UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

JUL 24 2003

MEMORANDUM

SUBJECT: PCB Waste Management Policy for Brownfields Sites

FROM: Maria Doa, Acting Director
National Program Chemicals Division, OPPT (7404T)

TO: Linda Garczynski, Director
Office of Brownfields Cleanup and Redevelopment, OSWER (5105T)

The attached draft of the "PCB Waste Management Policy for Brownfields Sites," Version 4, dated July 16, 2003 (Brownfields PCB Policy), has been updated to the extent possible to address your comments, as well as those from the Technology Innovation Office (TIO) and the TSCA PCB Coordinators. The comments led to improvements in the content of the document (e.g., readability, format, etc.) and the identification of gaps in the differing TSCA and Brownfields/CERCLA requirements. Finally, we have included several charts which summarize the content of the Policy and a listing of the Agency's points of contact for assistance with the TSCA PCB requirements.

Since we are committed to providing the Brownfields Program (e.g., grant recipients and states that are implementing voluntary cleanup programs) with meaningful guidance, we would like to provide the Headquarters Brownfields staff as well as the Regional Brownfields Coordinators a final opportunity to review the attached Brownfields PCB Policy for clarity and breadth of application. For example:

- Is the Policy sufficiently clear to address any confusion about the Agency's PCB cleanup standards and disposal requirements?
- Based on the experience of the Brownfields Program, does the Policy provide sufficient guidance on the types of PCB scenarios that would likely be encountered at Brownfields sites?

PREYNOLDS:pr:OPPT-NPCD-FOB:07/22/03; revised 7/24/03:4353NN-ICC:C:BF concurrence-OBCR:FILES--FOB/AUTHOR/SUBJECT:PCB Core Program:KEY WORDS: Brownfields PCB Policy / PCB Remediation Waste

CONCURRENCES

SYMBOL	7404T	7404T						
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DATE	7/24/03	7/24/03						

- If not, what specific recommendations would you make for the improvement of the Policy?

We would like to receive your final comments and concurrence on the Brownfields PCB Policy by Friday, August 8, 2003. Your comments/concurrence may be forwarded to Peggy Reynolds at reynolds.peggy@epa.gov. Questions concerning the Policy may be directed to Peggy Reynolds at 202-566-0513. Please contact me at 202-566-0718 if you wish to discuss this.

Attachment
"PCB Waste Management Policy for Brownfields Sites"

cc: Ann M. Pontius, Director
Toxics & Pesticides Enforcement Division, OECA (2245A)

Gerald B. Stubbs, Chief
Case Development, Policy & Enforcement Branch – Western, OECA (2245A)

Version 4, 7/16/03

PCB Waste Management Policy For Brownfields Sites

Purpose:

This PCB Waste Management Policy provides guidance for characterizing, cleaning up, containing, and disposing of PCB remediation waste[1] as found at Brownfields sites. This policy is considered an EPA PCB spill cleanup policy which only applies to Brownfields sites for purposes of implementing the Toxic Substances Control Act (TSCA) PCB regulations at 40 CFR 761. Appropriate PCB waste management at Brownfields sites requires full compliance with the requirements specified in the TSCA PCB regulations for PCB remediation waste at 40 CFR 761.61. The alternative waste management option presented in this guidance was largely taken from the TSCA PCB regulations at 40 CFR Part 761. Please refer to those regulations for specific regulatory and legal requirements regarding PCB remediation waste.

Designated Brownfields property may be sold or transferred by a current owner to a party who then becomes responsible for managing any PCB wastes, including spilled PCBs associated with the property, in full accordance with this policy. TSCA is the sole authority governing the sale, resale, transfer, etc. of PCB waste. The responsibility for the initial PCB contamination (e.g., spill or other release) resides with the person(s) who owned or operated the PCBs or PCB-containing equipment at the time of the contamination. However, after the property has been transferred, the new owner becomes responsible for controlling and mitigating any continuing and/or future releases of PCBs.

Introduction:

This policy was based on information regarding known Brownfields grant application scenarios available at the time of its development. While the U.S. EPA recognizes that the terminology and waste management practices most familiar to Brownfields grant applicants may be those of the Superfund Program, it is important to note that the guidance contained in this document is specifically based on the PCB waste management requirements which have been promulgated under TSCA. The guidance states that individuals should comply with the TSCA PCB requirements at 40 CFR 761.61 as written, or the alternative option presented in this document (which was largely taken from those regulations). Questions regarding the applicability of this guidance may be directed to the appropriate Regional PCB Coordinator (see Section G).

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[1]PCB Remediation Waste includes soil, rags, and other debris generated as a result of any PCB spill cleanup; see full definition at 40 CFR 761.3.

Waste Management Approach for PCB Wastes at Brownfields Sites

A. *Alternative Waste Management Cleanup Approach for PCB at Brownfields Sites:*

The alternative waste management option presented below, for Brownfields sites only, covers three classes of PCB remediation waste:

- **bulk PCB remediation waste** including, but not limited to, soil, sediments, dredged materials, muds, PCB sewage sludge, and industrial sludge;
- **non-coated (e.g., unpainted) intact structural porous surfaces contaminated by PCB spills** including, but not limited to, floors, walls, and ceilings made of concrete, brick or wood; and
- **coated intact structural porous surfaces** including, but not limited to, floors, walls, and ceilings made of concrete, brick or wood, that have been covered with a coating (e.g., paint) and that have been subsequently contaminated by spills from PCB liquids.

1. For PCB waste management at Brownfields sites involving bulk PCB remediation waste and structural porous surfaces in ***high occupancy areas,***[2] the following PCB cleanup levels apply:

   - $\leq$1 part per million (ppm) PCBs in the residual waste or porous surface without further conditions.
   - >1 to $\leq$10 ppm if the site is covered with an appropriate cap[3] meeting the requirements at 40 CFR 761.61(a)(7). In addition, the institutional control specified at 40 CFR 761.61(a)(8) must be implemented.

2. For PCB waste management at Brownfields sites involving bulk PCB remediation waste

[2] *"High occupancy areas"* are defined at 40 CFR 761.3 as, "any area where PCB remediation waste has been disposed of on-site and where occupancy for any individual not wearing dermal and respiratory protection for a calendar year is: 840 hours or more (an average of 16.8 hours or more per week) for non-porous surfaces and 335 hours or more (an average of 6.7 hours or more per week) for bulk PCB remediation waste. Examples could include a residence, school, day care center, sleeping quarters, a single or multiple occupancy 40 hours per week work station, a school classroom, a cafeteria in an industrial facility, a control room, and a work station at an assembly line."

