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Report to Congressional Requesters

November 1989

AVIATION SAFETY

Facility Ranking of Controller Survey Responses

GAO/RCED-90-39

GAO

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Resources, Community, and
Economic Development Division

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November 21, 1989

The Honorable Guy V. Molinari
Ranking Minority Member
Subcommittee on Investigations
and Oversight
Committee on Public Works and
Transportation
House of Representatives

The Honorable Glenn M. Anderson
Chairman, Committee on Public Works
and Transportation
House of Representatives

This report responds to your request that we rank, in order, the largest air traffic facilities on the basis of controller views of their working conditions, training, safety, and morale. The information in this report supplements information provided to you in two earlier reports, Aviation Safety: Serious Problems Continue to Trouble the Air Traffic Control Work Force (GAO/RCED-89-112, Apr. 21, 1989) and Aviation Safety: Conditions Within the Air Traffic Control Work Force (GAO/RCED-89-113FS, Apr. 24, 1989). The information for this report, as well as the other two reports, is based on our 1988 survey of the air traffic work force—consisting of controllers, supervisors, and facility managers—to determine how those directly involved in air traffic control feel about their working conditions and other aspects of the air traffic control system. The survey represented the overall work force views at the Federal Aviation Administration's (FAA) 84 largest facilities on various issues, including the adequacy of staffing, training of new controllers, morale, and safety of the air traffic control system.

Controllers and supervisors share many of the same concerns about their working conditions, whereas managers view conditions more favorably. The results presented in this report summarize the extent of the controllers' concerns. We are not separately reporting supervisors' and managers' responses for each facility because doing so would affect our pledge of confidentiality. Appendix I shows the distribution and ranking of controller responses at 82 facilities,[1] consisting of all 20 air

[1]Two of the 84 surveyed facilities were not included in any ranking in this report because of a low number of controllers' responses.

their respective facilities, controllers at two centers had the most negative views in all six areas, and controllers at another three centers had the least negative views in all six areas. Similarly, controllers at 12 terminals had the most negative views in all 6 areas, and controllers at another 11 terminals had the least negative views.

Table 1: Facilities With Contrasting Controller Views on Six Areas Surveyed

Controller views at centers[a]	
Most negative	**Least negative**
Boston	Albuquerque
Washington, D.C.	Houston
	Minneapolis
Controller views at terminals[a]	
Most negative	**Least negative**
Baltimore-Washington	Cleveland
Boston	Hebron, Ky.
Burbank	Jacksonville
Kennedy Tower, N.Y.	Lubbock
Miami	Milwaukee
New York TRACON	Minneapolis
Oakland TRACON	Phoenix
Ontario TRACON	Sacramento
Orlando	St. Louis TRACON
Philadelphia	Tampa
Phoenix TRACON	West Palm Beach
Washington National	

[a]In alphabetical order

Note: TRACON = terminal radar approach control facility.

Importance of Facility-Specific Data

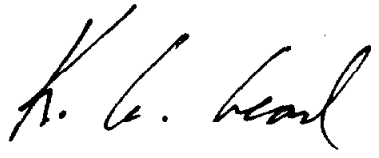
The extent of concern that controllers expressed at FAA's largest air traffic control facilities differs. FAA headquarters' officials have begun to recognize that these view points can be a valuable management tool for identifying desirable and undesirable working conditions at specific facilities.

Additionally, FAA is beginning to focus its effort on identifying issues at the facility level. In October 1988, after a regional transport flew within 1.5 miles of the presidential aircraft (Air Force One) when operating in the northeast corridor, the Department of Transportation ordered FAA to review air traffic control operations at Boston, New York, Philadelphia, and Washington facilities. As a result, FAA has conducted facility-specific reviews at four Boston and New York sites and is working on sites at Philadelphia and Washington. A similar review for Chicago O'Hare Airport was also conducted. From these reviews, FAA identified specific issues similar to those included in our study involving training, staffing,

The results presented in this report were derived from a mail survey of terminal and center air traffic controllers conducted between May 2 and August 5, 1988. All terminal controllers were surveyed, but only a sample of center controllers were surveyed. Since the center controllers were sampled, the summary statistics used for ranking centers in this report are subject to sampling error. All sampling errors for this report were calculated at the 95-percent confidence level. The sampling error ranged from ± 1.8 percent to ± 8.4 percent. More precise estimates of the sampling errors are contained in appendix II along with additional information on our scope and methodology.

Facility FPLs on August 31, 1988, and August 31, 1989, are shown in appendix III. The major air traffic control facilities discussed in this report, and the controllers' questionnaire return rates for each facility, are shown in appendix IV.

As you requested, we did not obtain official agency comments on a draft of this report. As arranged, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to the Secretary of Transportation; the Administrator, FAA; and other interested parties. If you have any questions about this report, please call me on (202) 275-1000. Major contributors to this report are listed in appendix V.



Kenneth M. Mead
Director, Transportation Issues

Tables

Abbreviations

ATC	air traffic control
FAA	Federal Aviation Administration
FPL	full performance level (controller)
GAO	General Accounting Office
OJT	on-the-job training
TRACON	terminal radar approach control facility

Question 2 (Continued)

Amount of traffic handled.

Center	Rank	Percentage of responses: Somewhat or much more traffic	Appropriate level of traffic	Somewhat or much less traffic
Washington, D.C.	1	88	10	2
Atlanta	2	85	14	1
Boston	2	85	15	0
Los Angeles	4	83	17	0
Indianapolis	5	80	19	1
Cleveland	6	78	21	1
Jacksonville	6	78	22	0
Salt Lake City	8	75	21	3
New York	9	69	24	7
Chicago	10	65	31	4
Denver	11	64	31	5
Kansas City	12	61	39	0
Seattle	13	60	39	1
Memphis	14	58	42	0
Miami	15	55	40	5
Oakland	16	53	46	1
Fort Worth	17	47	52	1
Albuquerque	18	35	55	10
Minneapolis	19	33	58	10
Houston	20	31	66	3

Notes:

1. Rank order shows facilities with highest percentage of controllers choosing the negative response to the survey question as shown in the first column under "percentage of responses."

2. Facilities with the same percentage of response are given the same rank order and listed in alphabetical order.

3. Controllers' percentage of response is by facility, rounded to nearest whole number.

4. Controllers were promised confidentiality to encourage their response to each question. When the number of controllers responding to a question was too few, we excluded the facility from our ranking.

5. Percentages may not add to 100 because of rounding.

Question 2 (Continued)

Amount of traffic handled.

Terminal	Rank	Percentage of responses: Somewhat or much more traffic	Appropriate level of traffic	Somewhat or much less traffic
Dayton	33	65	35	0
Pittsburgh	33	65	35	0
St. Louis TRACON	35	64	36	0
Chicago O'Hare	36	62	38	0
Kansas City	36	62	38	0
San Diego	36	62	33	5
Atlanta	39	57	38	6
Detroit	39	57	43	0
San Antonio	39	57	37	7
San Francisco	42	53	41	6
Indianapolis	43	52	39	9
Sacramento	43	52	40	8
Denver TRACON	45	50	50	0
Hebron, Ky.	46	48	52	0
Memphis	46	48	52	0
Oklahoma City	46	48	43	10
Denver	49	47	53	0
Houston	50	46	54	0
Jacksonville	51	45	55	0
Cleveland	52	40	56	4
Newark	52	40	60	0
New Orleans	54	39	56	6
Los Angeles	55	38	62	0
Milwaukee	56	33	58	8
Oakland Tower	56	33	67	0
Dallas-Love Tower	58	29	57	14
Fort Lauderdale	59	25	69	6
Austin Tower	60	21	63	16
Minneapolis	61	19	78	3
Lubbock	62	14	64	23

Question 9 (Continued)

Working without a break.

