

Method Performance

MERCURY SPOT KIT FIELD TRIAL at OAK RIDGE NATIONAL LABORATORY

SUMMARY OF RESULTS

Description

A total of 47 soil samples were tested using the Mercury SPOT Kit. The samples came from the East Fork Poplar Creek floodplain in Oak Ridge, Tennessee. The samples were dried, pulverized, and the contamination of mercury determined by Cold Vapor Atomic Absorption Spectrometry (CVAAS). The samples contained mercury between 0.4 and 3000 ppm (mg/kg). The predominant forms of mercury in these samples were elemental mercury and mercury sulfide.

1 ppm Detection Level Results

- All 47 samples were tested using the Mercury SPOT Kit at the 1 ppm detection level.
- Thirty seven of the 45 samples containing mercury at concentrations greater than 1 ppm gave a positive result.
- Seven of the highly contaminated samples caused the Mercury SPOT pad to become clogged resulting in slow flow rates of the sample, wash, and substrate solutions. The signal generated in these tests had a high background signal (the entire surface of the Mercury SPOT pad turned dark blue) which prevented an interpretation of the test result.
- Two samples contained 1 ppm mercury or less and gave negative responses in the SPOT test.
- One of the soils contained 17 ppm mercury and gave a false negative result. This soil was found to contain an interferant which prevented the detection of mercury by the Mercury SPOT Kit.

4 ppm Detection Level Results

Note: By placing only one drop of extract into the enzyme reagent tube instead of four, the test detection level becomes 4 ppm.

- When the seven extracts giving invalid results were retested at the 4 ppm detection level, the flow rates of solutions through the Mercury SPOT pad was normal and positive results were observed.

400 ppm Detection Level Results

In order to demonstrate the utility of the Mercury SPOT Kit in monitoring mercury contamination at levels greater than 1 ppm, twenty three extracts were diluted 1:400 into deionized water (making the detection level 400 ppm) and tested.

- The eleven samples containing 360 ppm mercury or greater gave positive results.
- The twelve samples containing 281 ppm mercury or less gave negative results.

The data is summarized in the accompanying table.

Correlation of EPA Method 7471 with the Mercury SPOT Kit

SAMPLE ID	METHOD 7471 (ppm)	Mercury	SPOT	Kit
		1 ppm RESULT	4 ppm RESULT	400 ppm RESULT
127	2850	POS.		POS.
324	2060	INVALID	POS.	POS.
223	2020	POS.		POS.
524	1830	INVALID	POS.	POS.
621	1360	INVALID	POS.	POS.
424	1190	INVALID	POS.	POS.
5102	1100	POS.		POS.
729	804	INVALID	POS.	
920	589	POS.		POS.
810	454	POS.		POS.
8102	400	POS.		
025	376	INVALID	POS.	POS.
5201	360	POS.		POS.
7601	310	POS.		
211	281	POS.		NEG.
115	258	INVALID	POS.	NEG.
7509	250	POS.		
5107	240	POS.		
9402	240	POS.		
312	226	POS.		NEG.
717	183	POS.		NEG.
5105	160	POS.		NEG.
7905	160	POS.		
7209	150	POS.		
9308	150	POS.		
4607	140	POS.		NEG.
7801	120	POS.		
9502	110	POS.		
4604	100	POS.		NEG.
8301	100	POS.		
4107	73	POS.		
512	64.8	POS.		NEG.
7107	57	POS.		
918	56.2	POS.		NEG.
4203	38	POS.		NEG.
5106	36	POS.		
013	29	POS.		NEG.
822	21.4	POS.		NEG.
8408	21	POS.		
8001	19	POS.		
8808	18	POS.		
4101	17	NEG.		
7704	15	POS.		
8205	9.2	POS.		
8906	3	POS.		
9506	1	NEG.		
8705	0.4	NEG.		