[3] A cap is an engineering mechanism used to limit exposure to PCBs see 40 CFR 761.61(a) (7).

and structural porous surfaces in ***low occupancy areas,***[4] the following PCB cleanup levels apply:

- $\leq$25 ppm without further conditions, unless otherwise specified at 40 CFR 761.61(a)(4)(i)(B).

- >25 to $\leq$50 ppm if the site is secured by a fence and marked with a sign that includes the PCB M_L mark[5].

- >25 to $\leq$100 ppm if the site is covered with a cap meeting the requirements at 40 CFR 761.61(a)(7). In addition, the institutional control specified at 40 CFR 761.61(a)(8) must be implemented.

3. For PCB waste management at Brownfields sites involving porous structural surfaces, such as concrete, brick or wood floors, walls, or ceilings in ***industrial areas***[6], "clean" is defined by a bulk PCB concentration (e.g., weight/weight or volume/volume), such as a core sample, and not a surface PCB concentration, such as a wipe sample. The Appendix contains a core sampling procedure developed by EPA Region 1 which can be used to determine the extent of the contamination. There may be additional methods that can be used to collect a core sample that may be comparable to the EPA Region 1 procedure. In characterizing Brownfields sites, established EPA sampling procedures or guidance such as 40 CFR 761, Subpart N (40 CFR 761.260), or CERCLA site characterization guidance should be used to determine the appropriate number and location of samples. PCB remediation waste sampling should be based on in-situ characterization data rather than post-excavation or demolition composite samples collected from waste piles and roll-off containers. Certain additional considerations apply when the bulk PCB concentrations obtained fall in the ranges indicated below:

   (a) If the average PCB concentration is >5 to $\leq$10 ppm, with a maximum concentration of 25 ppm in any sample, at a maximum depth of contamination of 15 centimeters (6 inches): apply and maintain two coats of paint or epoxy of contrasting colors or a solid

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[4] "*Low occupancy areas*" are defined at 40 CFR 761.3 as, "any area where PCB remediation waste has been disposed of on-site and where occupancy for any individual not wearing dermal and respiratory protection for a calendar year is: less than 840 hours (an average of 16.8 hours per week) for non-porous surfaces and less than 335 hours (an average of 6.7 hours per week) for bulk PCB remediation waste. Examples could include an electrical substation or a location in an industrial facility where a worker spends small amounts of time per week (such as an unoccupied area outside a building, an electrical equipment vault, or in the non-office space in a warehouse where occupancy is transitory)."

[5]The PCB marking requirements are found at 40 CFR 761.45. Figure 1 contains examples of the PCB Marks.

[6]An "industrial area" is defined as an area that meets the definition of either "*high occupancy area*" or "*low occupancy area*" and where children under the age of six are not given access at any time. Industrial areas cannot house day care centers, schools, or any other places where children under the age of six may be found. The risk assessment done for this scenario excluded children under the age of six, per standard risk assessment guidance.

barrier; mark the contaminated surface with the PCB M_L mark [5] in a location easily visible to individuals present in the area; and maintain the intact coating or barrier through a deed restriction for the site according to 40 CFR 761.61(a)(8) specifically ***limiting the property to industrial use only.***

(b) If the average PCB concentration is ≤5 ppm, with a maximum concentration of 10 ppm in any sample, at a maximum depth of contamination of 5 centimeters (2 inches), there shall be a deed restriction established for the site according to 40 CFR 761.61(a)(8) specifically ***limiting the property to industrial use only.***

B. Post-cleanup Sampling and Deed Restriction Requirements:

The following post-cleanup sampling procedures and deed restriction requirements also apply for PCB waste management at Brownfields sites addressed under Section A above:

(a) Post-cleanup sampling procedures must be conducted in accordance with the applicable requirements for ***porous surfaces*** specified at 40 CFR 761.61(a)(6) and 40 CFR Part 761 Subpart O. Use the Appendix (EPA Region 1 guidance) in place of 40 CFR 761.286, or contact the Regional PCB Coordinator for guidance regarding the use of some other sampling procedure.

(b) The deed restriction requirements at 40 CFR 761.61(a)(8) for any site where PCBs remain at concentrations ≥1 ppm.

C. Disposal of Brownfields Site Cleanup Waste:

When the Brownfields sites alternative waste management option is used, the PCB wastes that are generated when complying with the above requirements for high occupancy, low occupancy, and industrial areas must be disposed of by adhering to one (or a combination, if appropriate) of these disposal options:

- In an incinerator approved under 40 CFR 761.70.
- In a chemical waste landfill approved under 40 CFR 761.75.
- In a hazardous waste landfill that has been permitted by EPA under section 3004 of RCRA, or by a State authorized under section 3006 of RCRA.
- Under an alternate disposal approval issued under 40 CFR 761.60(e).
- In accordance with a TSCA PCB Coordinated Approval issued under 40 CFR 761.77.
- In accordance with a TSCA PCB risk-based disposal approval issued under 40 CFR

761.61(c), for on-site disposal only.

A current listing of EPA approved TSCA PCB disposal facilities can be found on the EPA's PCB website at www.epa.gov/pcb under "PCB Waste Handlers".

Individuals who generate PCB cleanup wastes at concentrations of 50 ppm or greater must use a manifest to ship that waste off-site. The generic PCB identification number (i.e., 40 CFR Part 761) must be used on the manifest by individuals who do not have a waste storage facility on-site. In most cases, however, individuals may prefer to have an unique EPA identification number which is obtained by submitting a Notification of PCB Activity using EPA Form 7710-53 in accordance with 40 CFR 761.202 and 761.205; this form is available on the PCB website at www.epa.gov/pcb under "Databases and Forms." This policy does not authorize the redisposal of cleanup waste onsite without obtaining the necessary PCB disposal approvals.

D. ***PCB Wastes Not Addressed By This Guidance:***

This policy only provides guidance on the specific requirements for managing PCB remediation waste. For other types of PCB waste the requirements listed below must be followed.

(a) Dispose of **PCB liquids** in accordance with 40 CFR 761.60(a).

(b) Dispose of **PCB containing electrical equipment** (e.g., transformers, mining equipment, heat transfer systems, hydraulic systems, electromagnets, switches, voltage regulators) in accordance with 40 CFR 761.60(b) and (c).

(c) Dispose of **PCB bulk product waste** (i.e., items originally manufactured with PCBs as a component or contaminant in a non-liquid state at PCB concentrations of 50 ppm or greater – dried paint, caulking, etc.) in accordance with 40 CFR 761.62.