Center	Rank	Percentage of responses		
		Somewhat or much too long	Appropriate	Somewhat or much too short
Indianapolis	1	89	11	0
Boston	2	88	12	0
Washington, D.C.	3	87	13	0
Jacksonville	4	79	20	1
Los Angeles	4	79	21	0
Denver	6	70	30	0
Salt Lake City	7	68	30	2
Oakland	8	67	33	0
Seattle	8	67	33	0
Atlanta	10	66	34	0
Cleveland	11	60	39	1
Kansas City	11	60	38	2
New York	13	58	40	1
Chicago	14	56	43	1
Miami	15	53	47	0
Memphis	16	48	51	1
Albuquerque	17	34	65	1
Houston	18	26	74	0
Minneapolis	19	24	73	2
Fort Worth	20	20	75	5

Question 9 (Continued)

Working without a break.

Terminal	Rank	Percentage of responses		
		Somewhat or much too long	Appropriate	Somewhat or much too short
Detroit	33	51	47	2
Dallas-Love Tower	34	50	50	0
Fort Lauderdale	34	50	50	0
Portland TRACON	34	50	44	6
Tampa	37	49	51	0
Indianapolis	38	48	48	4
Las Vegas	38	48	52	0
Edwards Air Force Base	40	45	55	0
Charlotte, N.C.	41	44	56	0
Oklahoma City	42	43	57	0
St. Louis TRACON	43	41	59	0
Denver	44	40	60	0
New Orleans	45	39	61	0
Norfolk	45	39	61	0
San Diego	47	38	62	0
Sacramento	48	36	60	4
San Antonio	48	36	64	0
Oakland Tower	50	33	67	0
Austin Tower	51	32	63	5
Denver TRACON	51	32	68	0
Houston	51	32	66	2
Hebron, Ky.	54	31	69	0
Pittsburgh	54	31	69	0
Dallas-Ft. Worth TRACON	56	29	69	2
Kansas City	56	29	71	0
Milwaukee	56	29	71	0
West Palm Beach	59	24	71	5
Memphis	60	22	78	0
Minneapolis	61	19	78	3
Lubbock	62	9	59	32

Question 11.B (Continued)

Current number of FPLs.

Center	Rank	Percentage of responses: Somewhat or much lower than needed	Appropriate number	Somewhat or much higher than needed
Indianapolis	1	100	0	0
Los Angeles	1	100	0	0
Washington, D.C.	3	98	2	0
Boston	4	97	2	1
Kansas City	5	96	4	0
Seattle	6	95	5	0
Atlanta	7	94	6	0
New York	7	94	6	0
Memphis	9	92	8	0
Chicago	10	91	9	0
Denver	11	90	8	2
Jacksonville	11	90	10	0
Salt Lake City	13	88	12	0
Miami	14	86	11	3
Oakland	15	81	18	1
Fort Worth	16	75	24	1
Cleveland	17	69	29	2
Houston	18	60	38	2
Minneapolis	19	41	49	9
Albuquerque	20	37	50	12

Question 11.B (Continued)

Current number of FPLs.

Terminal	Rank	Percentage of responses		
		Somewhat or much lower than needed	Appropriate number	Somewhat or much higher than needed
Columbus	33	92	8	0
Oakland Tower	33	92	8	0
Dayton	35	91	9	0
Dulles Tower	36	90	7	3
Houston	36	90	10	0
Kansas City	36	90	10	0
Pensacola	36	90	10	0
Seattle TRACON	40	89	11	0
Indianapolis	41	87	13	0
Denver TRACON	42	86	14	0
Los Angeles	42	86	0	14
Cleveland	44	84	12	4
Detroit	45	83	17	0
Edwards Air Force Base	45	83	8	8
San Diego	47	81	19	0
Dallas-Ft. Worth TRACON	48	77	19	4
St. Louis TRACON	48	77	23	0
Nashville	50	76	24	0
Tampa	50	76	24	0
Fort Lauderdale	52	75	19	6
Jacksonville	53	70	30	0
Sacramento	54	68	28	4
Milwaukee	55	67	33	0
Hebron, Ky.	56	55	41	3
Minneapolis	57	54	41	5
West Palm Beach	58	52	48	0
Denver	59	47	47	7
Phoenix	60	46	54	0
Lubbock	61	36	50	14
Austin Tower	62	32	63	5

Question 12 (Continued)

Too few developmental controllers to meet future needs.

Center	Rank	Percentage of responses		
		Somewhat or much too few	Appropriate number	Somewhat or much too many
Indianapolis	1	89	11	0
Washington, D.C.	2	88	11	1
Atlanta	3	86	11	3
Memphis	4	85	15	0
New York	5	78	20	3
Boston	6	75	24	1
Jacksonville	7	74	25	1
Seattle	7	74	25	1
Miami	9	71	29	0
Denver	10	68	28	4
Fort Worth	11	67	31	1
Kansas City	12	65	30	4
Los Angeles	13	63	33	4
Houston	14	61	37	2
Albuquerque	15	54	37	9
Oakland	16	48	40	11
Salt Lake City	17	44	49	7
Chicago	18	38	52	10
Cleveland	19	34	54	12
Minneapolis	20	30	58	12

Question 12 (Continued)

Too few developmental controllers to meet future needs.

Terminal	Rank	Percentage of responses		
		Somewhat or much too few	Appropriate number	Somewhat or much too many
Norfolk	31	75	21	4
Detroit	34	74	21	5
Dallas-Ft. Worth TRACON	35	73	23	4
Memphis	35	73	23	4
St. Louis TRACON	35	73	27	0
Philadelphia	38	72	26	3
Los Angeles TRACON	39	71	18	11
Pensacola	40	66	34	0
Milwaukee	41	65	35	0
Newark	42	64	36	0
New York TRACON	42	64	22	14
Tampa	44	62	36	2
Chicago TRACON	45	60	40	0
Jacksonville	45	60	35	5
Nashville	45	60	40	0
Minneapolis	48	59	41	0
Windsor Locks, Conn.	49	56	40	4
Denver	50	53	47	0
Fort Lauderdale	51	50	44	6
Lubbock	51	50	50	0
Cleveland	53	48	48	4
Chicago O'Hare	54	45	45	9
West Palm Beach	55	38	62	0
Kansas City	56	33	67	0
Austin Tower	57	32	68	0
Sacramento	57	32	64	4
Hebron, Ky.	59	24	69	7
New Orleans	60	22	67	11
Los Angeles	61	21	71	7
Phoenix	62	8	85	8

Question 17 (Continued)

Facility overtime situation.

Center	Rank[b]	Percentage of responses[a]		
		Too little overtime	Too much overtime	Overtime appropriate/no overtime needed
Salt Lake City	1	91	0	5
Seattle	2	82	0	13
Denver	3	75	0	17
Atlanta	4	69	7	21
Miami	5	64	1	34
Chicago	6	61	8	23
New York	6	61	15	12
Indianapolis	8	57	31	3
Memphis	8	57	6	34
Jacksonville	10	54	11	19
Cleveland	11	53	3	41
Fort Worth	12	43	0	53
Houston	13	39	0	52
Minneapolis	13	39	2	53
Washington, D.C.	15	36	46	4
Los Angeles	16	32	47	17
Albuquerque	17	30	0	65
Boston	17	30	40	22
Kansas City	19	27	55	12
Oakland	20	22	20	49

[a]Totals do not add to 100 percent since "other" responses are not shown.

