



air pollution control training in colleges and universities: a status report for the United States and Canada

S-11 Education and Training Committee

Survey Report No. 3

Principal Author: Harold M. Cota

The APCA Education and Training Committee surveyed air pollution training at colleges and universities in the United States and Canada in 1975. There were 197 full-time faculty teaching air pollution courses at 75 schools. Graduates from these programs are finding meaningful work in both the public and private sector. Financial support is briefly discussed.

In 1971, 91 schools indicated they had training efforts in air pollution control.¹ In an effort to document the changes that have occurred in the last five years, a questionnaire was sent to all schools known to have educational programs in air pollution control. The questionnaire was also published in the March 1975 issue of this Journal.² In addition, listings provided by APCA, the American Society of Engineering Education, and the Environmental Engineering Professors Association were used.

At the present time, 75 colleges and universities across the United States and Canada reported they have air pollution control course work at various levels. This paper summarizes the results of the information collected.

Table I. Faculty teaching air pollution courses (excluding graduate TA's).^a

Category	No.	%
Public health	25	8.83
Biology	14	4.95
Public administration	2	0.71
Chemistry	25	8.83
Environmental engineering	51	18.02
Civil engineering	30	10.60
Chemical engineering	25	8.83
Mechanical engineering	28	9.89
Other	83	29.33
Total	283	

^a61 schools reporting.

Air Pollution Control Studies

A complete list of schools by state is given in Appendix A. Undergraduate, graduate, two year, and some specialized programs are included.

There were 197 full-time faculty teaching air pollution control in the three professional ranks (assistant, associate, and full professor). The background of these and the part-time staff is shown in Table I.

Although space does not permit a detailed description of the academic programs, each school was asked to indicate the number of students they graduated who were qualified to work in some area of air pollution control. These responses are broken down by level in Table IIa.

It was of interest to try to determine the actual number of students placed directly in air pollution related jobs. Many schools did not have this type of information. The results available are given in Table III.

The trend from placement with governmental agencies that predominated several years ago has changed. Graduates are now increasingly being employed by industry and consulting engineers. This is true of those with either undergraduate or graduate degrees. In-

Table IIa. Number of students graduated qualified to work in air pollution.^a

	A.A.	B.S.	M.S.	Ph.D.
Pre-1969	0	69	352	57
1969	0	197	214	35
1970	0	356	341	45
1971	24	130	163	16
1972	27	135	167	14
1973	85	177	218	33

Table IIb. Number of students enrolled in 1974.

	A.A.	B.S.	M.S.	Ph.D.
1974	253	425	365	91

^a43 schools responded to data for 1971-74;
57 schools responded to data for pre-1971.

dustry is used in the broad sense to mean the private sector which includes those with environmental problems to be solved and those that provide control equipment and services.

The National Research Council (NRC) formed a Committee for the Study of Environmental Manpower to get a more systematic understanding of the present and future manpower needs in the environmental field.³ The results are expected early in 1977. The National Institute of Environmental Health Sciences under the auspices of its advisory council is currently updating a study of research needs for Congress.⁴ A study of undergraduate environmental engineering majors at universities in the U.S. is also underway.⁵

Financial Support of the Training Effort

The level of financial support available at the graduate level in the colleges and universities in 1973 and 1974 is shown in Table IV. This does not include the specialized programs available at Pennsylvania State University and the University of Southern California. In 1974 there were two schools that had enough financial support for one student.

Although there were 104 appointments available in 1974, it is anticipated that currently the support available is less. 25 schools indicated that their primary source was the federal govern-

ment; 19 indicated financial support was available from the state; and 12 schools indicated limited support from industry. The latter was primarily identified with pollution source type firms.

Schools across the country have continued developing programs to train students in air pollution control related specialties. Research facilities have been devoted to seeking answers to the many unanswered questions that arise in air resource management.

In addition to financial support for students, funds are typically required for facilities, faculty development and travel, and part-time employment for the students at all levels.

In 1973 EPA made a policy decision to phase out support of graduate and professional programs by 1976. Congress provided enough funds in FY 1976 to

Table IV. Financial support available at graduate level programs.

Appointments per school	Number of schools 1973	1974
1		2
2	6	2
3	3	4
4		3
5	1	1
6	3	2
7	2	1
8		
9		
10	5	5

Table III. Number of students completing an air pollution program and placed in related work.^a

	1971-72	1972-73	1973-74	1974-75
Control Agency: federal	27	30	39	1
Control Agency: state	25	42	41	20
Control Agency: local	20	25	34	1
Industry (pollution source)	43	37	60	7
Control Equipment Manufacturing	1	2	7	4
Industrial Manufacturing		1	3	
Consulting	9	13	27	6
University	11	11	23	1
Other	6	8	13	6

^a36 Schools reporting;
5 Schools reporting for 1974-75.

allow about 9 schools limited support in the form of forgivable loans for graduate students. These loans would be forgiven if the students work in control agencies. In FY 1977, it is not clear if Congress will provide EPA with any funds to assist graduate programs.