E. ***Other Applicable Requirements in the TSCA PCB Regulations:***

To appropriately address PCBs at Brownfields sites and comply with the guidance contained in this document, the following TSCA PCB regulations must be followed where applicable:

(a) ***Caps*** in 40 CFR 761.61(a)(7);

(b) ***Recordkeeping*** in 40 CFR 761.61(a)(9);

(c) ***Storage*** in 40 CFR 761.65; and

(d) ***Notification and manifesting*** (40 CFR 761 subpart K).

F. Notification and Review:

Written notification must be provided as described at 40 CFR 761.61(a)(3)(i)(A) - (E) at least 30 days prior to the date that the cleanup of a site begins. Notification must be provided to the EPA Regional Administrator, the Director of the State or Tribal environmental protection agency, and the Director of the county or local environmental protection agency where the cleanup will be conducted. The purpose of this notification is informational. For the Brownfields site alternative PCB waste management option only, the persons receiving the notification are under no obligation to review or approve of the Brownfields site PCB cleanup plans, however, they have the right to do so if they choose.

G. Consultation with Regional PCB Coordinators:

There may be occasions where this guidance document does not fully address a specific Brownfields site cleanup scenario (e.g., a large cleanup site for which the guidance may be inappropriate; alternative risk-based sampling approaches which require EPA approval under §761.61(c)). In such situations, owners of Brownfields sites are encouraged to contact the Regional PCB Coordinator for further guidance. A listing of the Regional PCB Coordinators follows. However, a current listing of the Regional PCB Coordinators can be found on the EPA's PCB website at www.epa.gov/pcb under "EPA Regional Contacts". An electronic version of the PCB regulations at 40 CFR part 761 can also be found on the PCB website at www.epa.gov/pcb under "Laws and Regulations".

Region 1, Boston, MA: (Covering CT, MA, ME, NH, RI, and VT)

Telephone: 617-918-1527
Address:
EPA-New England Regional Administrator
U.S. Environmental Protection Agency-New England
1 Congress Street, Suite 1100 (RA)
Boston, MA 02114-2023

Region 2, Edison, NJ: (Covering NJ, NY, PR, and VI)

Telephone: 732-321-6669
Address:
Regional Administrator
U.S. Environmental Protection Agency Region 2
290 Broadway
New York, NY 10007-1866

Region 3, Philadelphia, PA: (Covering DE, DC MD, PA, VA, and WV)

Telephone: 215-814-2177

Address: Regional Administrator
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1650 Arch Street
Philadelphia, PA 19103-2029

Region 4, Atlanta, GA: (Covering AL, FL, GA, KY, MS, NC, SC, and TN)

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Address: Regional Administrator
U.S. Environmental Protection Agency Region 4
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303-8960

Region 5, Chicago, IL: (Covering IL, IN, MI, MN, OH, and WI)

Telephone: 312-353-2291
Address: Regional Administrator
U.S. Environmental Protection Agency Region 5
77 W. Jackson Boulevard
Chicago, IL 60604

Region 6, Dallas, TX: (Covering AR, LA, NM, OK, and TX)

Telephone: 214-665-7579
Address: Regional Administrator
U.S. Environmental Protection Agency Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Region 7, Kansas City, KS: (Covering IA, KS, MO, and NE)

Telephone: 913-551-7395
Address: Regional Administrator
U.S. Environmental Protection Agency Region 7
901 North 5th Street
Kansas City, KS 66101

Region 8, Denver, CO: (Covering CO, MT, ND, SD, UT, and WY)

Telephone:	303-312-6027
Address:	Assistant Regional Administrator Office of Partnerships and Regulatory Assistance U. S. Environmental Protection Agency 999 18th Street Denver, CO 80202-2466

Region 9, San Francisco, CA: (Covering AZ, CA, HI, NV, AS, and GU)

Telephone:	415-947-4163
Address:	Regional Administrator U.S. Environmental Protection Agency Region 9 75 Hawthorne Street Mail Code ORA-1 San Francisco, CA 94105

Region 10, Seattle, WA: (Covering AK, ID, OR, and WA)

Telephone:	206-553-6693
Address:	Regional Administrator U.S. Environmental Protection Agency Region 10 1200 Sixth Avenue, RA-140 Seattle, WA 98101-1128

H. Summary:

The following tables summarize for quick reference the relevant information concerning the PCB Waste Management Policy for Brownfields Sites. Although these tables may be used as an informal reference, they may not be a complete statement of all of the applicable requirements and do not replace or supplant the requirements of the Policy. Please refer to the regulations at 40 CFR Part 761 for specific legal requirements.