[b]Ranking based on "too little overtime."

Question 17 (Continued)

Facility overtime situation.

Terminal	Rank[b]	Percentage of responses[a]		
		Too little overtime	Too much overtime	Overtime appropriate/no overtime needed
Detroit	32	51	14	30
Baltimore-Washington	33	50	27	17
Jacksonville	33	50	0	45
Tampa	33	50	3	45
Boston	36	49	20	6
New York TRACON	37	43	41	9
Minneapolis	38	42	3	56
Nashville	39	41	9	50
San Diego	40	40	5	55
Atlanta	41	38	40	10
Hebron, Ky.	41	38	0	62
Memphis	43	36	40	20
Dulles Tower	44	35	19	23
Lubbock	44	35	0	55
Salt Lake City TRACON	46	25	0	56
Phoenix	47	23	0	69
Windsor Locks, Conn	47	23	14	50
Pensacola	49	22	30	35
West Palm Beach	50	19	0	81
Phoenix TRACON	51	14	72	14
Oakland TRACON	52	12	67	14
Los Angeles	53	8	75	17
Los Angeles TRACON	53	8	81	11
Oakland Tower	53	8	58	25
San Francisco	56	6	59	29
Chicago O'Hare	57	5	76	14
Las Vegas	58	4	92	4
Sacramento	58	4	22	57
Chicago TRACON	60	3	69	23
Burbank	61	0	90	10
Santa Ana, Calif.	61	0	92	8

[a]Totals do not add to 100 percent since "other" responses are not shown.

[b]Ranking based on "too little overtime."

Question 17 (Continued)

Facility overtime situation.

Terminal	Rank[b]	Percentage of response[a]		
		Too much overtime	Too little overtime	Overtime appropriate/no overtime needed
Las Vegas	1	92	4	4
Santa Ana, Calif.	1	92	0	8
Burbank	3	90	0	10
Los Angeles TRACON	4	81	8	11
Chicago O'Hare	5	76	5	14
Los Angeles	6	75	8	17
Phoenix TRACON	7	72	14	14
Chicago TRACON	8	69	3	23
Oakland TRACON	9	67	12	14
San Francisco	10	59	6	29
Oakland Tower	11	58	8	25
New York TRACON	12	41	43	9
Atlanta	13	40	38	10
Memphis	13	40	36	20
Pensacola	15	30	22	35
Baltimore-Washington	16	27	50	17
Sacramento	17	22	4	57
Boston	18	20	49	6
Dulles Tower	19	19	35	23
Detroit	20	14	51	30
Windsor Locks, Conn.	20	14	23	50
Philadelphia	22	13	71	13
Charlotte, N.C.	23	11	74	15
Nashville	24	9	41	50
Newark	25	8	77	15
Pittsburgh	25	8	80	4
Kennedy Tower, N.Y.	27	7	67	20
Orlando	27	7	69	17
San Diego	29	5	40	55
St. Louis TRACON	29	5	60	25
Dayton	31	4	52	26

(continued)

Training

Question 19

How do you rate the quality of the on-the-job training (OJT) developmental controllers currently receive at your facility in each of the following areas?

Table I.6: Quality of Facility Aspects of Developmental OJT

Facilities with at least half of controllers citing training concerns		
	Number of facilities	
Aspect of training considered less than adequate	**Center**	**Terminal**
a. Using backup systems	18	39
b. Controlling traffic in bad weather	16	27
c. Emergency procedures	18	32
d. Handling heavy traffic	2	4
e. Holding patterns	10	46
f. Operational characteristics of types of aircraft	8	7
g. Direct routings (expediting traffic)	0	1
h. Control techniques	0	1
i. Phraseology	0	0
j. Flow control procedures	5	11

Question 19 (Continued)

a. Using backup systems.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Austin Tower	1	81	13	6
Burbank	2	80	10	10
Los Angeles	3	79	7	14
Dayton	4	77	18	5
Seattle TRACON	5	71	25	4
Detroit	6	69	26	5
Kennedy Tower, N.Y.	7	67	20	13
San Francisco	7	67	27	7
Los Angeles TRACON	9	66	26	8
Windsor Locks, Conn.	10	65	22	13
Dulles Tower	11	64	29	7
Edwards Air Force Base	11	64	27	9
Las Vegas	11	64	32	4
Washington National	14	63	29	9
Denver TRACON	15	62	29	10
Kansas City	15	62	29	10
Phoenix	15	62	31	8
Pittsburgh	15	62	31	8
Baltimore-Washington	19	61	32	6
Jacksonville	19	61	22	17
San Diego	19	61	33	6
Hebron, Ky.	22	59	41	0
New Orleans	22	59	35	6
Lubbock	24	58	26	16
Phoenix TRACON	25	57	39	4
Salt Lake City TRACON	25	57	43	0
Memphis	27	56	41	4
Oakland TRACON	27	56	35	9
Miami	29	55	30	15
Milwaukee	29	55	30	15
Ontario TRACON	29	55	35	10
West Palm Beach	29	55	40	5

(continued)

Question 19 (Continued)

b. Controlling traffic in bad weather.

Center	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Atlanta	1	76	17	7
Kansas City	2	74	13	13
Chicago	3	72	18	9
Cleveland	4	71	20	9
Los Angeles	4	71	17	12
Washington, D.C.	6	68	25	8
Boston	7	67	24	9
Indianapolis	7	67	24	9
New York	9	66	20	14
Salt Lake City	9	66	24	10
Oakland	11	63	30	7
Denver	12	60	17	23
Memphis	13	59	28	14
Houston	14	54	26	20
Fort Worth	15	52	34	14
Jacksonville	16	51	36	13
Minneapolis	17	49	34	17
Albuquerque	18	43	36	21
Miami	18	43	36	22
Seattle	20	42	36	21

Question 19 (Continued)

b. Controlling traffic in bad weather.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Sacramento	32	46	38	17
Oklahoma City	34	45	35	20
West Palm Beach	34	45	35	20
Dallas-Ft. Worth TRACON	36	44	28	28
Kansas City	37	43	48	10
San Antonio	37	43	47	10
Miami	39	42	32	26
San Diego	39	42	53	5
Chicago TRACON	41	41	50	9
Memphis	41	41	52	7
Kennedy Tower, N.Y.	43	40	40	20
Oakland TRACON	43	40	35	26
Washington National	43	40	43	17
Boston	46	39	42	19
Minneapolis	46	39	36	25
New Orleans	46	39	33	28
Windsor Locks, Conn.	46	39	39	22
Charlotte, N.C.	50	37	41	22
Pensacola	51	36	48	16
Santa Ana, Calif.	51	36	28	36
Seattle TRACON	51	36	44	20
St. Louis TRACON	51	36	41	23
Nashville	55	32	48	20
Tampa	55	32	41	27
Ontario TRACON	57	30	40	30
Jacksonville	58	26	58	16
LaGuardia Tower	59	25	31	44
Norfolk	59	25	61	44
Portland TRACON	61	18	53	29

Question 19 (Continued)

c. Emergency procedures.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Dayton	1	77	18	5
Dulles Tower	2	76	17	7
Pittsburgh	3	71	21	8
Detroit	4	69	26	5
Phoenix	4	69	15	15
Cleveland	6	64	20	16
Los Angeles	6	64	21	14
Los Angeles TRACON	8	61	26	13
Burbank	9	60	30	10
Las Vegas	9	60	32	8
Salt Lake City TRACON	9	60	40	0
Boston	12	58	33	8
Chicago O'Hare	12	58	32	11
New York TRACON	12	58	32	10
Ontario TRACON	12	58	16	26
Kansas City	16	57	38	5
Seattle TRACON	16	57	30	13
Washington National	16	57	31	11
Austin Tower	19	56	39	6
LaGuardia Tower	19	56	25	19
Memphis	19	56	41	4
Denver TRACON	22	55	36	9
Indianapolis	22	55	40	5
Portland TRACON	24	53	24	24
Baltimore-Washington	25	52	45	3
Hebron, Ky.	25	52	38	10
Milwaukee	25	52	30	17
Atlanta	28	51	37	12
Chicago TRACON	29	50	47	3
Denver	29	50	43	7
Edwards Air Force Base	29	50	33	17
Phoenix TRACON	29	50	46	4

(continued)

Question 19 (Continued)

d. Handling heavy traffic.