Research programs and contracts indirectly provide funds for both facilities and student support and some schools will take this route. As the private sector

absorbs more of the graduates who are receiving training in air pollution control, it is expected that they will begin directly and indirectly to support the programs.

Conclusions

It is clear that there has been a nationwide effort over the last few years to train a new generation of air pollution

control specialists. The evidence is a clear commitment of faculty and facilities at the schools in Appendix A.

Graduates from these programs are finding meaningful work in local, state and federal agencies and in a wide spectrum of industry. Support for these programs in the future is expected to come from the private sector as funding from state and federal agencies decreases.

Appendix A

State	College or University	Program In	No. of Air Pollution Courses	Degrees	Name
Arizona	Northern Arizona U.	PS, EnvS	2	BS	R. Davis
	U. of Arizona	Atm Sci, CE, ChE, ME	3	BS, MS	Walter Fahey
California	Cal. State U. — Humboldt	EnvRE	3	BS	Al Burrows
	Cal. State U. — Long Beach	CE			V. Phelapati
	Cal. State U. — Northridge	H Sci	6	BS, MS	L. S. Caretto
	Cal. State U. — Sacramento	CE	3	MS	Ajit Virdee
	Cal. Poly. State U. — San Luis Obispo	EnvE	14	BS, ME	W. E. Holtz
	Loyola Marymount U.	EnvE & Sci, WRM	1	MS, MSE	D. R. Anderson
	U. of Calif. — Irvine	Engr	8	BS, MS, PhD	J. H. Mulligan
	U. of Calif. — Los Angeles	Ap Sci, Engr	9		R. R. O'Neill
U. of Calif. — Riverside	Env Sci	4	AB, BS	Garrison Sposito	
	U. of Southern California	Env Mang, Engr	10	MS, PhD	John J. Kirlin
Colorado	Colorado State U.	Engr	7	BS, MS, PhD	L. V. Baldwin
	D. of C. Howard U.	Engr	7	AA, BS, ME, MS	Irvin Jones
Florida	Florida Tech. U.	Engr	4	BS, MS	J. Paul Hartman
	U. of Florida — Gainesville	Env Sci	6	BS, MS, PhD	E. E. Pyatt
Georgia	U. of Georgia College of Agriculture	An & D Sci	2		Charles H. White
Hawaii	U. of Hawaii	A & S, Engr, PH	10		C. S. Ramage
Illinois	Governors State U.	Env Sci	7	BS, MS	Ted Andrews
	Illinois Inst. of Tech.	EnvE	8	MS, PhD	James Patterson
	Northern Illinois U. — DeKalb				Burley Bechdolt
	Southern Ill. U. at Carbondale	Th EnvE	4	BS, MS	J. W. Chen
U. of Ill. at Urbana — Champaign	AirR, CE	9	MS, PhD	C. P. Siess	
	Rosa-Hulman Inst. of Tech		1		Herbert Bailey
Iowa	Iowa State U.	Erth Sci, ChE	7		George Burnet
Kentucky	U. of Kentucky	ChE	5	MS, PhD	R. B. Grieves
	Western Kentucky U.	EnvE T, Env S	2	BS	Donald R. Rowe
Louisiana	McNeese State U.	Sci	2	BS, MS	V. Monsour
Massachusetts	Harvard U.	PH	4	MS, PhD	D. W. Moeller
Maryland	U. of Maryland	Engr, Met	8	BS, MS, PhD	H. Landsberg
Michigan	Ferris St. College	Ap H	1	BS	John R. Fleming
	U. of Detroit	Engr	2		David Camp
	Wayne State U.	Engr	4	MS, PhD	Ralph H. Kummeler
Minnesota	U. of Minnesota	PH	6	MS, MSPH, PhD	Conrad Straud
Missouri	St. Louis U.	Met	5		Ross Heinrich
	Washington Univ. — St. Louis	ME	5	MS, DSc	S. P. Sutera
North Carolina	East Carolina U. — Greenville	Env H	1	BS	Trenton G. Davis
	U. of N. Carolina — Chapel Hill	PH	9	MSEE, MSPH, PhD	R. F. Christman
	U. of North Carolina — Charlotte	EnvE, Ubn E		AA, BSE	Richard Phelps
New Mexico	N.M. Inst. of Mining & Tech.	EnvE		BS, MS	L. E. Murr
New York	Barnard College — Columbia Univ.	Geog	1		Tody Berger Holtz
	Manhattan College	Engr	2		J. Barker
	Rensselaer Poly. Inst.	Ch E, EnvE	6	BE, BS, MS, PhD	David Hansen

Acknowledgment

The author appreciates the assistance of Arthur Stern and Howard Hesketh in developing a list of colleges and universities. Members of the APCA S-11 Committee assisted in various ways with this report. Angela Grenz and Noni Smyth at Cal Poly were most helpful in preparing the report.

