Appendix E

OTA/NAS Survey of Personnel Needs of Firms in the United States

As noted in *Chapter 14: Personnel Availability and Training,* OTA and the National Academy of Sciences' (NAS) Committee on National Needs for Biomedical and Behavioral Research Personnel cosponsored a survey of the personnel needs of U.S. firms using biotechnology. The purpose of the OTA/NAS survey was twofold. First, OTA was interested in identifying the companies that were using new biotechnology as defined at the outset of this report. Second, OTA and NAS were interested in the number of employees engaged in industrial biotechnology, how that number would grow, and where shortages of personnel, if any, are occurring. The cover letter and survey questionnaire reproduced in this appendix were sent to 286 U.S. companies. Of the 133 firms that responded, 18 indicated that they were not engaged in biotechnology activities, and 20 others were determined not to be engaged in biotechnology from their answers to the questionnaire. The remaining 95 indicated that they were engaged in biotechnology activities. The responses of these 95 firms, which are tabulated on the survey questionnaire reproduced in this appendix, are the basis of the characteristics described for the respondents. The distribution of size of firms was not significantly different between respondents and nonrespondents. Because the survey response rate was low, however, only general trends in the data have been used in the discussion of personnel needs in chapter 14.

Cornell University

Ithaca, New York 14853

March 4, 1983

Dear :

The Congressional **Office of Technology Assessment (OTA) and the National** Academy of Sciences (NAS) **Committee on** National Needs **for** Biomedical Behavioral Research **Personnel have a mutual interest in determining the nation'ts need for research personnel. I am chairman of the NAS Committee's Panel on Basic Biomedical Sciences. We are particularly concerned that there be an adequate nunber of people trained in areas of the new biotechnology.**

I am writing to ask your assistance in collecting some information on this issue. You could help us greatly in our efforts to get a profile of current employment opportunities and a sense of future demard in biotechnology and related industries by responding to the three questions on the attached page. To be useful in our report to the Congress, we need your answers before March 14, 1983. The tabulated data from the questionnaire will be published. Only OTA and the NAS panel will have access to the individual responses.

If you have additional commments or suggestions that you think would assist us, please include them with your response. A self-addressed envelope is enclosed. Also, if you have any questions concerning the questionnaire, don't hesitate to call me at (607) 256-3374.

With thanks for your help.

Yours sincerely,

Robert Barker, Ph.D.
Director, Division of Biological Sciences
Cornell University

RB:db
Enclosures

COMPANY NAME AND ADDRESS:

PERSON COMPLETING THIS FORM:
Name:

Phone Number:

For the purpose of this questionnaire, Biotechnology is defined as the application of novel biological strategies (rDNA, cell-fusion, mobilized cells or enzymes) for biochemical processing.

1. **What year did your company begin research or development in activities related to the new biotechnology?** _____

2. **Please check all areas of biotechnology application in which your company is involved:**

a) ___ fine chemicals
b) ___ bulk chemicals
c) ___ pharmaceuticals
d) ___ animal agriculture
e) ___ biomass conversion
f) ___ human diagnostics
g) ___ plant agriculture
h) ___ mineral leaching and mining
i) ___ pollution control
j) ___ enhanced oil recovery
k) ___ other; specify _____

PLEASE INCLUDE ANY COMMENTS ON REVERSE

SPECIALTIES	(1) Check if you are experiencing personnel shortages in any of these specialties.			2) No. scientists currently on staff (list each employee only once).			(3) No. you intend to retain during next 18 months.			4) Expected No. of scientists to be hired in next 18 months.			(5) For vacant positions, do you expect to:		
	Ph.D.	MS	BS	Ph.D.	MS	BS	Ph.D.	MS	BS	Ph.D.	MS	BS	Hire from Industry	Hire from Academia	Retrain current Staff
a) Recombinant DNA/molecular genetics	10	7	4	293	126	167				143	65	92	22	43	4
b) Hybridomas/monoclonal antibodies	6	5	6	89	50	108				38	29	79	16	30	9
c) animal reproduction/embryotransplantation	1	0	0	1	1	1				0	0	0	1	1	1
d) classical genetics	1	1	1	30	8	12				6	5	3	4	4	1
e) gene synthesis	10	5	3	26	5	14				18	7	17	9	18	3
f) enzymology/immobilized systems	6	3	3	97	36	86				23	17	19	10	13	4
g) industrial microbiology	7	2	2	58	34	43				34	17	17	16	18	3
h) bioprocess engineering	12	4	3	71	47	68				44	31	25	21	15	2
j) analytical biochemistry	2	3	3	37	20	28				21	6	5	8	16	4
k) biochemistry, general	3	2	5	117	41	83				30	19	44	14	25	5
l) Cell culture	5	≤	7	42	47	98				17	24	25	14	22	5
m) Cell fusion	2	0	0	11	4	11				6	3	8	3	5	2
n) Cell biology/physiology	4		3	18	7	18				10	5	10	3	9	1
o) plant molecular biology	8	0	1	40	18	18				31	12	20	7	17	2
p) plant biology/physiology	3	1	0	30	7	20				8	5	3	1	8	3
q) pharmacology	1	0	0	9	7	14				16	7	11	2	3	0
r) toxicology		0	0	13	2	16				2	2	1	≡	1	0
s) microbiology, general	2	0		82	33	84				22	14	20	14	15	1
t) physiology	0	1	2	8	3	15				1	1	5	4	1	0
u) Other biotechnology specialties (specify _____)	4	3	4	51	23	44				8	7	9	8	11	2

THE SAME AS (2)