cement, sandstone, limestone, unglazed ceramics, and other possible PCB suspected material. This procedure may also be used on other softer porous surfaces, such as wood.

1.2.2 Soft surfaces can be sampled using a chisel or sharp knife to generate a representative sample to be extracted and analyzed for PCBs. Soft porous surfaces include wood, wall plasterboard, low density plastics, rubber, caulking, and other PCB suspected material.

1.3 This SOP provides for collection of surface samples (0 – 0.5 inches) and delineation of PCB contamination throughout the core of the porous surface. The procedure can be used to sample the porous surface at distinctly different depth zones.

2.0 Method Summary

A one-inch or other sized diameter carbide drill bit is used in a rotary impact hammer drill to generate a fine powder, or other representative sample, suitable for extraction and analysis of PCBs from porous surfaces. This method also allows the use of chisels or knives for the collection of samples from soft porous surfaces for PCB analysis.

3.0 Definitions

3.1 Field/Bottle Blank: A sample container of the same lot as the containers used for the environmental samples. This evaluates PCB contamination introduced from the sample container(s) from a common lot.

3.2 Equipment/Rinse/Rinsate Blanks: A sample that is collected by pouring hexane over the sample collection equipment after decontamination and before sample collection. The sample is collected in the appropriate sample container identical to the sample containers. This represents background contamination resulting from the field equipment, sampling procedure, sample container, and shipment.

3.3 Field Replicates/Duplicates: Two or more samples collected at the same sampling location. Field replicates should be samples collected side by side. Field replicates represent the precision of the whole method, site heterogeneity, field sampling, and the laboratory analysis.

3.4 Field Split Samples: Two or more representative subsamples taken from one environmental sample in the field. Prior to splitting, the environmental sample is homogenized to correct for sample heterogeneity that would adversely impact data comparability. Field split samples are usually analyzed by different laboratories (interlaboratory comparison) or by the same laboratory (intralaboratory comparison). Field splits are used to assess sample handling procedures from field to laboratory and laboratory comparability.

3.5 Laboratory Quality Samples: Additional samples that will be collected for the laboratory's quality control program: matrix spike, matrix spike duplicate, laboratory duplicates, etc.

3.6 Proficiency Testing (PT)/Performance Evaluation (PE) Sample: A sample, the composition of which is unknown to the laboratory or analyst, provided to the analyst or laboratory to assess the capability to produce results within acceptable criteria. This is optional depending on the data quality objectives. If possible, it is recommended that the PE sample be of similar matrix as the porous surface(s) being sampled.

3.7 Porous Surface: Any surface that allows PCBs to penetrate or pass into itself including, but not limited to, paint or coating on metal; corroded metal; fibrous glass or glass wool; unglazed ceramics; ceramics with porous glaze; porous building stone such as sandstone, travertine, limestone, or coral rock; low density plastics such as Styrofoam and low density polyethylene; coated (varnished or painted) or uncoated wood; painted or unpainted concrete or cement; plaster; plasterboard; wallboard; rubber; caulking; fiberboard; chipboard; asphalt; or tar paper.

3.8 Shipping Container Temperature Blank: A water sample that is transported to the laboratory to measure the temperature of the samples in the cooler.

4.0 Health and Safety

4.1 Eye, respiratory, and hearing protection are required at all times during sample drilling. A properly fitted respirator is required for hard porous surface sampling. A respirator is recommended whenever there is a risk of inhalation of either particulate or volatilized PCBs during sampling.

4.2 All proper personal protection clothing and equipment must be worn.

4.3 When working with potentially hazardous materials or situations, follow EPA, OSHA, and specific health or safety procedures.

4.4 Care must be exercised when using an electrical drill and sharp cutting objects.

5.0 Interferences and Potential Problems

5.1 This sampling technique produces a finely ground uniform powder, which minimizes the physical matrix effects from variations in the sample consistency (i.e., particle size, uniformity, homogeneity, and surface condition). Matrix spike analysis of a sample is highly recommended to monitor for any matrix related interferences.

5.2 Nitrile gloves are recommended. Latex gloves must not be used due to possible phthalate contamination.

5.3 Interferences may result from using contaminated equipment, solvents, reagents, sample containers, or sampling in a disturbed area. The drill bit must be decontaminated between samples. (see Section 11.0.)

