



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203-0001

January 8, 1997

Mr. Philip Otis
U.S. Department of the Navy/Northern Division - NAVFAC
10 Industrial Highway
Code 1811/PO - Mail Stop 82
Lester, PA 19113-2090

Re: Site 13 Method 8080 Chromatograph, at the former Naval Construction Battalion Center
Davisville, Rhode Island

Dear Mr. Otis:

Pursuant to § 12.5 of the NCBC Federal Facility Agreement (FFA), the Environmental Protection Agency's (EPA) has reviewed the above referenced document.

The Navy used EPA Analytical Method 8080 to verify that the soils remaining at Site 13 after excavation meet the cleanup level. EPA reviewed the data and has determined that the Navy's laboratory has correctly identified the mixture of three PCB Aroclors present at the site. EPA does not believe that reanalysis of the site soils by Method 680 is needed. The enclosed comments elaborate on the procedure used.

The Navy must ensure these ongoing removal actions will adequately mitigate or eliminate the threats posed by the sites and will be conducted in a manner consistent with State and federal regulations. Should the Navy, in consultation with EPA and RIDEM, determine that additional remedial action is required at the sites, the Navy must transition from removal to remedial response activities.

If you have any questions with regard to this letter, please contact me at (617) 573-5736.

Sincerely,

A handwritten signature in cursive script that reads "Christine A.P. Williams".

Christine A.P. Williams
Remedial Project Manager
Federal Facilities Superfund Section

Enclosure

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
Office of Environmental Measurement & Evaluation
60 Westview Street, Lexington, MA 02173-3185

MEMORANDUM

DATE: January 6, 1997
SUBJECT: Quality Assurance Review of PCB data from NCBC Site 13.
FROM: Alan Peterson, QA Chemist *AP*
TO: Christine Williams, RPM

SCOPE

The PCB contamination found at Site 13 is a mixture of Aroclors. The purpose of this data review is to determine if the Aroclor results generated by Method 8080 are suitable for making proper cleanup decisions, or, if reanalysis of the samples by Method 680 is warranted due to a significant error in these results.

EXECUTIVE SUMMARY

Upon review of the data submitted, it is apparent that the laboratory has correctly identified a mixture of three Aroclors present in the samples (Aroclors 1248, 1254, and 1260) which show no major signs of weathering. When a mixture of Aroclors is present in a sample, Method 8080 will, in general, generate results which are biased high. Thus, the level of confidence is also high, that if all confirmatory results are below the action level for the site, the clean-up goals should have been obtained. Based on this assertion, it is not recommended that reanalysis of the samples be performed using Method 680.

A more in-depth discussion of the bias presented by method 8080 is detailed below.

FINDINGS AND RECOMMENDATIONS

Method 8080 determines the presence of a specific Aroclor by the chromatographic pattern it generates on a gas chromatograph (GC). The chromatographic pattern represents a mixture of individual congeners. The congeners are present in relative proportions to each other and form a pattern as they elute from the GC that is characteristic of a particular Aroclor. In Method 8080, the chemist chooses five of the most prominent characteristic peaks in an Aroclor to quantitate sample results. Each peak is quantitated separately, and the average of the five results is reported as the sample concentration. This quantitation technique helps compensate for possible interferences that may be present in the sample, or when changes in the relative proportions between congeners takes place as the Aroclor weathers in the environment.

Method 8080 becomes less effective at determining accurate Aroclor concentrations when either the Aroclor has weathered significantly, or when a mixture of Aroclors exists within the sample, as is the

case with Site 13. (Note, if the weathering of an Aroclor has advanced to the point where the chromatographic pattern is unrecognizable, Method 8080 may not even detect the Aroclor's presence.)

The problem in quantitating Aroclor mixtures, is that many of the individual congeners present in one Aroclor are also present in other Aroclors. Thus, if two Aroclors are present in a sample, and the peak chosen to quantitate one of the Aroclors is also present in the second Aroclor, then the reported concentration for that peak will be biased high by the contribution of the second Aroclor. Table 1 demonstrates this effect. Listed, by retention time, are the 5 quantitation peaks used by the laboratory for each of the Aroclors found at Site 13. In this example, each Aroclor is present at the same concentration (i.e., 1 ppm). The table illustrates the contribution effects to each of the quantitation peaks from the other Aroclors present.

For example, the third quantitation peak for Aroclor 1248 has a retention time of 15.7 minutes. Aroclor 1254 also contains this same congener as part of its composition. The peak produced by Aroclor 1254 is nearly the exact size as Aroclor 1248. Thus, the reported 1248 concentration for this peak would be double its true concentration due to the contribution of Aroclor 1254. Aroclor 1260 does not have this congener present in its mix, and thus does not effect quantitation.

Table 1 shows how Method 8080 can over estimate Aroclor concentrations in a sample containing a mixture of Aroclors. In this example, the total Aroclor concentration could be over-estimated by greater than 50%. To improve sample results, the laboratory eliminated several of the quantitation peaks (denoted by the #). However, in this example, this still led to a greater than 40% increase in the total reported Aroclor concentration.

Method 680 diverges from this concept of analyzing for Aroclors. The method looks directly for the individual congeners and thus can not overestimate results as with Method 8080. Method 680 has the following distinct advantages over Method 8080.

- Since the method uses a gas chromatograph/mass spectrometer (GC/MS) to analyze samples, positive confirmation of the result is possible with a single analysis.
- The method is not affected by weathering of PCBs in the environment. The GC/MS can determine both the breakdown products and the remaining PCB fraction.
- The method opens a whole new area of investigation into the understanding of how PCBs react in the environment. As more data becomes available, better treatment and disposal decisions will be possible.

In the case of Site 13 samples, there is no real need to use method 680 because the results of 8080 are overestimated and are still under the regulatory limit. The cost of analyzing more samples by method 680 would not be justified in this case. If you have any questions concerning this review, please feel free to call me at (617) 860-4322.

Table 1
Relative Contributions to Each Quantitation Peak
Based on an Equal Mixture of Three Aroclors

Aroclor	Quant peak R.T.	1248 (ppm)	1254 (ppm)	1260 (ppm)	Total Contribution (ppm)	Average of 5 peaks (ppm)
1248	12.8	1			1.0	1.4
	14.4	1			1.0	
	15.7	1	1.0		2.0	
	17.0	1	0.4		1.4	
	18.4	1	0.3		1.3	
1254	19.0	0.2	1	0.5	1.7	1.8
	19.5	0.2	1	0.5	1.7	
	21.7	0.2	1	0.4	1.6	
	# 23.0 *		1	1.3	2.3	
	# 24.5	0.1	1	0.8	1.9	
1260	# 22.5	0.1	0.9	1	2.0	1.5
	# 23.0 *		0.7	1	1.7	
	# 25.9		0.4	1	1.4	
	26.6		0.2	1	1.2	
	28.4		0.1	1	1.1	
Total Aroclor concentration based on all 5 quantitation peaks =						4.7
Total Aroclor concentration excluding laboratory eliminated quantitation peaks =						4.3

* Same Quantitation Peak.

Peak eliminated by laboratory for quantitation of final result.