Table 1. Alternative PCB Waste Management Option for Brownfields Sites

Waste Type	Redevelopment Goal		
	High Occupancy	***Low Occupancy***	***Industrial Area***
Bulk PCB Remediation Waste[1]	**Definition** *> 6.7 hrs/wk without dermal or respiratory protection* (see 40 CFR 761.3 for the complete definition) **Cleanup standards** ≤ 1 ppm in residual waste w/o further conditions > 1 to ≤ 10 ppm if site covered w/ appropriate cap & institutional control implemented (deed restriction)	**Definition** *< 6.7 hrs/wk without dermal or respiratory protection* (see 40 CFR 761.3 for the complete definition) **Cleanup standards** ≤ 25 ppm in residual waste, unless otherwise specified in 40 CFR 761.61(a)(4)(i)(B) > 25 ppm to ≤ 50 ppm if secured by fence and marked per 40 CFR 761.45 >25 ppm to ≤ 100 ppm w/ appropriate cap & institutional control implemented (deed restriction)	Meets definition of Low Occupancy or High Occupancy *and no access by children under age 6* **Cleanup standards** > 5 ppm to ≤ 10 ppm w/ max. concentration 25 ppm at 15cm depth must apply two contrasting colors of paint or solid barrier, mark location and maintain by implementing a deed restriction ***limiting property to industrial use only*** ≤ 5 ppm w/ max conc. 10 ppm at 5 cm depth must implement a deed restriction ***limiting property to industrial use only***
Non-coated Intact Structural Porous Surfaces Contaminated by PCB spills[2]	**Definition** *> 6.7 hrs/wk without dermal or respiratory protection* (see 40 CFR 761.3 for the complete definition) **Cleanup standards** ≤ 1 ppm in residual waste w/o further conditions > 1 to ≤ 10 ppm if site covered w/ appropriate cap & institutional control (deed restriction)	**Definition** *< 6.7 hrs/wk without dermal or respiratory protection* (see 40 CFR 761.3 for the complete definition) **Cleanup standards** ≤ 25 ppm in residual waste, unless otherwise specified in 40 CFR 761.61(a)(4)(i)(B) > 25 ppm to ≤ 50 ppm if secured by fence and marked per 40 CFR 761.45 >25 ppm to ≤ 100 ppm w/ appropriate cap & institutional control (deed restriction)	Meets definition of Low Occupancy or High Occupancy *and no access by children under age 6* **Cleanup standards** > 5 ppm to ≤ 10 ppm w/ max. concentration 25 ppm at 15cm depth must apply two contrasting colors of paint or solid barrier, mark location and maintain by implementing a deed restriction ***limiting property to industrial use only*** ≤ 5 ppm w/ max conc. 10 ppm at 5 cm depth must implement a deed restriction ***limiting property to industrial use only***
Coated Intact Porous Structure Contaminated by PCB spills[3]	**Definition** *> 6.7 hrs/wk without dermal or respiratory protection* (see 40 CFR 761.3 for the complete definition) **Cleanup standards** ≤ 1 ppm in residual waste w/o further conditions > 1 to ≤ 10 ppm if site covered w/ appropriate cap & institutional control (deed restriction)	**Definition** *< 6.7 hrs/wk without dermal or respiratory protection* (see 40 CFR 761.3 for the complete definition) **Cleanup standards** ≤ 25 ppm in residual waste, unless otherwise specified in 40 CFR 761.61(a)(4)(i)(B) > 25 ppm to ≤ 50 ppm if secured by fence and marked per 40 CFR 761.45 >25 ppm to ≤ 100 ppm w/ appropriate cap & institutional control (deed restriction)	Meets definition of Low Occupancy or High Occupancy + *no access by children under age 6* **Cleanup standards** > 5 ppm to ≤ 10 ppm w/ max. concentration 25 ppm at 15cm depth must apply two contrasting colors of paint or solid barrier, mark location and maintain by implementing a deed restriction ***limiting property to industrial use only*** ≤ 5 ppm w/ max conc. 10 ppm at 5 cm depth must implement a deed restriction ***limiting property to industrial use only***

[1] including but not limited to: soil, rags and other debris generated as a result of a PCB spill; see full definition at 40 CFR 761.3

[2] including but not limited to: unpainted floors, walls, and ceilings, made of concrete and wood

[3] including but not limited to: floors, walls, and ceilings, made of concrete and wood, that have been covered by a coating e.g., paint and subsequently contaminated

Table 2. Additional Post-Cleanup Sampling Procedures and Deed Restriction Requirements for Brownfields Sites

Cleanup Action	Applicable Regulations/Specific Requirements
(A) **Follow porous surface cleanup requirements**	40 CFR 761.61 (a) (6) & 761 Subpart O. See appendix for Region 1 core sampling procedure.
(B) **Implement deed restriction if PCB concentrations ≥ 1 ppm.**	40 CFR 761.61 (a)(8)

Table 3. Disposal Options for PCB Remediation Waste at Brownfields Sites

Disposal Option	Applicable Regulations/Specifications
(A) **Approved incinerator**	40 CFR 761.70
(B) **Approved chemical waste landfill**	40 CFR 761.75
(C) **RCRA permitted landfill**	RCRA section 3004 or State authorized under RCRA section 3006
(D) **Alternate disposal approval**	Issued in accordance with 40 CFR 761.60 (e)
(E) **TSCA PCB Coordinated Approval**	Issued under 40 CFR 761.77
(F) **TSCA PCB risk-based disposal approval**	Issued under 40 CFR 761.61(c) for on-site disposal only

Table 4. PCB Wastes NOT Addressed in PCB Waste Management Policy for Brownfields Sites

Other types of PCB Waste requiring Disposal	Applicable Regulations/Specifications
(a) **PCB liquids**	40 CFR 761.60 (a)
(b) **PCB containing electrical equipment** (e.g. transformers, mining equipment, heat transfer systems, hydraulic systems, electro-magnets, switches, voltage regulators)	40 CFR 761.60 (b) & (c)
(c) **PCB Bulk Product Waste** (i.e. items originally manufactured with PCBs as a component or contaminant in a non-liquid state at PCB concentrations of ≥ 50 ppm - dried paint, caulking, etc.)	40 CFR 761.62

Table 5. ***Other Applicable Requirements in the TSCA PCB Regulations***

Activity	Applicable Regulations/Specifications
Caps	40 CFR 761.61 (a)(7)
Recordkeeping	40 CFR 761.61 (a) (9)
Storage	40 CFR 761.65
Notification and Manifesting	40 CFR 761 Subpart K

Table 6. ***Notification and Review for Brownfields Site Alternative PCB Waste Management Option***

Specific Requirements	Notice Recipients	Time Frame	Action
40 CFR 761.61 (a)(3)(i)(A) - (E)	> US EPA Regional Administrator > Director of State or Tribal environmental agency > Director of County or Local environmental agency	30 days prior to start of cleanup	Recipients under no obligation to review or approve, but have right to do so.

Example Scenarios to Illustrate Application of PCB Waste Management Policy at Brownfields Sites

The scenarios that follow are examples of how to apply the Brownfields PCB Waste Management Policy.

- **Typical cleanup situation at Brownfields site and applicable responses**

  Scenario: An abandoned warehouse (or factory) is being redeveloped for use as an office building (i.e., a high occupancy area). PCB fluids were found stored in the basement, and the floors/walls in only the basement of the building have been covered with PCB-containing paint.

  Requirements: Thirty (30) days prior to initiating cleanup activities, provide written notifications to EPA Regional Administrator, the Director of the State or Tribal environmental protection agency, and the Director of the county or local environmental protection agency where the cleanup will be conducted per 40 CFR 761.61(a)(3)(i)(A) - (E). The liquid PCBs stored in the basement would have to be removed and incinerated per 40 CFR 761.60(a) in a permitted TSCA incinerator or alternate disposal technology. The paint if it contains PCBs at concentrations of 50 parts per million (ppm) or greater which has been used to cover porous surfaces (e.g., such as cement floors/walls) would have to be removed to reduce exposure from surfaces contaminated with PCBs. Any spills to the coated or uncoated floor would have to be cleaned up and post-cleanup sampling would have to be conducted.

  Storage of PCB waste must be in conformance with 40 CFR 761.65 if any PCB wastes are to be stored prior to disposal. All PCB wastes are required to be disposed of properly, and a manifest must accompany the waste to any off-site storage or disposal facilities.

  The cleanup levels for a high occupancy area are ≤ 1 ppm in order to avoid any further engineering or institutional controls or use restrictions, or ≤ 10 ppm with a cap and deed restriction. Alternatively, the basement could be designated a low occupancy area, by establishing the associated occupancy limitations (where the cleanup level is less stringent).

