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Curtis A. Esche and Jensen H. Groff, Column Editors

Introduction

The Proficiency Analytical Testing (PAT) Program is a collaborative effort of the American Industrial Hygiene Association (AIHA) and researchers at the Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. The PAT Program provides quality control reference samples to over 1300 occupational health and environmental laboratories in 18 countries. Although one objective of the PAT Program is to evaluate the analytical ability of participating laboratories, the primary objective is to assist these laboratories in improving their laboratory performance.

Each calendar quarter (designated as a round), samples are mailed to participating laboratories and the data are analyzed to evaluate laboratory performance on a series of analyses. Each mailing and subsequent data analysis is completed in time for participants to obtain repeat samples and to correct analytical problems before the next calendar quarter starts. The PAT Program currently includes four sets of samples, as shown in Table 1. A mixture of three of the four possible metals and one to three of the ten possible organic solvents are rotated for each round. Fibers alternate between amosite and chrysotile asbestos and man-made fibers; no fiber mixtures are provided. Each set consists of four concentrations and a blank. The metal, silica, and fiber samples are on filters and the organic solvents are on charcoal or silica gel tubes. The organic solvent set also includes five blank charcoal or silica gel tubes for desorption efficiency determination.

Laboratories are evaluated for each analysis by comparing their reported results against an acceptable performance limit for each PAT Program sample the laboratory analyzes. Reference laboratories are preselected to provide the performance limits for each sample. These reference laboratories must meet the following criteria: (1) the laboratory was rated proficient in the last PAT evaluation of all the contaminants in the program; and (2) the laboratory, if located in the United States, is AIHA accredited. After the data from the reference laboratories are collected and statistically treated, the mean of the collected data is called the reference value and the performance limits equal the mean ±3 standard deviations. Data are acceptable if they fall within the performance limits. Data falling outside the performance limits are reported as outliers.

TABLE 1. Current Sets of Samples in PAT Program

Metals	Silica	Fibers (Phase Contrast Microscopy Fiber Counting)	Organic Solvents
Cadmium	Quartz	Amosite	Benzene
Chromium		Chrysotile	Chloroform
Lead		Man-made fibers	1,2-Dichloroethane
Zinc			Methanol
			p-Dioxane
			Tetrachloroethylene
			Toluene
			1,1,1-Trichloroethane
			Trichloroethylene
			o-Xylene

Laboratories are rated based on performance in the PAT Program over the last year (i.e., four calendar quarters), as well as on individual contaminant performance. Individual contaminants are metals, silica, asbestos/fibers, and organic solvents. Individual contaminant performance is rated as (1) proficient if all results have been reported and all are classified as acceptable for the last two consecutive rounds; and (2) proficient in all other cases if three-fourths or more of the results reported in the last four consecutive rounds are classified as acceptable.[1]

PAT Round 126, July 1996

A total of 1324 laboratories were enrolled in the PAT Program, with 1218 laboratories submitting results on round 126. Table 2 lists the reference values, performance limits, and participants for each sample type in the PAT Program. Table 3 presents the summary of the PAT proficiency ratings for each analytical area.

There were some changes this round involving cadmium and asbestos/fiber samples. Cadmium sample number one was lowered because the laboratory accreditation committee of AIHA wanted to test the laboratories' ability to measure cadmium near the new recommended Occupational Safety and Health Administration permissible exposure limit. The relative standard deviation (RSD) for cadmium sample number one was 5.5 percent, which is in the range of prior PAT metals variability. No increase in the number of outliers was observed.

Asbestos/fiber sample number two was a man-made fiber (glass fiber). The RSD for this sample was 42.3 percent. This was the first time that a sample was below 100 fibers/mm^2. The fact that asbestos/fiber samples typically have higher RSDs, coupled with a reference value below 100 fibers/mm^2, probably contributed to the large variability for this sample. The total number of outliers was similar to other asbestos/fiber samples, although they were all high. There will be one man-made fiber included with each asbestos/fiber kit in future PAT rounds. Laboratories should use the "A" rules when counting man-made fibers.