Center	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Boston	1	53	33	14
Kansas City	2	51	27	22
Salt Lake City	3	46	36	18
Chicago	4	43	19	37
Denver	4	43	29	28
Indianapolis	6	41	27	32
Jacksonville	7	40	38	22
Atlanta	8	39	32	28
Cleveland	8	39	32	29
Oakland	10	38	30	32
Washington, D.C.	10	38	32	30
Fort Worth	12	36	41	23
Seattle	13	35	37	28
New York	14	34	41	25
Los Angeles	15	33	34	33
Minneapolis	16	32	26	41
Miami	17	31	44	25
Memphis	18	29	43	28
Houston	19	26	38	37
Albuquerque	20	22	39	39

Question 19 (Continued)

d. Handling heavy traffic.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Pensacola	33	28	36	36
Santa Ana, Calif.	33	28	12	60
Denver	35	27	33	40
Miami	35	27	34	39
Salt Lake City TRACON	35	27	33	40
Oakland TRACON	38	26	21	52
Philadelphia	38	26	33	41
Boston	40	25	19	56
Fort Lauderdale	40	25	38	38
West Palm Beach	40	25	25	50
Atlanta	43	24	22	55
Las Vegas	43	24	36	40
Minneapolis	45	22	14	64
Jacksonville	46	21	16	63
Washington National	46	21	35	44
Baltimore-Washington	48	20	40	40
Cleveland	48	20	40	40
Tampa	48	20	49	32
LaGuardia Tower	51	19	25	56
Denver TRACON	52	18	45	36
Hebron, Ky.	53	17	24	59
Chicago O'Hare	54	16	32	53
Dallas-Ft. Worth TRACON	54	16	22	61
Los Angeles TRACON	54	16	26	58
Chicago TRACON	57	12	21	68
Memphis	58	11	41	48
St. Louis TRACON	59	5	18	77
Nashville	60	4	40	56
Kennedy Tower, N.Y.	61	0	53	47

Question 19 (Continued)

e. Holding patterns.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Phoenix TRACON	1	88	13	0
Salt Lake City TRACON	2	86	7	7
Dayton	3	81	14	5
Miami	4	79	21	0
Washington National	4	79	15	6
Burbank	6	78	22	0
Detroit	6	78	19	3
Los Angeles TRACON	8	76	18	6
Boston	9	75	11	14
Dallas-Ft. Worth TRACON	9	75	18	7
San Diego	9	75	19	6
Houston	12	74	24	3
Dulles Tower	13	72	24	3
Las Vegas	13	72	24	4
Indianapolis	15	71	24	6
Milwaukee	15	71	29	0
Denver TRACON	17	70	30	0
Kansas City	17	70	30	0
Santa Ana, Calif.	17	70	25	5
New York TRACON	20	69	19	12
Pittsburgh	20	69	27	4
Norfolk	22	68	29	4
Oklahoma City	23	67	27	7
Hebron, Ky.	24	66	31	3
Nashville	25	64	24	12
Austin Tower	26	63	31	6
Memphis	26	63	38	0
New Orleans	26	63	31	6
Atlanta	29	62	26	13
Tampa	29	62	35	3
Charlotte, N.C.	31	61	39	0
Cleveland	31	61	30	9

(continued)

Question 19 (Continued)

f. Operational characteristics of types of aircraft.

Center	Rank	Percentage of responses		
		Less than adequate or poor	Adequate	Good or excellent
Boston	1	67	25	7
Houston	2	63	27	10
New York	3	55	27	17
Washington, D.C.	3	55	31	15
Denver	5	53	32	14
Kansas City	5	53	33	14
Jacksonville	7	52	33	15
Cleveland	8	50	36	15
Memphis	9	49	37	14
Fort Worth	10	48	29	23
Oakland	10	48	40	12
Chicago	12	47	32	21
Salt Lake City	13	46	39	15
Indianapolis	14	45	38	18
Seattle	14	45	34	21
Atlanta	16	44	39	18
Miami	17	43	44	13
Albuquerque	18	42	27	31
Los Angeles	19	38	38	24
Minneapolis	20	26	45	29

Question 19 (Continued)

f. Operational characteristics of types of aircraft.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Nashville	32	36	28	36
Charlotte, N.C.	34	35	31	35
Oakland TRACON	34	35	28	37
Ontario TRACON	34	35	30	35
Windsor Locks, Conn.	34	35	39	26
Boston	38	33	28	39
Cleveland	39	32	52	16
Los Angeles TRACON	39	32	32	37
Miami	39	32	41	27
Oklahoma City	39	32	42	26
Dallas-Love Tower	43	29	50	21
New Orleans	43	29	35	35
Norfolk	43	29	68	4
Minneapolis	46	28	33	39
Dallas-Ft. Worth TRACON	47	27	39	35
Pittsburgh	47	27	54	19
Washington National	49	26	43	31
Burbank	50	25	40	35
West Palm Beach	50	25	35	40
Atlanta	52	24	46	30
Chicago TRACON	52	24	44	32
Kansas City	52	24	52	24
Portland TRACON	52	24	47	29
Santa Ana, Calif.	52	24	36	40
Memphis	57	22	59	19
Baltimore-Washington	58	19	55	26
Fort Lauderdale	58	19	44	38
St. Louis TRACON	60	14	36	50
LaGuardia Tower	61	13	31	56

Question 19 (Continued)

g. Direct routings (expediting traffic).

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Phoenix TRACON	1	67	19	15
Pensacola	2	48	32	20
Seattle TRACON	2	48	38	14
Detroit	4	45	42	13
Dulles Tower	4	45	34	21
Los Angeles	6	42	33	25
Miami	7	39	49	12
Chicago O'Hare	8	38	8	54
Pittsburgh	8	38	46	15
Atlanta	10	37	43	20
Denver TRACON	11	36	50	14
Kennedy Tower, N.Y.	11	36	55	9
Tampa	11	36	42	22
Dayton	14	35	65	0
Edwards Air Force Base	15	33	42	25
Houston	15	33	46	21
San Antonio	15	33	53	13
Charlotte, N.C.	18	32	44	24
Las Vegas	18	32	32	36
Nashville	18	32	44	24
Philadelphia	18	32	50	18
Milwaukee	22	30	57	13
Fort Lauderdale	23	29	43	29
Jacksonville	24	28	33	39
Baltimore-Washington	25	27	57	17
Salt Lake City TRACON	25	27	60	13
Boston	27	26	44	29
Minneapolis	27	26	43	31
West Palm Beach	27	26	53	21
Austin Tower	30	25	44	31
Burbank	30	25	40	35
Dallas-Love Tower	30	25	58	17

(continued)

Question 19 (Continued)

h. Control techniques.