5.4 Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment.

6.0 Personnel Qualifications

6.1 All field samplers working at hazardous materials/waste sites are required to take a 40 hour health and safety training course prior to engaging in any field activities. Subsequently, an 8 hour refresher health and safety course is required annually.

6.2 The field sampler should be trained by an experienced sampler before initiating this procedure.

6.3 All personnel shall be responsible for complying with all quality assurance/quality control requirements that pertain to their organizational/technical function.

7.0 Equipment and Supplies

7.1 This list varies with the matrix and if depth profiling is required

Rotary impact hammer variable speed drill
1-inch or other suitable (1/2, 3/4, etc.) diameter carbide tip drill bits
Steel chisel or sharp cutting knife, and hammer
Brush and cloths to clean area
Stainless steel scoopulas

Aluminum foil to collect the powder sample
1 quart Cubitainer with the top cut out to collect the powder sample
Aluminum weighing pans to collect the powder sample
Cleaned glass container (2 oz or 40 mL) with Teflon lined cap
Decontamination supplies: hexane, two small buckets, a scrub brush, detergent, deionized water, hexane squirt bottle, and paper towels
Dedicated vacuum cleaner with a disposable filter or a vacuum pump with a dust filter
Polyethylene tubing and Pasteur pipettes
Sample tags/labels, custody seals, and Chain-of-Custody form

8.0 Sampling Design

8.1 A sufficient number of samples must be collected to meet the data quality objectives of the project. If the source of the PCB contamination is regulated under the federal TSCA PCB Regulations at 40 CFR Part 761, the sampler should insure that the sampling design is sufficient to meet any investigation or verification sampling requirements. At a minimum, the following is recommended:

8.1.1 Suspected stained area (s) should be sampled.

8.1.2 At each separate location, collect at least 3 samples of each type of porous surface, regardless of the amount of each type of porous surface present.

8.1.3 In areas where PCB equipment was used or where PCBs were stored, samples should be collected at a frequency of 1 sample/100 square feet (ft^2).

9.0 Sample Collection

9.1 Hard Porous Surfaces

9.1.1 Lock a 1-inch or another size diameter carbide drill bit into the impact hammer drill and plug the drill into an appropriate power source. For easy identification, sample locations may be pre-marked using a marker or paint. (Note: the actual drilling point must not be marked.) Remove any debris with a clean brush or cloth prior to drilling. All sampling decisions of this nature should be noted in the sampling logbook.

9.1.2 Use a Cubitainer with the top cut off or aluminum foil to contain the powdered sample. Begin drilling in the designated location. Apply steady even pressure and let the drill do the work. Applying too much pressure will generate excessive heat and dull the drill bit prematurely. The drill will provide a finely ground powder that can be easily collected.

9.1.3 Samples should be collected at ½-inch depth intervals. Thus, the initial surface sample should be collected from 0 – 0.5 inches. A ½-inch deep hole generates about 10 grams (20 mL) of powder. Multiple holes located closely adjacent to each other, may be needed to generate sufficient sample volumes for a PCB determination. It is strongly recommended that the analytical laboratory be consulted on the minimum sample size needed for PCB extraction and analysis.

9.1.4 Wall and Ceiling Sampling: A team of two samplers will be required for wall and ceiling sampling. The second person will hold a clean catch surface (e.g. an aluminum pan) below the drill to collect the falling powder. Alternatively, use the chuck-end of the drill bit and punch a hole through the center of the collection pan. The drill bit is then mounted through the pan and into the drill. For ceilings, the drill may be held at an angle to collect the powder. Thus the driller can be drilling at an angle while the assistant steadies the pan to catch the falling powder. As a precaution, it may be advantageous to tape a piece of plastic around the drill, just below the chuck, to avoid dust contaminating the body of the drill and entering the drill's cooling vents. Caution must be taken to prevent obstruction of the drill's cooling vents.

9.2 Soft Porous Surfaces

9.2.1 The procedure for the hard porous surface may be used for certain soft porous surfaces, such as wood.

9.2.2 Samples should be collected at no more than ½-inch depth intervals using a metal chisel or sharp cutting knife. Thus, the initial surface sample should be collected from 0 – 0.5 inches. It is important to collect at least 10 grams for analysis.