  Any records generated in compliance with the notification and cleanup requirements must be retained for a period of 5 years as required by 40 CFR 761.125(c)(5). PCB contamination occupying a limited portion of the property would not otherwise affect the use of the entire property as long as the contamination has been properly contained (e.g., no exposure pathways exist) and will be maintained.

- **Worst Case Cleanup Scenario at a Brownfields Site**

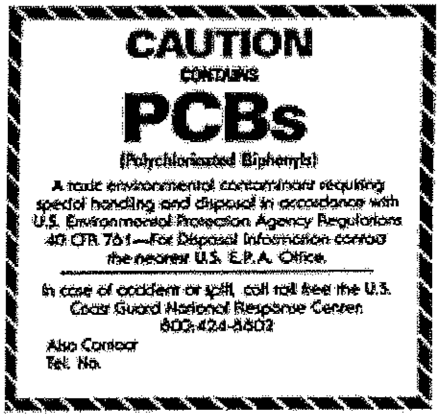
Background: An abandoned facility is being proposed to be revitalized as a day care center. The facility is a single building with walls and floors constructed of concrete. The concrete floors are coated with paint that has been subsequently contaminated by spills of liquid PCBs. The concrete walls do not contain a coating (i.e., they are bare concrete), but have been contaminated by spills of liquid PCBs. The future reuse of this facility meets the definition of a high occupancy area at 40 CFR 761.3, therefore the cleanup levels listed in the Brownfields PCB Waste Management Policy apply.

Management of Concrete Floors: The concrete floors are covered with a coating (paint), that was subsequently contaminated by spills of liquid PCBs. The PCB contamination may reside only in the paint, or the PCB contamination may have migrated through the paint to the underlying concrete floor. In order for the building to be reused as a day care center (i.e., high occupancy area), the floor must be cleaned up to a level of less than 1 ppm to avoid further conditions, or to a level of less than 10 ppm if the floor is covered with a protective barrier. If the floor does not already meet one of these cleanup levels, the first step in meeting these cleanup levels may be to remove the paint from the floor. After the paint is removed from the floor, core sampling of the bare concrete should be done in accordance with the core sampling procedures developed by EPA Region 1 in the Appendix to this policy or a procedure that will provide data on the concentration and distribution of PCB concentrations comparable to the Region 1 procedure. The core sampling will help to determine the extent to which the PCBs may have migrated through the paint into the concrete floor. If the core sampling demonstrates that the PCB concentration in the concrete floor is less than 1 ppm, no additional action is required. The concrete floor is in compliance with the cleanup levels for a high occupancy area. However, if the core sampling demonstrates that the PCB concentration in the concrete floor is less than 10 ppm, then the concrete floor must be covered with a protective barrier in accordance with 40 CFR 761.61(a)(7) and the institutional control (deed restriction) at 40 CFR 761.61(a)(8) must be implemented in order for the concrete floor to be reused in a high occupancy area.

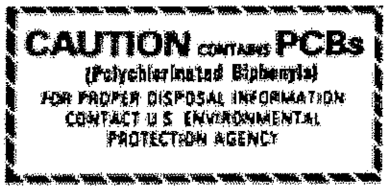
Management of Concrete Walls: The concrete walls are contaminated by spills of liquid PCBs. In order to be reused as a day care center (i.e., high occupancy area), the walls must be cleaned up to a level of less than 1 ppm and no further action is required or to a level of less than 10 ppm if the walls are covered with a protective barrier.

Concerning this Example: EPA does not have prescriptive procedures for cleaning porous surfaces contaminated by spills of liquid PCBs. Rather, the selected procedures would be based on site specific conditions, including PCB concentration and degree of PCB migration into the concrete. If the concrete floor or walls do not meet the cleanup levels for a high occupancy area, the facility cannot be used as a high occupancy area. The facility owner may apply to the Regional Office for a risk-based alternate cleanup approval under 40 CFR 761.61(c) in order to set different cleanup levels and consider instituting different engineering controls and/or administrative controls, if still deemed relevant, for a high occupancy area.

Figure 1: **PCB Marks**



Large PCB Mark (M_L)



Small PCB Mark (M_S)

APPENDIX

REGION I, EPA-NEW ENGLAND

DRAFT
STANDARD OPERATING PROCEDURE
FOR SAMPLING CONCRETE IN THE FIELD

REGION I, EPA-NEW ENGLAND

DRAFT
STANDARD OPERATING PROCEDURE FOR SAMPLING CONCRETE IN THE FIELD

U.S. EPA-NEW ENGLAND
Region I
Quality Assurance Unit Staff
Office of Environmental Measurement and Evaluation

Prepared by:	**Alan W Peterson** **Quality Assurance Chemist**	**Date:**	12/30/97
Reviewed by:	**Andrew Beliveau** **Senior Technical Specialist**	**Date:**	12/30/97
Approved by:	**Nancy Barmakian** **Branch Chief**	**Date:**	12/30/97

Region I, EPA New England

Standard Operating Procedure for Sampling Concrete in the Field

Table of Contents

Region I, EPA New England

Standard Operating Procedure for Sampling Concrete in the Field

1.0 Scope and Application

The following Standard Operating Procedure (SOP) describes a concrete sampling technique which uses an impact hammer drill to generate a uniform, finely ground, powder which is easily homogenized, extracted and analyzed. This procedure is primarily geared at providing enough sample for one or two different analyses at a time. That is, the time required to generate sufficient sample for a full sweet of analyses may be impractical. The concrete powder is suitable for all types of environmental analyses, with the exception of volatile compounds, and may be analyzed in the field or at a fixed laboratory. This procedure is applicable for the collection of samples from concrete floors, walls, and ceilings.

The impact hammer drill is far less labor intensive than previous techniques using coring devices, or hammers and chisels. It allows for easy selection of sample location and sample depth. Not only can the project planner control the depth to sample into the concrete, from surface samples (0 - ½ inch) down to a core of the entire slab, but the technique can also be modified to collect samples at discrete depths within the concrete slab.

Another issue with concrete sampling is the fact that the amount of time spent drilling translates into the weight of sample produced. Thus, to maximize sampling time, it is important to know the minimum amount of sample required for each analysis. To do this, the project planner should take the following steps: 1) Use the Data Quality Objective (DQO) process and familiarity with the site to develop the objectives of the sampling project and the depth(s) of sample to be collected. 2) Review the site history and any previous data collected to determined possible contaminants of concern. 3) Establish the action levels for those possible contaminants and determine the appropriate analytical methods (both field and/or fixed laboratory) to meet the DQOs of the project. 4) Based on the detection limits of these methods, determine the amount of sample required for each analysis and the total sample weight require for each sample location (including quality control samples).