Center	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Denver	1	40	32	28
Boston	2	36	41	23
Fort Worth	2	36	34	30
Cleveland	4	34	37	29
Salt Lake City	5	33	39	28
Atlanta	6	32	37	31
Chicago	6	32	34	33
Washington, D.C.	6	32	29	39
Kansas City	9	31	39	29
Oakland	10	30	39	31
Houston	11	27	46	27
Miami	11	27	45	28
Seattle	13	26	35	39
Memphis	14	25	46	29
New York	14	25	40	36
Jacksonville	16	23	49	27
Los Angeles	16	23	38	39
Indianapolis	18	21	39	39
Minneapolis	19	18	28	54
Albuquerque	20	17	31	52

Question 19 (Continued)

h. Control techniques.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
San Antonio	31	23	47	30
Tampa	31	23	50	28
Austin Tower	35	22	56	22
Chicago TRACON	36	21	24	56
Jacksonville	36	21	32	47
Norfolk	36	21	57	21
Oklahoma City	36	21	37	42
Orlando	36	21	50	29
Columbus	41	20	52	28
Denver	41	20	53	27
Indianapolis	41	20	55	25
Kennedy Tower, N.Y.	41	20	47	33
Ontario TRACON	41	20	30	50
Phoenix TRACON	46	19	52	30
Minneapolis	47	17	31	53
Baltimore-Washington	48	16	61	23
Dallas-Ft. Worth TRACON	48	16	38	46
Fort Lauderdale	50	13	50	38
Los Angeles TRACON	50	13	26	61
Milwaukee	50	13	61	26
Salt Lake City TRACON	50	13	53	33
Windsor Locks, Conn	50	13	48	39
Nashville	55	12	52	36
Oakland TRACON	55	12	37	51
Memphis	57	11	48	41
Hebron, Ky.	58	10	34	55
LaGuardia Tower	59	6	19	75
Lubbock	60	5	75	20
St. Louis TRACON	60	5	36	59

Question 19 (Continued)

i. Phraseology.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Chicago TRACON	1	41	44	15
Washington National	2	29	31	40
Dulles Tower	3	28	38	34
Houston	4	27	41	32
Kennedy Tower, N.Y.	4	27	53	20
Pittsburgh	4	27	46	27
Chicago O'Hare	7	26	37	37
Atlanta	8	25	41	33
Detroit	8	25	43	33
Dallas-Ft. Worth TRACON	10	24	28	48
Las Vegas	10	24	24	52
Phoenix	12	23	8	69
Seattle TRACON	13	21	38	42
New York TRACON	14	20	36	44
Oklahoma City	14	20	35	45
San Francisco	16	19	38	44
Edwards Air Force Base	17	17	8	75
Cleveland	18	16	36	48
Columbus	18	16	44	40
Burbank	20	15	35	50
Lubbock	20	15	45	40
Memphis	20	15	52	33
Dallas-Love Tower	23	14	79	7
Denver	23	14	57	29
Kansas City	23	14	48	38
Phoenix TRACON	23	14	32	54
St. Louis TRACON	23	14	41	45
Dayton	28	13	30	57
Fort Lauderdale	28	13	38	50
Philadelphia	28	13	44	44
San Antonio	28	13	43	43
Santa Ana, Calif.	32	12	4	84

(continued)

Question 19 (Continued)

j. Flow control procedures.

Center	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
New York	1	68	18	15
Chicago	2	57	37	7
Atlanta	3	51	41	8
Jacksonville	3	51	41	8
Boston	5	50	34	17
Cleveland	6	49	43	8
Fort Worth	6	49	40	12
Washington, D.C.	6	49	41	10
Indianapolis	9	45	42	13
Kansas City	9	45	40	15
Miami	9	45	42	13
Oakland	12	41	33	26
Denver	13	36	33	31
Houston	14	35	39	26
Salt Lake City	15	33	52	15
Los Angeles	16	29	44	27
Memphis	17	26	49	25
Minneapolis	17	26	41	33
Seattle	19	22	44	34
Albuquerque	20	14	48	38

Question 19 (Continued)

j. Flow control procedures.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Denver	33	29	57	14
Indianapolis	33	29	59	12
Milwaukee	33	29	33	38
Hebron, Ky.	36	28	28	45
Nashville	37	27	45	27
San Antonio	38	26	48	26
Pittsburgh	39	25	67	8
Portland TRACON	39	25	50	25
Chicago O'Hare	41	23	62	15
Los Angeles TRACON	41	23	43	34
Minneapolis	41	23	49	29
Dayton	44	22	39	39
Los Angeles	45	21	36	43
Fort Lauderdale	46	20	33	47
Columbus	47	19	35	46
Austin Tower	48	18	65	18
Ontario TRACON	48	18	29	53
Oklahoma City	50	16	42	42
Burbank	51	15	55	30
West Palm Beach	51	15	60	25
Cleveland	53	14	45	41
LaGuardia Tower	53	14	50	36
Santa Ana, Calif.	55	13	46	42
Newark	56	8	33	58
Lubbock	57	6	81	13
San Diego	57	6	71	24
Windsor Locks, Conn.	59	5	68	27
New Orleans	60	0	71	29

Question 20 (Continued)

Quality of on-the-job training.

Center	Rank	Percentage of responses		
		Poor or very poor	Adequate	Good or excellent
Boston	1	51	35	14
Denver	2	40	34	26
Chicago	3	39	38	23
Oakland	4	37	40	23
Atlanta	5	35	45	20
Indianapolis	6	34	42	24
New York	6	34	37	29
Cleveland	8	33	42	25
Fort Worth	8	33	41	26
Kansas City	10	32	52	16
Washington, D.C.	11	31	43	26
Miami	12	29	47	23
Los Angeles	13	28	44	29
Seattle	13	28	37	35
Jacksonville	15	26	49	25
Houston	16	23	49	28
Memphis	17	20	53	27
Salt Lake City	17	20	55	25
Albuquerque	19	19	44	36
Minneapolis	20	18	39	43

Question 20 (Continued)

Quality of on-the-job training.

Terminal	Rank	Percentage of responses		
		Poor or very poor	Adequate	Good or excellent
Tampa	32	22	46	32
Dallas-Love Tower	34	21	57	21
Orlando	34	21	61	18
Phoenix TRACON	34	21	57	21
San Diego	34	21	42	37
Cleveland	38	20	44	36
Denver	38	20	67	13
Oklahoma City	38	20	45	35
Boston	41	19	42	39
Oakland TRACON	41	19	40	42
Chicago TRACON	43	18	35	47
Santa Ana, Calif.	44	16	36	48
Memphis	45	15	63	22
Newark	45	15	46	38
Dallas-Ft. Worth TRACON	47	14	46	40
Hebron, Ky.	47	14	32	54
Lubbock	47	14	59	27
Fort Lauderdale	50	13	31	56
Los Angeles TRACON	50	13	47	39
Columbus	52	12	50	38
Nashville	52	12	36	52
Pensacola	52	12	38	50
Ontario TRACON	55	10	20	70
Minneapolis	56	8	39	53
Sacramento	56	8	36	56
Windsor Locks, Conn.	56	8	29	63
Salt Lake City TRACON	59	7	67	27
Baltimore-Washington	60	6	55	39
LaGuardia Tower	60	6	38	56
St. Louis TRACON	62	5	27	68

Question 21 (Continued)

Sufficiency of training involving live traffic.