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3. "Clearing the employment picture," *Environ. Sci. Technol.* 10: 222 (1976).
4. D. W. Moeller, Harvard University, Personal communication, May 28, 1976.

5. J. W. Male, Illinois Institute of Technology, Personal communication, January 27, 1976.

Dr. Cota is a professor in the Environmental Engineering Department, California Polytechnic State University, San Luis Obispo, CA 93407.

Ohio	Inst. of Env. Sciences	Env Sci		MS	Graham Mitchell
	Miami U. - Oxford	Env Sci	2	MS	C. E. Barthel
	U. of Cincinnati	Med, Env H, EnvE CE	22	AA, MS, PhD	L. M. Lausney
Oklahoma	East Central Okla. State U.	Env Sci		BS	M. L. Rowe
	Oklahoma State	CE	1		A. F. Gaudy
	U. of Oklahoma - Norman	CE, Env Sci	8	BS, MS, PhD	Larry W. Canter
Oregon	Portland State U.	Engr	9	BS, MS	Fred Young
Pennsylvania	Drexel U.	Env St	9		P. W. Purdom
	Lafayette College	Engr	1		L. J. McGeady
	Penn. State U.	Air Env St			John B. Nesbitt
South Carolina	Slippery Rock College	Env St	3	BS	Charlton F. Dresdon
	Clemson University	Env SE	4	ME, MS, PhD	John H. Austin
	State Tech. Inst. of Memphis		1		George Williams
Tennessee	Tennessee Technological U.	Engr	2		John C. McGee
	U. of Tennessee	CE	7	MS, PhD	William Grecco
	Vanderbilt U.	Env RE, WRE	7	BE, MS, PhD	Karl Schnelle
	U. of Houston	Engr	6	BS, MS, PhD	F. L. Worley
Texas	U. of Texas - Austin	CE, Env H	9	BS	Hudson Matlock
	U. of Texas - El Paso	Engr	5	BS, MS	H. Bartel
	Brigham Young Univ. - Provo	ChE Sci	1		Calvin Bartholomew
Utah	U. of Utah - Salt Lake	Bio, Met, Ch E	3		Noel deNevers
	Utah State U. - Logan	EnvE	2		Donald Procella
	U. of Vermont	CE	4	BS, MS	J. C. Oppenlander
Washington	U. of Washington - Seattle	Air R, CE, Water R	11	BSCE, MS, PhD	Vernon Hammer
	Washington State U.	ChE, EnvE, EnvS	7	D Sc, MS	Donald Bender
	U. of Wisconsin - Madison	Env St	8	MS, PhD	Reid A. Bryson
Wisconsin	U. of Wisconsin - Milwaukee	Engr, Met	15	BS, MS	V. L. Shan
	W. Virginia College of Grad. Studies	Engr, Sci			Richard Barnard
CANADA; Quebec	Universite de Sherbrooke	Engr	3	BS, MS, PhD	N. Therien
Community Colleges					
California	Moorpark College		1		M. Naseri
Iowa	Kirkwood Community College - Cedar Rpd.	Env Oc	1		Harold B. Kort
Minnesota	916 Area Voc Tech School			Vo Tech	Charles Hanf
New Jersey	Middlesex County College	Env H Sci	1	AA	B. Lalancette
New York	Hudson Valley Community College	Env Tech	1	AAS	C. Fred Zipprich
Pennsylvania	Northampton County C. C.	Env S	2	AA	R. C. Richardson
CANADA; Alberta	Mount Royal College	Env Q Con	5	AA	A. R. Thirnbeck

Abbreviations Used

A & S:	Arts and Sciences	EnvE Sci:	Environmental Engineering Sciences	Env Tech:	Environmental Technology
Air Env St:	Air Environmental Studies	Env H:	Environmental Health	Erth Sci:	Earth Science
Air R:	Air Resources	Env H Sci Tech:	Environmental Health Science	Geog:	Geography
An & D Sci:	Animal and Dairy Science	Env Mag:	Environmental Management	H Sci:	Health Science
Ap H:	Applied Health	Env Oc:	Environmental Occupations	ME:	Mechanical Engineering
Ap Sci:	Applied Science	Env Q Con:	Environmental Quality Control	Med:	Medicine
Atm Sci:	Atmospheric Science	Env R E:	Environmental Resources	Met:	Meteorology
Bio:	Biology	Env S:	Environmental Service	PH:	Public Health
CE:	Civil Engineering	Env Sci:	Environmental Science	PS:	Public Service
Ch E:	Chemical Engineering	Env SE:	Environmental Systems Engineering	Sci:	Science
Ch E Sci:	Chemical Engineering Science	Env St:	Environmental Studies	Th E:	Thermal Engineering
D Sc:	Doctor of Science			Ubn E:	Urban Engineering
Engr:	Engineering			WR:	Water Resources
EnvE:	Environmental Engineering			WRE:	Water Resources Engineering
				WRM:	Water Resources Management