9.2.3 For soft porous surfaces, such as caulking and rubber, a representative sample can be collected using a metal chisel or sharp cutting knife.

9.3 Multiple Depth Sampling

9.3.1 Multiple Depth Sampling may not be applicable to certain porous surfaces, such as caulking.

9.3.2 Collect the surface sample as outlined in Section 9.1 or 9.2.

9.3.3 Use the vacuum pump or cleaner to clean out the hole.

9.3.4 To collect multiple depths there are two options.

9.3.4.1 Option one: drill sequentially ½-inch increments with the 1 inch drill.

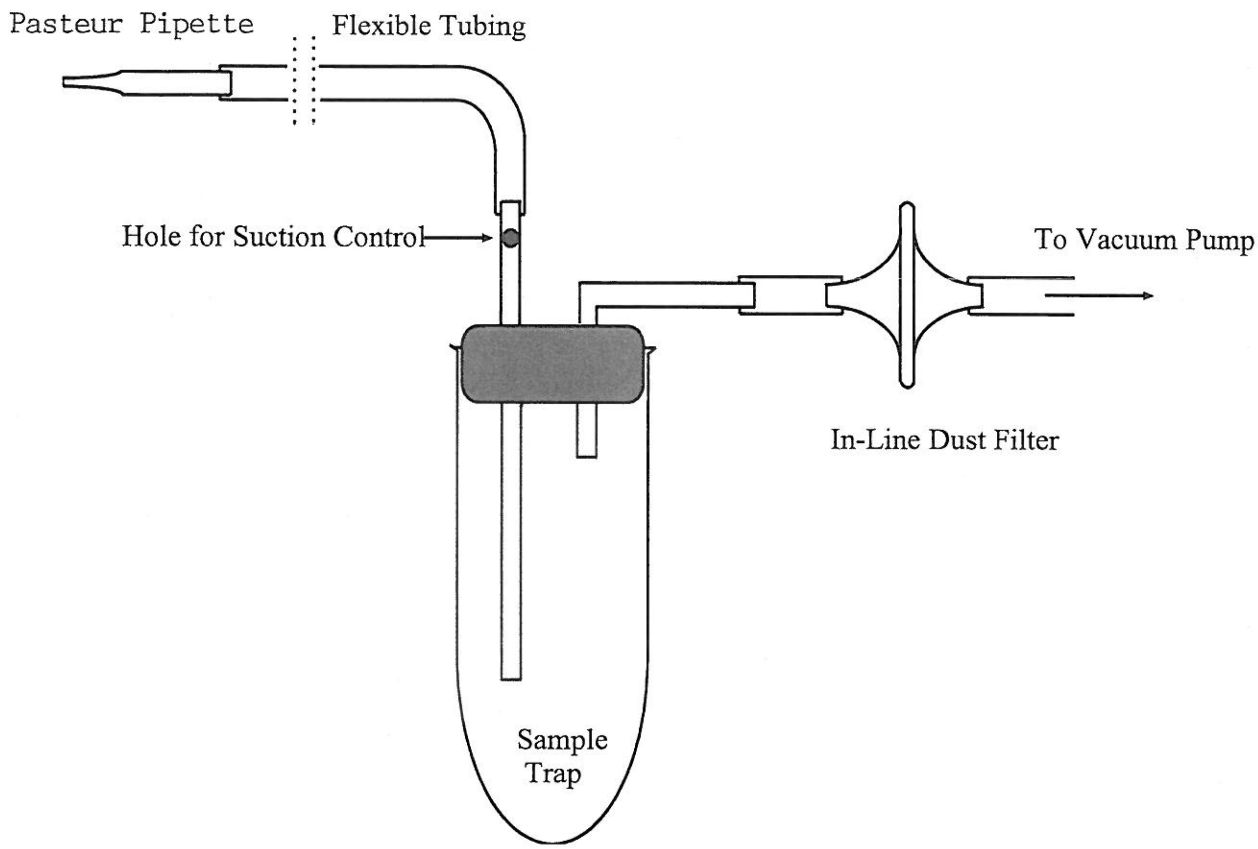
9.3.4.2 Option two: drill with the 1 inch bit and either make the hole larger or use a smaller bit to take the next ½- inch sample.