As with any environmental data collection project, all aspects of a concrete sampling episode should be well thought out, prior to going out in the field, and thoroughly described in a Quality Assurance Project Plan (QAPP). The QAPP should clearly state the DQOs of the project and document a complete Quality Assurance/Quality Control program to reconcile the data generated with the established DQOs. For more information on these subjects, refer to EPA documents QA/R-5, EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, and QA/G-4, Guidance for the Data Quality Objective Process.

2.0 Method Summary

A one-inch diameter carbide drill bit is used in a rotary impact hammer drill to generate a fine concrete powder suitable for analysis. The powder is placed in a sample container and homogenized for field or fixed laboratory analysis. The procedure can be used to sample a single depth into the concrete, or may be modified to sample the concrete at distinctly different depth zones. The modified depth sampling procedure is designed to minimize any cross contamination between the sampling zones. If different sampling depths are required, two different diameter drill bits and a vacuum sampling apparatus are employed.

3.0 Health and Safety

Eye and hearing protection are required at all times during sample drilling. A small amount of dust is generated during the drilling process. Proper respiratory protection and/or a dust control system must be in place at all times during sampling.

4.0 Interferences and Potential Problems

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

As stated in Section 1.0 above, this sampling procedure is not recommended for volatile organic compound (VOC) analysis. The combination of heat generated during drilling and the exposure of a large amount of surface area will greatly reduce VOC recovery. If low boiling point semi-volatile compounds (i.e., naphthalene) are being analyzed, then the drill speed should be reduced to minimize heat build-up.

5.0 Equipment and Supplies

5.1 Single Depth Concrete Sampling

5.1.1 Rotary impact hammer drill
5.1.2 1-inch diameter carbide drill bits
5.1.3 Stainless steel scoopulas
5.1.4 Stainless steel spoonulas (for collecting sample in deeper holes, >2-inches)
5.1.5 Rectangular aluminum pans (to catch concrete during wall and ceiling sampling)
5.1.6 Gasoline powered generator (if alternative power source is required)

5.2 Multiple Depth Sampling (in addition to all the above)

5.2.1 ½ inch diameter carbide drill bits
5.2.2 Vacuum/sample trap assembly (see Section 7.2 and Figure 1)

5.2.2.1 Vacuum pump
5.2.2.2 2-hole rubber stopper
5.2.2.3 Glass tubing (to fit stopper)
5.2.2.4 Large glass test tubes, or Erlenmeyer flasks, for sample trap (several are suggested)
5.2.2.5 Polyethylene tubing for trap inlet (Tygon tubing may be used for the trap outlet)
5.2.2.6 Pasture pipets
5.2.2.7 Pipe cleaners
5.2.2.8 In-line dust filter (glass fiber filter, or equivalent)

6.0 Sample Containers, Preservation, and Storage

Concrete samples must be collected in glass containers for organic analyses, and may be collected in either glass or plastic containers for inorganic analyses. In general, a 2-ounce sample container with Teflon-lined cap (wide-mouth jars are preferred) will hold sufficient volume for most analyses. A 2-

ounce jar can hold roughly 90 grams sample. Note, samples which require duplicate and/or matrix spike/matrix spike duplicate analyses may require a larger sample container, or additional 2-ounce sample containers.

Organic samples are to be shipped on ice and maintained at 4°C (± 2°C) until the time of extraction and analysis. Inorganic samples may be shipped and stored at room temperature. Refer to 40 CFR Part 136 for guidelines on analysis holding times.

To maintain sample integrity, chain-of-custody procedures must be implemented at the time of sampling to 1) document all sample locations and associated field sample identification numbers, 2) document all quality control samples taken, including field duplicates, split samples for confirmatory analyses, and PE samples, and 3) document the transfer of field samples from field sampler to field chemist or fixed laboratory.

7.0 Procedure

7.1 Single Depth Concrete Sampling

Lock a 1-inch diameter carbide drill bit into the impact hammer drill and plug the drill into an appropriate power source. (A gasoline generator will be needed if electricity is not available.) For easy identification, sample locations may be pre-marked using a crayon or a non-contaminating spray paint. (Note, the actual drilling point must not be marked.) Depending on the appearance of the sample location, or the objectives of the sampling project, it may be desired to wipe the concrete surface with a clean dry cloth prior to drilling. All sampling decisions of this nature should be noted in the sampling logbook. 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 concrete powder that can be easily collected, homogenized and analyzed. Having several decontaminated impact drill bits on hand will help expedite sampling when numerous sample locations are to be drilled.

<u>Sample Collection</u>

A ½-inch deep hole (using a 1-inch diameter drill bit) generates about 10 grams of concrete powder. Based on this and the action levels for the project, determine the sampling depth, and/or the number of sample holes to be composited, to generate sufficient sample volume for all of the required analyses. (Note, with the absorbency of concrete, a ½-inch deep hole can be considered a surface sample.)

A decontaminated stainless steel scoopula can be used to collect the sample. The powder can either be collected directly from the surface of the concrete and/or the concrete powder can be scraped back into the hole and the less rounded back edge of the scoopula can be used to collect the sample. For holes greater than 2-inches in depth, a stainless steel spoonula will make it easier to collect the sample from the bottom of the hole.

To ensure collection of a representative sample when multiple analyses are required, a concrete sample should always be collected and homogenized in a single container and then divided up into the individual containers for the various analyses or split samples. This is particularly important when sample holes are deep, or when several holes are drilled adjacent to each other to form a sample composite.

Wall and Ceiling Sampling

A team of two samplers will be required for wall and ceiling sampling. The second person will be needed to hold a clean catch surface (i.e., an aluminum pan) below the drill to collect the falling powder. For wall samples, a scoopula, or spoonula, can be used to collect remaining concrete powder from within the hole. For ceiling holes, it may be necessary to drill the hole at an angle so the concrete powder can fall freely in the collection plan (and avoid falling on the drill). Another alternative might be to 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. Thus, the driller can be drilling straight up while the assistant steadies the pan to catch the falling dust. 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 mechanical vents. (Note, the plastic should deflect dust from the drill, but be loose enough underneath to allow for proper ventilation.)