Terminal	Rank	Percentage of responses		
		Probably or definitely not	Uncertain	Probably or definitely yes
Kennedy Tower, N.Y.	1	47	0	53
Chicago O'Hare	2	45	20	35
New York TRACON	3	40	8	52
Detroit	4	39	17	44
Philadelphia	5	36	5	59
Dulles Tower	6	34	7	59
Edwards Air Force Base	7	33	8	58
Columbus	8	31	4	65
Miami	8	31	5	64
Burbank	10	30	5	65
Oklahoma City	10	30	5	65
Ontario TRACON	10	30	5	65
Los Angeles	13	29	7	64
Norfolk	13	29	14	57
San Francisco	13	29	24	47
Austin Tower	16	28	6	67
Houston	16	28	8	65
Pensacola	16	28	8	64
Dayton	19	27	14	59
Lubbock	19	27	9	64
Oakland Tower	19	27	27	45
Pittsburgh	19	27	15	58
Kansas City	23	24	10	67
Las Vegas	23	24	4	72
Los Angeles TRACON	23	24	3	74
Denver TRACON	26	23	5	73
Minneapolis	26	23	3	74
Seattle TRACON	28	22	7	70
Atlanta	29	21	10	69
Dallas-Love Tower	29	21	29	50
Phoenix TRACON	29	21	7	71
San Antonio	32	20	13	67

(continued)

System Safety

Question 26

How would you rate the overall safety of the ATC (air traffic control) system today?

Table I.8: Views of Overall System Safety

Percentage of controllers' response at a facility	Number of facilities					
	Poor safety		Adequate safety		Good or excellent safety	
	Center	Terminal	Center	Terminal	Center	Terminal
60 to 100	0	0	0	1	4	13
50 to 59	0	1	1	3	5	14
40 to 49	0	0	7	23	7	18
30 to 39	1	3	8	22	2	13
20 to 29	5	12	4	8	2	3
10 to 19	8	26	0	5	0	1
1 to 9	6	17	0	0	0	0
0	0	3	0	0	0	0
Total	**20**	**62**	**20**	**62**	**20**	**62**

Question 26 (Continued)

Rating of system safety.

Terminal	Rank	Percentage of responses		
		Poor or very poor	Adequate	Good or excellent
Dallas-Love Tower	1	50	21	29
New York TRACON	2	39	27	33
Ontario TRACON	3	38	43	19
Phoenix TRACON	4	37	37	27
Philadelphia	5	29	37	34
Denver	6	27	40	33
Santa Ana, Calif.	6	27	50	23
Dulles Tower	8	25	32	43
Edwards Air Force Base	8	25	42	33
Oklahoma City	10	24	43	33
Columbus	11	23	35	42
San Antonio	11	23	27	50
Memphis	13	22	22	56
Pensacola	14	21	45	34
Burbank	15	20	35	45
Orlando	15	20	37	43
Los Angeles TRACON	17	19	41	41
San Diego	17	19	48	33
Seattle TRACON	17	19	42	38
Tampa	17	19	30	51
Denver TRACON	21	18	32	50
Detroit	22	17	43	40
Miami	22	17	34	49
Portland TRACON	22	17	50	33
Las Vegas	25	16	36	48
Phoenix	26	15	31	54
Pittsburgh	26	15	46	38
Los Angeles	28	14	43	43
Washington National	28	14	47	39
Boston	30	13	46	41
Dayton	30	13	39	48
Newark	30	13	33	53
Windsor Locks, Conn.	30	13	29	58

(continued)

Question 27

Please consider your own observations and experience for each of the factors listed below. Then indicate your opinion as to whether that factor is currently helping, is currently hindering, or currently has no impact on the maintenance of ATC system safety today.

Table I.9: Difficulty in Maintaining Safety

Facilities with at least half of controllers citing safety concerns		
	Number of facilities	
Factor hindering ability to maintain safety	**Center**	**Terminal**
a. Skill level of developments	13	14
b. Number of developments	6	32
c. Number of FPLs	15	51
d. Traffic workload	20	56
e. Overtime being worked	8	28
f. Hardware reliability	15	52
g. Software reliability	10	52
h. Controller morale	18	54

Question 27 (Continued)

a. Current skill level of developmental controllers.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
New York TRACON	1	80	11	10
Dayton	2	78	13	9
San Francisco	3	65	18	18
Kennedy Tower, N.Y.	4	60	27	13
Oakland TRACON	5	58	12	30
Los Angeles TRACON	6	55	26	18
Columbus	7	54	12	35
Denver	8	53	20	27
San Antonio	8	53	20	27
San Diego	10	52	29	19
Dallas-Love Tower	11	50	50	0
Denver TRACON	11	50	32	18
Los Angeles	11	50	29	21
Santa Ana, Calif.	11	50	23	27
Atlanta	15	49	21	30
LaGuardia Tower	16	47	29	24
Houston	17	46	29	24
Pittsburgh	17	46	31	23
Burbank	19	45	15	40
New Orleans	20	44	39	17
Detroit	21	43	33	24
Phoenix TRACON	21	43	30	27
Seattle TRACON	23	42	23	35
Dallas-Ft. Worth TRACON	24	40	29	31
Norfolk	25	39	36	25
Miami	26	38	38	24
Ontario TRACON	26	38	43	19
Orlando	26	38	34	28
Pensacola	26	38	38	24
Philadelphia	26	38	28	33
Chicago O'Hare	31	36	36	27
Las Vegas	31	36	24	40

(continued)

Question 27 (Continued)

b. Current number of developmental controllers available.

Center	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Indianapolis	1	70	22	8
Jacksonville	2	62	23	15
Boston	3	57	33	11
Atlanta	4	55	31	14
Denver	5	51	36	13
Los Angeles	6	50	36	14
Memphis	7	48	34	18
Miami	8	47	39	14
Kansas City	9	46	32	22
Seattle	10	45	41	14
Chicago	11	44	37	18
New York	11	44	40	16
Salt Lake City	13	42	40	18
Washington, D.C.	13	42	27	31
Fort Worth	15	38	46	16
Houston	16	37	43	21
Oakland	17	32	49	19
Cleveland	18	28	60	12
Albuquerque	19	21	50	29
Minneapolis	20	20	52	28

Question 27 (Continued)

b. Current number of developmental controllers available.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Philadelphia	33	49	31	21
Seattle TRACON	34	46	35	19
Windsor Locks, Conn	34	46	46	8
Pensacola	36	45	45	10
St. Louis TRACON	36	45	32	23
Salt Lake City TRACON	38	44	44	13
Milwaukee	39	43	33	24
Chicago TRACON	40	40	43	17
Dallas-Ft. Worth TRACON	40	40	42	17
Dayton	42	39	43	17
Dulles Tower	42	39	29	32
Los Angeles	44	36	50	14
Lubbock	44	36	59	5
Jacksonville	46	35	45	20
Memphis	46	35	35	31
Cleveland	48	33	46	21
Nashville	48	33	33	33
New Orleans	48	33	39	28
West Palm Beach	48	33	52	14
Austin Tower	52	32	53	16
Chicago O'Hare	52	32	41	27
Tampa	54	31	33	36
Minneapolis	55	30	46	24
Denver	56	27	53	20
Hebron, Ky.	57	24	28	48
Kansas City	57	24	52	24
Phoenix	59	23	15	62
Fort Lauderdale	60	20	40	40
Sacramento	61	16	40	44
Newark	62	13	47	40