9.3.5 A stainless steel scoopula will make it easier to collect the sample from the bottom of the hole.

9.4 Vacuum Trap Design and Clean-out

The trap presented in Figure 1 is a convenient and thorough way for collecting and removing concrete powder from drilled holes. The trap system is designed to allow for control of the suction from the vacuum pump and easy trap clean-out between samples. Note, by placing a hole in the inlet tube (see Figure 1), a finger on the hand holding the trap can be used to control the suction at the sampling tip. Thus, when this hole is left completely open, there will be no suction, and the sampler can have complete control over where and what to sample. To change-out between samples the following steps should be taken: 1) the Pasteur pipette and piece of polyethylene tubing at the sample inlet should be replaced with new materials, 2) the portion of the rubber stopper and glass tubing that was in the trap should be wiped down with a clean damp paper towel (wetted with deionized water) and then dried with a fresh paper towel, 3) a clean pipe cleaner should be drawn through the glass inlet tube to remove any concrete dust present, and 4) the glass tube or flask used to collect the sample should swapped out with a clean decontaminated sample trap. Having several clean tubes or flasks on hand will facilitate change-out between samples.

Figure 1



Note: the holes should be vacuumed thoroughly to minimize any cross-contamination between sample depths and the bits should be decontaminated between samples. (See Section 11.0)

10.0 Sample Handling, Preservation, and Storage

10.1 Samples must be collected in glass containers for PCB analyses. In general, a 2-ounce sample container with a Teflon-lined cap (wide-mouth jars are preferred) will hold sufficient mass for most analyses. A 2-ounce jar can hold roughly 90 grams of sample.

10.2 Samples are to be shipped refrigerated and maintained at $\leq 6°C$ until the time of extraction and analysis.

10.3 The suggested holding time for PCB samples is 14 days to extraction.

11.0 Decontamination

11.1 Assemble two decontamination buckets. The first bucket contains a detergent and potable water solution, and the second bucket is for rinsate. Place all used drill bits, hose for the vacuum cleaner, and utensils in the detergent and water bucket. Scrub each piece thoroughly using the scrub brush. Note, the powder does cling to the metal surfaces, so care should be taken during this step, especially with the twists and curves of the drill bits. Next, rinse each piece with water and hexane. Place the rinsed pieces on clean paper towels and individually dry and inspect each piece. Note: all pieces should be dry prior to reuse.

11.2 Lightly contaminated drill bits and utensils may be wiped with a hexane soaked cloth and hexane rinsed for decontamination.

12.0 Data and Record Management

12.1 All data and information collection should follow a Field Data Management SOP or Quality Assurance Project Plan (QAPP).

12.2 Follow the chain of custody procedures to release the samples to the laboratory. A copy is kept with the sampling records.

12.3 The field data is stored for at least 3 years.

13.0 Quality Control and Quality Assurance

13.1 Representative samples are required. The sampler will evaluate the site specific conditions to assure the sample will be representative.

13.2 All sampling equipment must be decontaminated prior to use and between each discrete sample.

13.3 All field Quality Control (QC) sample requirements in a Sample and Analysis Plan (SAP) or QAPP must be followed. The SAP or QAPP may involve field blanks, equipment blanks, field duplicates and/or the collection of extra samples for the laboratory's quality control program.

13.4 Field duplicates should be collected at a minimum frequency of 1 per 20 samples or 1 per non-related porous matrix, whichever is greater.

14.0 Waste Management and Pollution Prevention

14.1 During field sampling events there may be PCB and/or hazardous waste produced from the sample collection. The waste must be handled and disposed of in accordance with federal, state, and local regulations. The dust filter, and tubing if a vacuum pump is used, is disposed after each site investigation. This waste will be treated as PCB waste if the samples are positive for PCBs. It may be possible to manage or dispose of the waste produced at the site where the work was performed. If the site does not meet regulatory requirements for these types of activities, the waste must be transported to a facility permitted to manage and/or dispose of the waste.