7.2 Multiple Depth Concrete Sampling

The above method for concrete sampling can also be used to collect samples from different depths within the concrete. To do this, two different sized drill bits (i.e., ½ inch and 1 inch) and a simple vacuum pump with a vacuum trap assembly is required (see Figure 1). First, the 1 inch drill bit is used to drill to the first level and the concrete sample is collected as described in Section 7.1. The vacuum pump is then turned on and the hole is cleaned out using the vacuum trap assembly. The drill bit is then changed to the ½ inch bit and the next depth is drilled out (the ½ inch bit is used to avoid contact with the sides of the first hole). A clean tube or flask is placed on the vacuum trap, and the sample from the second drilling is collected. To go further, the 1 inch drill is used to open up the hole to the second level, the hole is cleared, and then the ½ inch drill is used again to go to a third level, etc. Note, the holes and concrete surface should be vacuumed thoroughly to minimize any cross-contamination between sample depths.

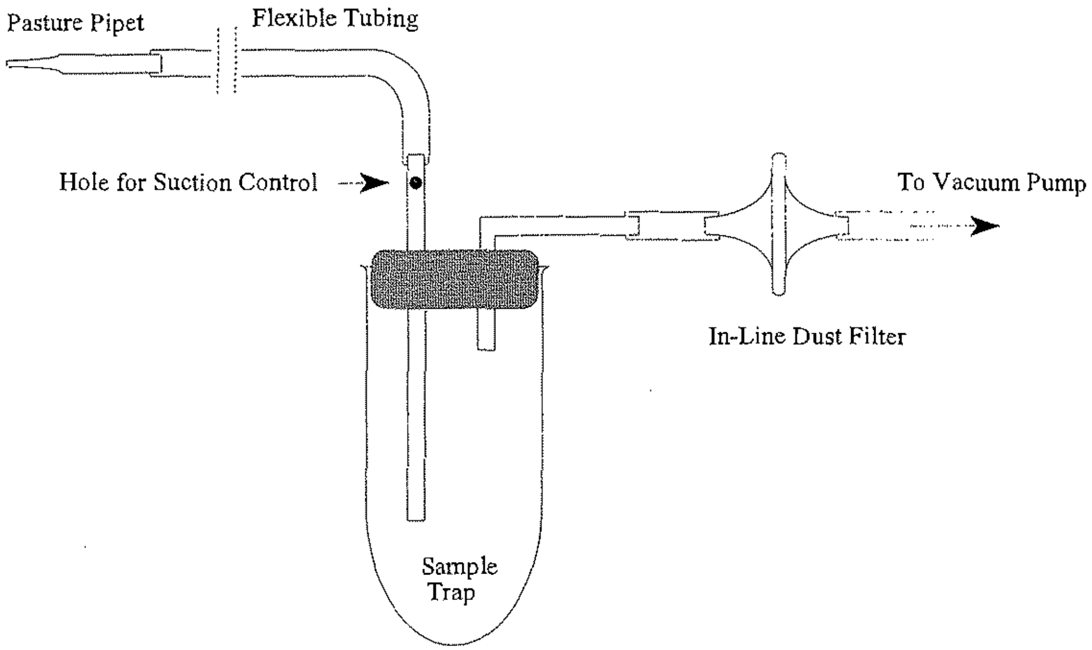
Vacuum Trap Design and Clean-out

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 pasture pipet 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.

7.3 Decontamination Procedure

Necessary supplies for decontamination include: two small buckets, a scrub brush, potable water,

Figure 1



deionized water, a squirt bottle for the deionized water, and paper towels. The first bucket contains a soap and potable water solution, and the second bucket contains just potable water. Place all used drill bits and utensils in the soap and water bucket. Scrub each piece thoroughly using the scrub brush. Note, the concrete 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 in the potable water bucket, and follow with a deionized water rinse from the squirt bottle. Place the deionized water rinsed pieces on clean paper towels and individually dry and inspect each piece. Note, all pieces should be dry prior to reuse.

8.0 Field Documentation

All Site related documentation and reports generated from concrete sampling should be maintained in the central Site file. If personal logbooks are used, legible copies of all pertinent pages must be placed in the Site file.

8.1 Field Logbooks

All field documentation should be maintained in bound logbooks with numbered pages. If loose-leaf logsheets are used to document site activities, extra care should be taken in keep track of all logsheets. The original copy of all logsheets should be maintained in the central Site file. Note, all sample locations must be documented by tying in their location to a detailed site map, or by using two or more permanent landmarks. The following information should be documented in the field logbooks:

- Site name and location,
- EPA Site Manager,
- Name and affiliation of field samplers (EPA, Contractor company name, etc.),
- Sampling date,
- Sample locations and IDs,
- Sampling times and depths, and
- Other pertinent information or comments

8.2 Sample Labeling and Chain-of-Custody

8.2.1 Sample Labels

Sample labels will be affixed to all sample containers. Labels must contain the following information:

- Project name,
- Sample number, and/or location
- Date and time of sampling,
- Analysis,
- Preservation, and
- Sampler's name.

8.2.2 Chain-of-Custody

All samples must be traced from collection, to shipment, to laboratory receipt and laboratory custody. The Chain-of-Custody (COC) Record is a multi-part form that is initiated as samples are acquired and accompanies a sample (or group of samples) as they are transferred from person to person. The COC form is signed by all individuals responsible for sampling, sample transport, and laboratory receipt. (Note, overnight deliver services, often used with sample transport, are exempt from having to sign the COC form. However, copies of all shipping invoices must be kept with the COC documentation.) One copy of the COC is retained by the field sampling crew, while the original (top, signed copy) and remaining carbonless copies are placed in a zip-lock bag and taped to the inside lid of the shipping cooler. If multiple coolers are required for a sample shipment to a single laboratory, the COC need only be sent with one of the coolers. The COC should state how many coolers are included with the shipment. All sample shipments to different laboratories require individual COC forms. The original COC form accompanies the samples until the project is complete, and is then kept in the permanent project file. A copy of the COC is also kept with the project manager, the laboratory manager, and attached to the data package.

8.2.3 Custody Seal

The Custody seal is an adhesive-backed label which is also part of the chain-of-custody process. The custody seal is used to prevent tampering with the samples after they have been collected in the field and sealed in coolers for transit to the laboratory. The Custody seals are signed and dated by a sampler and affixed across the opening edges of each cooler containing samples. Clear packing tape should be wrapped around the cooler, and over the Custody seal, to secure the cooler and avoid accidental tampering with the Custody seal.

9.0 Quality Assurance and Quality Control (QA/QC)

A solid QA/QC program is essential to establishing the quality of the data generated so that proper project decisions can be made. The following are key quality control elements which should be incorporated into a concrete sampling and analytical program.

