Proficiency Analytical Testing (PAT) Program February 28, 1998

Curtis A. Esche and Jensen H. Groff

Mr. Esche and Mr. Groff are affiliated with the Department of Health and Human Services, U.S. Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Division of Physical Sciences and Engineering, Quality Assurance and Statistics Activity. They can be reached at HHS/PHS/CDC/NIOSH, Robert A. Taft Laboratories, 4676 Columbia Parkway (MS/R8), Cincinnati, OH 45225.

PAT ROUND 132 JANUARY 1998

A total of 1214 laboratories were enrolled in the PAT Program with 1105 laboratories submitting results on Round 132. Table I lists the reference values, performance limits, and participants for each sample type in the PAT Program. Table II presents the summary of the PAT proficiency ratings for each analytical area.

PAT PASSIVE MONITOR ROUND 132 JANUARY 1998

A total of 164 kits containing two passive monitors exposed to test atmospheres of benzene, toluene, and o-xylene was sent to participating laboratories for Round 132 of the PAT Passive Monitor program on December 24, 1997. By the due date of February 2, 1998, 154 laboratories submitted results. One hundred thirty-one laboratories were rated proficient. The acceptable performance limit is the reference value ±18%. Laboratory analyses within this performance limit were rated as acceptable. A laboratory was rated proficient if three-fourths or more of the analyses reported were rated acceptable. Table III presents the summary of reported results from all

TABLE I. Reference Values, Performance Limits, and Participants for Each Sample Type; PAT Round 132 (January 1998)

Contaminant	Sample Number	No. of Reference Labs	Reference Value	RSD (%)	Performance Limits		No. of Outliers
					Lower	Upper	
Cadmium (mg)	1	321	0.0028	5.9	0.0023	0.0032	23
	2	321	0.0127	4.2	0.0111	0.0143	19
	3	321	0.0135	4.2	0.0118	0.0152	25
	4	321	0.0038	5.4	0.0032	0.0044	30
Chromium (mg)	1	318	0.2074	6.0	0.1704	0.2445	19
	2	318	0.1477	5.8	0.1220	0.1735	18
	3	318	0.1076	5.7	0.0892	0.1261	20
	4	318	0.0594	5.6	0.0494	0.0694	17
Lead (mg)	1	325	0.0415	4.5	0.0360	0.0471	25
	2	325	0.0947	4.0	0.0836	0.1057	18
	3	325	0.0289	4.8	0.0247	0.0331	17
	4	325	0.0646	4.1	0.0567	0.0726	20
Silica (mg)	1	80	0.0638	18.7	0.0281	0.0996	5
	2	80	0.0896	17.0	0.0439	0.1353	2
	3	80	0.1179	15.9	0.0615	0.1742	7
	4	80	0.0683	18.3	0.0308	0.1058	4
Asbestos/fibers (amosite) (f/mm²)	1	948	219	18.4	115	356	49
	2	948	286	17.3	157	453	59
	3	948	112	20.0	50	199	65
	4	948	442	16.0	255	679	62
n-Butyl acetate (mg)	1	289	0.0580	7.7	0.0446	0.0714	27
	2	289	0.3951	4.3	0.3438	0.4464	27
	3	289	0.1417	5.6	0.1180	0.1654	22
	4	289	0.2921	4.6	0.2518	0.3325	29
Ethyl acetate (mg)	1	289	0.2863	6.1	0.2335	0.3391	22
	2	289	0.9328	5.4	0.7830	1.0826	22
	3	289	0.1326	7.3	0.1036	0.1615	22
	4	289	0.5510	5.6	0.4583	0.6437	25
Isopropanol (mg)	1	289	0.6923	4.6	0.5973	0.7872	24
	2	289	0.2177	4.7	0.1873	0.2482	31
	3	289	1.0484	4.5	0.9065	1.1904	26
	4	289	0.4540	4.6	0.3912	0.5169	27

TABLE II. Proficiency Ratings Based on Rounds 129 to 132 (April 1997–March 1998)

Contaminant	No. of Labs Rated	No. of Labs Rated Proficient	Percentage Labs Rated Proficient
Metals	318	294	92.5
Silica	80	77	96.3
Asbestos/fibers	948	905	95.4
Organic solvents	289	266	92.0

TABLE III. Passive Monitor Round 132—Reference Values, Performance Limits, and Performance Summary

Contaminant	Sample	Reference Value (ppm)^	Lower Performance Limit (ppm)	Upper Performance Limit (ppm)	No. of Labs Rated	No. of Outliers
Benzene	1	12.1	9.922	14.278	164	9
	2	30.6	25.092	36.108	164	16
o-Xylene	1	12.0	9.84	14.16	164	14
	2	14.58	11.956	17.204	164	24
Toluene	1	14.8	12.136	17.464	164	13
	2	36.06	29.569	42.551	164	16

^ppm = parts per million.

laboratories, reference values, and performance limits for passive monitors.

PAT ROUND 133 APRIL 1998

PAT Round 133 was sent to participating laboratories on April 1, 1998. In the PAT program, the organic solvents were chloroform; 1,1,1-trichloroethane; and trichloroethylene. Metals in this round included cadmium, lead, and zinc. Silica had a talc background and asbestos/fibers were chrysotile with one man-made fiber sample.

BACKGROUND

The Proficiency Analytical Testing Program is a collaborative effort of the American Industrial Hygiene Association 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 1200 occupational health and environmental laboratories in 17 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 IV. A mixture of 3 of the 4 possible metals, and 1 to 3 of the 15 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 metals, silica, and fiber samples are on filters, and the organic solvents are on charcoal, carbon molecular sieve, or silica gel tubes. The organic solvent set also includes five blank charcoal, carbon molecular sieve, 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. After the data from all laboratories are collected and statistically treated, the mean of the collected data is calculated, 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.

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]

TABLE IV. Current Sets of Samples in the PAT Program

Metals	cadmium	
	chromium	
	lead	
	zinc	
Silica	quartz	
Asbestos/fibers	amosite	
	chrysotile	
	man-made fibers	
Organic solvents	benzene	methyl ethyl ketone
	n-butyl acetate	methyl isobutyl ketone
	chloroform	tetrachloroethylene
	1,2-dichloroethane	toluene
	p-dioxane	1,1,1-trichloroethane
	ethyl acetate	trichloroethylene
	isopropanol	o-xylene
	methanol	

REFERENCES

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