



PAT Program Background and Current Status

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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 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 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 12 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. 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.

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 or-

ganic 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 128, January 1997

A total of 1324 laboratories were enrolled in the PAT Program, with 1217 laboratories submitting results on round 128. 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. Round 128 marked the first round for methyl ethyl ketone and methyl isobutyl ketone. Relative standard deviations were somewhat high, but not beyond the expected range for a new organic solvent.

Round 128 was also the second 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 fifty-eight laboratories participated in the second practice round. One hundred forty-nine laboratories submitted results and 121 were rated proficient. Ratings from this round do not count toward accreditation. The first official round is round 130 in July 1997. Results from the practice round will be published in a future column.

New organic solvents are being introduced into the PAT Program. Ethyl acetate, *n*-butyl acetate, and isopropanol will appear 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.

PAT Round 129, April 1997

PAT round 129 was sent to participating laboratories on April 1, 1997. The organic solvents in this round were 1,2-dichloroethane, tetrachloroethylene, and trichloroethylene. Metals in this round included cadmium, lead, and zinc. Silica

TABLE 1. Current Sets of Samples in PAT Program

Metals	Cadmium	
	Chromium	
	Lead	
	Zinc	
Silica	Quartz	
Asbestos/fibers	Amosite	
	Chrysotile	
	Man-made fibers	
Organic solvents	Benzene	Methyl isobutyl ketone
	Chloroform	Tetrachloroethylene
	1,2-Dichloroethane	Toluene
	<i>p</i> -Dioxane	1,1,1-Trichloroethane
	Methanol	Trichloroethylene
	Methyl ethyl ketone	<i>o</i> -Xylene

TABLE 2. Reference Values, Performance Limits, and Participants for Each Sample Type: PAT Round 128 (January 1997)

Contaminant	Sample No.	No. of Reference Labs	Reference Value	RSD (%)	Performance Limits		No. of Labs	No. of Outliers
					Lower	Upper		
Cadmium (mg)	1	55	0.0039	4.1	0.0034	0.0044	359	36
	2	55	0.0144	4.2	0.0126	0.0162	359	25
	3	55	0.0096	4.3	0.0083	0.0108	359	29
	4	55	0.0067	5.5	0.0056	0.0078	359	13
Chromium (mg)	1	55	0.0707	4.2	0.0619	0.0795	356	48
	2	55	0.1664	5.9	0.1370	0.1958	356	26
	3	55	0.1165	5.2	0.0983	0.1348	356	34
	4	55	0.1545	6.8	0.1232	0.1858	356	20
Lead (mg)	1	55	0.0286	5.1	0.0242	0.0330	364	28
	2	55	0.0586	3.9	0.0517	0.0655	364	32
	3	55	0.0364	4.2	0.0318	0.0409	364	24
	4	55	0.0883	4.4	0.0767	0.0999	364	22
Silica (mg)	1	55	0.1093	19.6	0.0451	0.1735	78	2
	2	55	0.0733	20.1	0.0291	0.1174	78	0
	3	55	0.0575	19.6	0.0236	0.0913	78	1
	4	55	0.1531	23.7	0.0443	0.2618	78	0
Asbestos/fibers (amosite) (f/mm ²)	1	55	356	22	160	629	1031	29
	2	55	466	20.3	225	794	1031	37
	3	55	216	21.6	99	378	1031	41
	4	55	109	24.7	43	205	1031	48
Methyl ethyl ketone (mg)	1	55	0.1753	8.6	0.1300	0.2206	320	32
	2	55	0.3861	7.3	0.3010	0.4712	320	24
	3	55	0.5634	7.9	0.4294	0.6974	320	22
	4	55	0.9701	5.5	0.8114	1.1288	320	26
Methyl isobutyl ketone (mg)	1	55	0.0987	7.6	0.0763	0.1210	321	36
	2	55	0.2447	7.3	0.1910	0.2985	321	29
	3	55	0.4885	7.5	0.3791	0.5979	321	22
	4	55	0.7418	6.1	0.6069	0.8767	321	30

had a calcite background and asbestos/fibers were chrysotile with one man-made fiber sample.

TABLE 3. PAT Proficiency Ratings Based on Rounds 125 to 128 (April 1996–March 1997)

Contaminant	No. of Labs Rated	No. of Labs Rated Proficient	Percent of Labs Rated Proficient
Metals	356	332	93.3
Silica	78	77	98.7
Asbestos/fibers	1031	989	95.9
Organic solvents	320	288	90

Reference

- 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).