Round 126 was the first practice round for passive monitors. Monitors were obtained from three different manufacturers and the organic solvents used were benzene, *o*-xylene, and toluene. One hundred forty-seven laboratories participated in the first practice round. Results from the practice round will be

TABLE 2. Reference Values, Performance Limits, and Participants for Each Sample Type; PAT Round 126 (July 1996)

Contaminant	Sample No.	No. of Reference Labs	Reference Value	RSD (%)	Performance Limits		No. of Labs	No. of Outliers
					Lower	Upper		
Cadmium (mg)	1	60	0.0029	5.5	0.0024	0.0033	364	27
	2	60	0.0073	4.7	0.0063	0.0084	364	28
	3	60	0.0147	4.4	0.0128	0.0167	364	24
	4	60	0.0048	4.8	0.0041	0.0055	364	30
Chromium (mg)	1	60	0.2137	5.2	0.1805	0.2469	361	31
	2	60	0.1250	5.9	0.1028	0.1472	361	22
	3	60	0.0726	6.1	0.0594	0.0859	361	20
	4	60	0.1016	5.5	0.0847	0.1185	361	34
Lead (mg)	1	60	0.0231	4.8	0.0197	0.0264	369	32
	2	60	0.0550	4.1	0.0483	0.0618	369	25
	3	60	0.0830	3.6	0.0740	0.0920	369	32
	4	60	0.0331	4.6	0.0285	0.0376	369	31
Silica (mg)	1	59	0.0824	23.9	0.0234	0.1415	82	3
	2	59	0.1038	28.1	0.0164	0.1911	82	4
	3	59	0.0876	20.1	0.0348	0.1404	82	3
	4	59	0.1406	28.1	0.0219	0.2593	82	3
Asbestos/fibers (amosite) (f/mm^2)	1	60	297.3	23.9	122.3	548.7	1030	42
	2	60	52.6	42.3	7.0	140.5	1030	41
	3	60	188.5	22.6	82.5	337.8	1030	64
	4	60	363.9	21.9	164.1	642.4	1030	45
Benzene (mg)	1	60	0.0731	6.5	0.0589	0.0873	332	31
	2	60	0.0989	6.8	0.0788	0.1190	332	25
	3	60	0.4918	4.3	0.4281	0.5554	332	28
	4	60	0.3579	5.0	0.3039	0.4119	332	27
o-Xylene (mg)	1	60	0.1648	5.1	0.1395	0.1901	332	39
	2	60	0.8760	4.2	0.7662	0.9858	332	49
	3	60	0.3541	5.5	0.2955	0.4127	332	31
	4	60	0.6648	4.5	0.5757	0.7539	332	39
Toluene (mg)	1	60	0.8820	3.6	0.7858	0.9783	332	37
	2	60	0.4485	4.3	0.3900	0.5070	332	35
	3	60	0.7588	4.4	0.6588	0.8587	332	31
	4	60	0.2662	4.4	0.2312	0.3012	332	31

published in a future column. The next practice round for passive monitors will be in January 1997.

New organic solvents will be introduced into the PAT Program. Methyl ethyl ketone and methyl isobutyl ketone will appear in round 128 (January 1997), followed by ethyl acetate, *n*-butyl acetate, and isopropanol in round 130 (July 1997). Also, there will be one man-made fiber sample included with every asbestos/fiber kit. Laboratories will be instructed to use the "A" rules when counting man-made fibers for statistical reasons.

TABLE 3. PAT Proficiency Ratings Based upon Rounds 123 to 126 (October 1995–September 1996)

Contaminant	No. of Labs Rated	No. of Labs Rated Proficient	Percent Labs Rated Proficient
Metals	361	332	92
Silica	82	81	98.8
Asbestos/fibers	1030	986	95.7
Organic solvents	332	300	90.4

PAT Round 127, October 1996

PAT round 127 was sent to participating laboratories on October 1, 1996. The organic solvents in this round were chloroform, 1,2-dichloroethane, and tetra-

chloroethylene. Metals in this round included cadmium, lead, and zinc. Silica had a talc and coal mine dust background, and asbestos/fibers were chrysotile with one man-made fiber sample.

References

1. Esche, C.A.; Groff, J.H.; Schlecht, P.C.; Shulman, S.A.: Laboratory Evaluations and Performance Reports for the Proficiency Analytical Testing (PAT) and Environmental Lead Proficiency Analytical Testing (ELPAT) Programs. DHHS (NIOSH) Pub. No. 95-104. National Institute for Occupational Safety and Health, Cincinnati, OH (1994).