9.1 Equipment Blanks

An equipment blank should be performed on decontaminated drill bits and collection utensils at a frequency of 1 per 20 samples or 1 per day, whichever is greater. To prepare the equipment blank, place the decontaminated drill bit and utensils in a large clean stainless steel bowl. Pour sufficient deionized water into the bowl to fill all of the required sample containers. Next, stir the drill bit and utensils in the bowl with a clean utensil to thoroughly mix the blank. Finally, decant off the equipment blank into the sample containers. Note, a clean funnel may help to pour off the equipment blank into the containers.

9.2 Field Duplicates

Field duplicates are samples collected adjacent to each other (collocated) at the same sample location (not two aliquots of the same sample). Field duplicates not only help provide an indicator of overall precision, but measure the cumulative effects of both the field and analytical precision, and also measure the representativeness of the sample. Field duplicates must be prepared and analyzed at a frequency of 1 per 20 samples or 1 per non-related concrete matrix, whichever is greater. An example of a non-related concrete matrix might be the investigation of two different types of chemical spills.

Calculate the Relative Percent Difference (RPD) between the sample and its duplicate using Equation 1.

Equation 1

$$RPD = \frac{|S - D|}{\frac{(S + D)}{2}} x\ 100$$

Where:

S = Original sample result
D = Duplicate sample result

The following general guidelines have been established for field duplicate criteria:

- If both the original and field duplicate values are ≥ practical quantitation limit (PQL), then the control limit for RPD is ≤50%,
- If one or both values are < PQL, then do not assess the RPD.

If more rigorous field duplicate criteria are needed to achieve project DQOs, then that criteria should be documented in the project QAPP.

If the field duplicate criteria specified above are not met, then flag that target element with an "*" on the final report for both the original and field duplicate samples. Report both the original and field duplicate analyses; do not report the average. Field duplicate samples should be indicated on the sample ID. For example, the sample ID can contain the suffix "FD".

9.3 Laboratory Duplicates

Laboratory duplicates are two aliquots of the same sample that are prepared, homogenized and analyzed in the same manner. (Note, proper sample homogenization is critical in producing meaningful results.) The precision of the sample preparation and analytical methods is determined by performing a laboratory duplicate analysis. Laboratory duplicates can be prepared in the field and submitted as blind samples, or the laboratory can be requested to perform the laboratory duplicate analysis. In the case of laboratory prepared duplicates, the field sampling team must be sure to provide sufficient sample volume. Laboratory duplicates must be prepared and analyzed at a frequency of 1 per 20 samples or 1 per non-related concrete matrix, whichever is greater.

Calculate the RPD between the sample and its duplicate using Equation 1. The following general guidelines have been established for laboratory duplicate criteria:

- If both the original and laboratory duplicate values are $\geq$ PQL, then the control limit for RPD is $\leq 25\%$,
- If one or both values are < PQL, then do not assess the RPD.

If duplicate criteria are not met, then flag that target element with an "*" on the final report for both the original and duplicate samples. Report both the original and duplicate analyses; do not report the average.

9.4 Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate samples (MS/MSDs) are two additional aliquots of a sample which are spiked with the appropriate compound(s) or analyte(s) of concern and then prepared and analyzed along with the original sample. (Note, proper sample homogenization, prior to spiking, is critical in producing meaningful results.) MS/MSDs help evaluate the effects of sample matrix on the analytical methods being used. The field sampling team must provide sufficient sample volume such that the field or fixed laboratory can prepare and analyze MS/MSDs at a frequency of 1 per 20 samples or 1 per non-related concrete matrix, whichever is greater.

Calculate the recovery of each matrix spike compound or analyte using Equation 2.

Equation 2

$$MSR = \frac{SSR - SR}{SA} \; x \; 100$$

Where,

MSR	=	Matrix Spike Recovery,	SA	=	Spike Added
SSR	=	Spiked Sample Result,	SR	=	Sample Result

Calculate the relative percent difference (RPD) between the recoveries of each compound or analyte in the matrix spike and matrix spike duplicate using Equation 3.

Equation 3

$$RPD = \frac{| \, MSR - MSRD \, |}{\frac{(MSR + MSRD)}{2}} \; x \; 100$$

Where,

MSR = Matrix Spike Recovery
MSRD = Matrix Spike Duplicate Recovery

9.5 Performance Evaluation Samples

In accordance with the EPA Region I Performance Evaluation Program Guidance, performance evaluation (PE) samples should be submitted for each type of analysis to be performed in the field or by the fixed laboratory performing full protocol EPA methods. PE samples provide information on the quality of the individual data packages. PE samples are certified standard reference materials (SRMs) from a source other than that used to calibrate the instrument. If both field and fixed laboratories are being used to analyze samples, at least one solid PE sample should undergo both field analysis and confirmatory full protocol EPA method analysis to facilitate data comparability. A copy of the certified values for the SRM must be submitted with the final data packages to facilitate data evaluation.

9.6 Data Verification and Validation

All field data and supporting information (including chain-of-custody) that is collected during a concrete sampling episode should be verified daily, by a person other than that performing the work, to check for possible errors.

During the project planning process, a plan for data validation should be established for all data, both for field and fixed laboratories. All data must be validated to assure that it is of a quality suitable to make project decisions. For help in developing a data validation program refer to Region I, EPA New England, Data Validation Functional Guidelines for Evaluating Environmental Analyses.

9.7 Audits

9.7.1 Internal Audits

As part of the Quality Assurance/Quality Control Program for any sampling project, a series of internal audit checks should be instituted to monitor and maintain the integrity of the sample collection process. Timely internal reviews will insure that proper sampling, decontamination, chain-of-custody and quality control procedures are being followed. Also, the internal audit review is there to monitor any corrective actions taken, and/or institute corrective actions that should have been taken and were not. All corrective actions taken must be documented in an appropriate logbook, and if any corrective actions impact the final data reported, then they must also be documented in the final report narrative. The results of all internal audits must be documented in a report, and copies of the report issued to the Project Manager and the Quality Assurance Manager. The original copy of any audit report must remain with the main project file and be available for review.

9.7.2 External Audits

The Agency reserves the right to perform periodic field audits to ensure compliance with this SOP.

10.0 References

1) Guidance for the Data Quality Objective Process, QA/G-4, EPA/600/R-96/055, September 1994.

2) EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, QA/R-5, Interim Final, October 1997.

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

4) Region I, EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses, July 1996.

5) EPA Region I Performance Evaluation Program Guidance, July 1996.

6) U.S. EPA Code of Federal Regulations, 40 CFR, Part 136, Appendix B, Revised as of July 1995.