Question 27 (Continued)

c. Current number of FPL controllers available.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Burbank	1	95	0	5
LaGuardia Tower	2	94	6	0
Kennedy Tower, N.Y.	3	93	7	0
Las Vegas	4	92	8	0
Santa Ana, Calif.	4	92	0	8
San Antonio	6	90	3	7
Boston	7	89	5	5
Washington National	7	89	6	6
Baltimore-Washington	9	88	0	13
Oakland TRACON	9	88	5	7
San Francisco	9	88	12	0
Windsor Locks, Conn.	9	88	4	8
New York TRACON	13	87	4	10
Charlotte, N.C.	14	86	0	14
Dayton	15	83	9	9
Houston	15	83	12	5
Orlando	15	83	3	13
Chicago O'Hare	18	82	0	18
Columbus	19	81	12	8
Kansas City	19	81	10	10
Ontario TRACON	19	81	0	19
Pittsburgh	19	81	12	8
Salt Lake City TRACON	19	81	6	13
Chicago TRACON	24	80	9	11
Atlanta	25	79	8	13
Dallas-Love Tower	25	79	14	7
Miami	25	79	7	14
Portland TRACON	28	78	22	0
Seattle TRACON	29	77	8	15
Los Angeles TRACON	30	76	5	18
Edwards Air Force Base	31	75	8	17
Oakland Tower	31	75	17	8

(continued)

Question 27 (Continued)

d. Current amount of traffic workload.

Center	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Los Angeles	1	95	2	3
Washington, D.C.	1	95	5	0
Jacksonville	3	94	5	1
Atlanta	4	90	8	2
Indianapolis	5	89	8	3
Boston	6	86	9	5
Chicago	7	81	18	1
Cleveland	7	81	16	4
Memphis	9	80	15	5
New York	10	79	16	5
Seattle	10	79	15	5
Salt Lake City	12	76	18	5
Denver	13	75	21	4
Miami	14	73	22	5
Kansas City	15	68	30	2
Oakland	16	66	24	10
Fort Worth	17	60	32	7
Albuquerque	18	56	29	16
Houston	19	52	35	13
Minneapolis	19	52	32	16

Question 27 (Continued)

d. Current amount of traffic workload.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Detroit	31	74	23	2
Indianapolis	31	74	26	0
Pittsburgh	35	73	19	8
St. Louis TRACON	35	73	14	14
Denver TRACON	37	71	24	5
Kansas City	37	71	24	5
Miami	37	71	24	5
Portland TRACON	37	71	29	0
Dulles Tower	41	70	19	11
Jacksonville	41	70	25	5
Denver	43	67	27	7
Oakland Tower	43	67	33	0
San Antonio	43	67	30	3
Hebron, Ky.	46	66	17	17
Los Angeles	47	64	29	7
Norfolk	47	64	32	4
Memphis	49	63	30	7
San Diego	50	62	29	10
West Palm Beach	50	62	29	10
Milwaukee	52	57	29	14
Fort Lauderdale	53	56	31	13
Sacramento	53	56	32	12
Oklahoma City	55	55	35	10
Cleveland	56	52	32	16
New Orleans	57	44	33	22
Dallas-Love Tower	58	43	50	7
Austin Tower	59	37	47	16
Newark	60	33	53	13
Lubbock	61	32	55	14
Minneapolis	61	32	43	24

Question 27 (Continued)

e. Current amount of overtime being worked.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Santa Ana, Calif.	1	100	0	0
Burbank	2	95	0	5
Las Vegas	3	92	8	0
Phoenix TRACON	4	90	7	3
Oakland TRACON	5	88	9	2
Chicago O'Hare	6	86	9	5
Chicago TRACON	7	83	11	6
LaGuardia Tower	8	82	12	6
Los Angeles TRACON	8	82	11	8
New York TRACON	10	81	12	7
Los Angeles	11	79	21	0
Atlanta	12	77	15	8
Pittsburgh	13	68	12	20
Edwards Air Force Base	14	67	25	8
Miami	14	67	29	5
Oakland Tower	14	67	25	8
San Francisco	17	65	35	0
Boston	18	64	33	3
Norfolk	19	61	29	11
Memphis	20	59	33	7
Kansas City	21	57	43	0
Portland TRACON	22	56	39	6
Washington National	23	54	46	0
New Orleans	24	53	41	6
Philadelphia	24	53	34	13
Pensacola	26	52	45	3
Dulles Tower	27	50	36	14
Orlando	27	50	43	7
Oklahoma City	29	48	52	0
San Diego	29	48	48	5
Baltimore-Washington	31	47	41	13
Cleveland	32	46	46	8

(continued)

Question 27 (Continued)

f. Current hardware reliability.

Center	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Washington, D.C.	1	81	9	10
Albuquerque	2	75	6	20
Oakland	3	74	10	16
Los Angeles	4	72	17	11
Indianapolis	5	71	13	16
Chicago	6	70	16	14
Miami	7	68	10	22
Salt Lake City	8	64	20	17
Kansas City	9	63	16	21
Boston	10	62	15	23
New York	10	62	18	20
Atlanta	12	58	19	23
Denver	13	57	7	36
Jacksonville	13	57	17	26
Seattle	15	53	12	35
Memphis	16	44	19	36
Fort Worth	17	41	32	27
Houston	18	39	19	43
Minneapolis	19	35	16	49
Cleveland	20	34	22	44

Question 27 (Continued)

f. Current hardware reliability.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Edwards Air Force Base	33	67	17	17
San Diego	33	67	19	14
Burbank	35	65	10	25
Austin Tower	36	63	16	21
Columbus	37	62	15	23
Dallas-Ft. Worth TRACON	37	62	19	19
Portland TRACON	39	61	6	33
Miami	40	60	17	24
Sacramento	40	60	20	20
Pensacola	42	59	28	14
Kansas City	43	57	14	29
Ontario TRACON	43	57	24	19
Orlando	43	57	23	20
New Orleans	46	56	11	33
Houston	47	54	29	17
San Antonio	48	53	23	23
Atlanta	49	51	34	15
Jacksonville	50	50	25	25
Lubbock	50	50	27	23
Oakland Tower	50	50	17	33
Minneapolis	53	49	19	32
Las Vegas	54	48	32	20
Nashville	54	48	16	36
Oklahoma City	54	48	43	10
Fort Lauderdale	57	47	40	13
Seattle TRACON	58	46	31	23
Denver TRACON	59	45	32	23
Norfolk	60	43	21	36
Milwaukee	61	38	29	33
Salt Lake City TRACON	62	20	53	27

Question 27 (Continued)

g. Current software reliability.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Dallas-Love Tower	1	100	0	0
Newark	1	100	0	0
Detroit	3	98	2	0
Baltimore-Washington	4	94	6	0
Dulles Tower	5	93	0	7
Los Angeles	5	93	7	0
Boston	7	92	3	5
New York TRACON	7	92	5	4
Washington National	7	92	3	6
Windsor Locks, Conn.	7	92	8	0
Chicago O'Hare	11	91	9	0
Los Angeles TRACON	12	89	5	5
Dallas-Ft. Worth TRACON	13	88	6	6
San Francisco	13	88	6	6
Kennedy Tower, N.Y.	15	86	14	0
Phoenix TRACON	15	86	7	7
Burbank	17	85	0	15
Phoenix	17	85	15	0
Philadelphia	19	82	8	10
Oakland TRACON	20	79	14	7
Portland TRACON	21	78	0	22
Chicago TRACON	22	77	20	3
St. Louis TRACON	22	77	5	18
Cleveland	24	76	4	20
LaGuardia Tower	24	76	18	6
West Palm Beach	24	76	19	5
Charlotte, N.C.	27	75	11	14
Pensacola	28	72	17	10
Orlando	29	70	17	13
Tampa	29	70	14	16
Hebron, Ky.	31	69	24	7
Santa Ana, Calif.	31	69	15	15

(continued)

Question 27 (Continued)

h. Current controller morale.