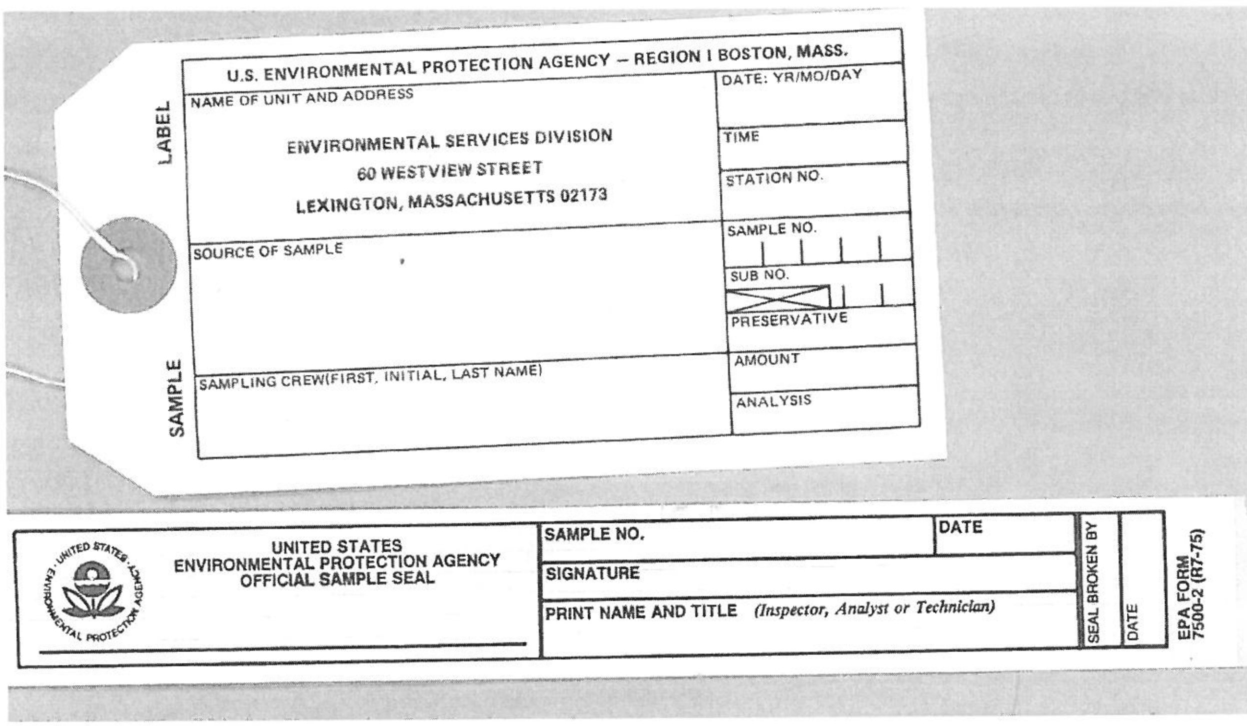
15.0 References

1. Guidance for the Preparation of Standard Operating Procedures for Quality-Related Operations, QA/G-6, EPA/600/R-96/027, November 1995.

2. 40 CFR Part 761 – Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution In Commerce, and Use Prohibitions

3. Sample Container and Holding Time: RCRA SW 846, Chapter 4, Table 4.1, Revision 4, February, 2007.

Example of Sample Label and Custody Seal



SAMPLE LABEL

U.S. ENVIRONMENTAL PROTECTION AGENCY – REGION I BOSTON, MASS.

NAME OF UNIT AND ADDRESS

ENVIRONMENTAL SERVICES DIVISION
60 WESTVIEW STREET
LEXINGTON, MASSACHUSETTS 02173

DATE: YR/MO/DAY

TIME

STATION NO.

SAMPLE NO.

SUB NO.

PRESERVATIVE

AMOUNT

ANALYSIS

SOURCE OF SAMPLE

SAMPLING CREW(FIRST, INITIAL, LAST NAME)

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
OFFICIAL SAMPLE SEAL

SAMPLE NO.

DATE

SIGNATURE

PRINT NAME AND TITLE *(Inspector, Analyst or Technician)*

SEAL BROKEN BY

DATE

EPA FORM
7500-2 (R7-75)

Example of Chain of Custody Form

ENVIRONMENTAL PROTECTION AGENCY
REGION 1

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME	NO. OF CON-TAINERS	REMARKS
SAMPLERS: *(Signature)*			

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS								REMARKS

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

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