



PAT Program Report: Background and Current Status

Paul C. Schlecht & Jensen H. Groff

To cite this article: Paul C. Schlecht & Jensen H. Groff (1994) PAT Program Report: Background and Current Status, Applied Occupational and Environmental Hygiene, 9:12, 945-946, DOI: [10.1080/1047322X.1994.10388437](https://doi.org/10.1080/1047322X.1994.10388437)

To link to this article: <https://doi.org/10.1080/1047322X.1994.10388437>



Published online: 24 Feb 2011.



Submit your article to this journal [↗](#)



Article views: 3



View related articles [↗](#)

PAT Program Report

Background and Current Status

Paul C. Schlecht and Jensen H. Groff

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 (NIOSH). The PAT program provides quality control reference samples to over 1400 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 I.

A mixture of three of the four possible metals and three of the ten possible organic solvents are rotated for each round. Asbestos alternates between amosite and chrysotile; no asbestos fiber mixtures are provided. Each set consists of four concentrations and a blank. The metals, silica, and asbestos samples are on filters and the organic solvents are on charcoal tubes. The organic solvent set also includes five blank charcoal 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 upon performance in the PAT program over the last year (i.e., four calendar quarters), as well as on individual contaminant performance and overall performance. Individual contaminants are metals, silica, asbestos, 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. Overall laboratory performance is rated as (1) proficient if two-thirds or more of the individual PAT contaminants are rated proficient; but (2) nonproficient if any individual PAT contaminants are rated nonproficient for more than four consecutive times (i.e., 1 year).¹

PAT Round 118, July 1994

A total of 1445 laboratories were enrolled in the PAT program with 1307 laboratories submitting results on round 118. Table II lists the reference

values, performance limits, and participants for each sample type in the PAT program. A total of 92.8 percent of the 1384 laboratories evaluated were rated overall proficient this time. There were no significant changes in the samples provided to the laboratories or any unusual problems encountered for this evaluation period. An automated data entry system has been introduced into the PAT program so that laboratories can submit analytical results over a modem using a computer and software developed at NIOSH. A total of 12 laboratories submitted results to the PAT program by the automated data entry system this time.

Proficiency Ratings—PAT Rounds 115 to 118, October 1993 to September 1994

A total of 1384 laboratories were rated based upon their performance over the last four rounds (one year). Table III presents the PAT proficiency ratings by analytical area and overall.

Upcoming PAT Round 119, October 1994

PAT Round 119 was sent on October 3, 1994. The organic solvents in this round were carbon tetrachloride, 1,2-dichloroethane, and trichloroethylene. Metals in this round included cadmium, lead, and zinc. Also, silica had a talc and coal mine dust background and the asbestos was chrysotile. There are plans to expand the organic solvents testing in the PAT program in the areas of active samplers and passive samplers. Preliminary testing is being done on methanol on silica gel tubes as a new organic solvent analyte for inclusion in the PAT program for January 1995.

TABLE I. Current Sets of Samples in the PAT Program

Metals	Silica	Asbestos (PCM Fiber Counting)	Organic Solvents
Cadmium	Quartz	Amosite	Benzene
Chromium		Chrysotile	Carbon tetrachloride
Lead			Chloroform
Zinc			1, 2-Dichloroethane
			<i>p</i> -Dioxane
			Tetrachloroethylene
			Toluene
			1, 1, 1-Trichloroethane
			Trichloroethylene
			<i>o</i> -Xylene

Reference

1. Groff, J.H.; Schlecht, P.C.; Shulman, S.: Laboratory Reports and Rating Criteria for the Proficiency Analytical Testing (PAT) Program. DHHS (NIOSH) Pub. No. 91-102. National Institute for Occupational Safety and Health, Cincinnati, OH(1990).

Editorial Note: Paul C. Schlecht and Jensen H. Groff are with the Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Cincinnati, Ohio.

TABLE II. Reference Values, Performance Limits, and Participants for Each Sample Type; PAT Round 118 (July 1994)

Contaminant	Sample Number	Number of Reference Labs	Reference Value	Relative Std. Dev.	Performance Limits	Number of Labs	Number of Outliers
Cadmium	1	62	0.0186 mg	4.5%	0.0162-0.0211 mg	394	19
	2	62	0.0109 mg	4.5%	0.0095-0.0123 mg	394	28
	3	62	0.0079 mg	4.4%	0.0069-0.0089 mg	394	27
	4	62	0.0137 mg	4.1%	0.0121-0.0153 mg	394	31
Chromium	1	62	0.2242 mg	7.0%	0.1768-0.2715 mg	392	12
	2	62	0.0881 mg	5.1%	0.0747-0.1016 mg	392	30
	3	62	0.1547 mg	5.2%	0.1309-0.1786 mg	392	29
	4	62	0.1116 mg	5.4%	0.0934-0.1298 mg	392	28
Lead	1	62	0.0889 mg	4.1%	0.0779-0.0999 mg	401	29
	2	62	0.0307 mg	4.9%	0.0263-0.0352 mg	401	24
	3	62	0.0634 mg	4.3%	0.0552-0.0716 mg	401	23
	4	62	0.0455 mg	5.1%	0.0386-0.0523 mg	401	20
Silica	1	61	0.1306 mg	16.8%	0.0646-0.1965 mg	92	4
	2	61	0.0897 mg	22.2%	0.0299-0.1494 mg	92	4
	3	61	0.0388 mg	32.8%	0.0007-0.0770 mg	92	4
	4	61	0.0657 mg	19.4%	0.0274-0.1040 mg	92	5
Asbestos (amosite)	1	62	396 f/mm ²	17.9%	207-645 f/mm ²	1108	64
	2	62	420 f/mm ²	21.4%	197-727 f/mm ²	1108	42
	3	62	800 f/mm ²	17.0%	443-1263 f/mm ²	1108	67
	4	62	515 f/mm ²	20.3%	251-873 f/mm ²	1108	65
Benzene	1	62	0.1429 mg	5.6%	0.1190-0.1668 mg	365	27
	2	62	0.3176 mg	4.4%	0.2759-0.3592 mg	365	29
	3	62	0.4522 mg	4.8%	0.3872-0.5172 mg	365	24
	4	62	0.2113 mg	4.9%	0.1800-0.2426 mg	365	21
<i>o</i> -Xylene	1	62	0.9842 mg	5.5%	0.8210-1.1474 mg	365	26
	2	62	0.3486 mg	6.0%	0.2861-0.4111 mg	365	28
	3	62	0.8385 mg	5.1%	0.7108-0.9663 mg	365	30
	4	62	0.5289 mg	4.9%	0.4519-0.6059 mg	365	33
Toluene	1	62	0.5558 mg	4.0%	0.4896-0.6220 mg	365	47
	2	62	0.9112 mg	3.8%	0.8080-1.0144 mg	365	38
	3	62	0.2353 mg	5.1%	0.1993-0.2713 mg	365	31
	4	62	0.7721 mg	4.1%	0.6768-0.8674 mg	365	28

TABLE III. PAT Proficiency Ratings Based Upon Rounds 115 to 118 (October 1993 to September 1994)

Contaminant	Number of Labs Rated	Number of Labs Rated Nonproficient	Percent Labs Rated Nonproficient
Metals	414	26	6.3
Silica	96	1	1.0
Asbestos	1178	56	4.8
Organic solvents	377	40	10.6
Overall	1384	99	7.2