Center	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Washington, D.C.	1	93	3	4
Atlanta	2	92	5	3
Salt Lake City	3	88	5	6
Miami	4	86	5	9
Boston	5	85	11	4
Denver	5	85	7	9
Kansas City	5	85	13	2
Los Angeles	5	85	9	6
Chicago	9	76	15	9
Oakland	10	75	15	10
Seattle	11	69	17	14
Cleveland	12	68	20	12
Indianapolis	13	67	20	13
Albuquerque	14	66	14	20
Jacksonville	14	66	20	14
Memphis	14	66	19	15
New York	17	65	23	12
Houston	18	57	15	28
Fort Worth	19	49	27	24
Minneapolis	20	33	20	46

Question 27 (Continued)

h. Current controller morale.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Ontario TRACON	32	76	14	10
Baltimore-Washington	34	75	25	0
Oakland Tower	34	75	17	8
Miami	36	74	14	12
Chicago TRACON	37	71	26	3
Edwards Air Force Base	38	67	17	17
Windsor Locks, Conn.	38	67	13	21
Indianapolis	40	65	22	13
Lubbock	41	64	23	14
St. Louis TRACON	41	64	9	27
Salt Lake City TRACON	43	63	38	0
Pittsburgh	44	62	31	8
Cleveland	45	60	12	28
Newark	45	60	7	33
Memphis	47	59	15	26
Dulles Tower	48	58	31	12
Oklahoma City	49	57	33	10
Houston	50	54	24	22
Los Angeles TRACON	50	54	24	22
Phoenix	50	54	0	46
Austin Tower	53	53	21	26
Norfolk	54	50	25	25
Tampa	55	49	9	42
Minneapolis	56	46	14	41
Seattle TRACON	56	46	35	19
Hebron, Ky.	58	45	24	31
Milwaukee	59	33	33	33
West Palm Beach	59	33	38	29
Sacramento	61	32	24	44
Jacksonville	62	30	25	45

Question 28 (Continued)

Controller morale.

Center	Rank	Percentage of responses: Low or very low	Neither high nor low	High or very high
Washington, D.C.	1	67	19	14
Salt Lake City	2	59	22	20
Boston	3	57	32	12
Los Angeles	4	55	23	22
Kansas City	5	54	30	16
Atlanta	6	53	23	24
Denver	7	51	22	28
Oakland	8	50	18	33
New York	9	48	36	16
Chicago	10	44	33	23
Seattle	11	41	32	27
Miami	12	38	31	31
Indianapolis	13	37	23	39
Houston	14	36	19	45
Cleveland	15	34	29	38
Fort Worth	16	29	31	40
Memphis	16	29	36	35
Jacksonville	18	28	38	33
Albuquerque	19	25	33	41
Minneapolis	20	19	28	53

Question 28 (Continued)

Controller morale.

Terminal	Rank	Percentage of responses		
		Low or very low	Neither high nor low	High or very high
Edwards Air Force Base	34	42	50	8
Seattle TRACON	35	38	35	27
Norfolk	36	36	29	36
Kansas City	37	35	45	20
Denver TRACON	38	33	33	33
Fort Lauderdale	38	33	33	33
Newark	38	33	13	53
Austin Tower	41	32	37	32
Houston	41	32	32	37
Windsor Locks, Conn.	41	32	40	28
Baltimore-Washington	44	31	50	19
Hebron, Ky.	45	29	39	32
Los Angeles TRACON	46	28	39	33
Indianapolis	47	27	32	41
LaGuardia Tower	47	27	33	40
Pittsburgh	47	27	31	42
West Palm Beach	50	25	30	45
Tampa	51	24	19	57
Lubbock	52	23	36	41
Memphis	53	22	33	44
Minneapolis	53	22	24	54
Cleveland	55	20	40	40
Sacramento	55	20	40	40
St. Louis TRACON	57	19	29	52
Oakland Tower	58	18	36	45
Milwaukee	59	17	30	52
Phoenix	60	15	38	46
Jacksonville	61	10	20	70
Oklahoma City	62	5	48	48

used two different approaches in analyzing controllers' responses to these questions.

To rank facilities according to the viewpoints of their controllers, we collapsed the responses to each of the 27 questions into 3 distinct categories which we considered positive, negative, or neutral. For each question, we calculated the percentage of all responses received for each of the three categories. Using the percentages from the negative category, we ranked the facilities by ordering them from highest (most negative) to lowest (least negative). We did not include a facility in the ranking for any question if 10 or fewer controllers responded to that question.

When ranking the facilities, we used one question at a time. In addition, we also grouped facilities by considering all 27 questions, using a mathematical technique—cluster analysis—that takes into account the statistical correlations among all questions. We performed this cluster analysis within each of the six areas of concern: workload, staffing, overtime, training, system safety, and morale. We used the following sequence of steps.

To provide a single numerical value to represent a controller's response to a question, we assigned an integer value, or score, to each point on the response scale. Scores ranged from one up to the number of points on the scale. The value given to a specific controller's response to a specific question was the score corresponding to the point on the scale checked by the respondent. We then calculated a mean (average) score for each question within each facility.

We computed similarity measures between each pair of facilities using the mean scores. The two "closest" facilities, according to their similarity measure, were aggregated into one "conglomerate" facility. We then computed similarity measures for the conglomerate facility and the remaining facilities. Depending on the similarity measures, a facility was either added to the conglomerate facility or an additional conglomerate was formed. This sequence was repeated so that at each successive stage, a facility was either added to an existing conglomerate or com-

Facility FPLs on August 31, 1988, and August 31, 1989

Center	Number of FPL Controllers		
	Aug. 31, 1988	Aug. 31, 1989	Difference
Albuquerque	207	217	+10
Atlanta	312	316	+4
Boston	161	168	+7
Chicago	167	194	+17
Cleveland	274	293	+19
Denver	216	219	+3
Fort Worth	246	244	−2
Houston	227	226	−1
Indianapolis	167	186	+19
Jacksonville	226	221	−5
Kansas City	226	234	+8
Los Angeles	172	187	+15
Memphis	206	205	−1
Miami	164	173	+9
Minneapolis	183	193	+10
New York	178	180	+2
Oakland	161	182	+21
Salt Lake City	129	142	+13
Seattle	142	159	+17
Washington, D.C.	241	232	−9

Terminal	Number of FPL Controllers		
	Aug. 31, 1988	Aug. 31, 1989	Difference
Oakland Tower	20	23	+3
Oakland TRACON	39	44	+5
Oklahoma City	32	33	+1
Ontario TRACON	24	26	+2
Orlando	37	37	0
Pensacola	38	30	−8
Philadelphia	42	45	+3
Phoenix	20	22	+2
Phoenix TRACON	35	37	+2
Pittsburgh	35	38	+3
Portland TRACON	18	16	−2
Sacramento	24	26	+2
St. Louis	17	17	0
St. Louis TRACON	33	34	+1
Salt Lake City TRACON	18	19	+1
San Antonio	34	32	−2
San Diego	31	25	−6
San Francisco	21	25	+4
Santa Ana, Calif.	23	29	+6
Seattle TRACON	34	33	−1
Tampa	49	46	−3
Washington National	42	39	−3
West Palm Beach	24	21	−3
Windsor Locks, Conn.	34	35	+1

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The Major Air Traffic Control Facilities Included in GAO's Survey and Related Controllers' Questionnaire Return Rates

Return Rate in Percent					
Air Route Traffic Control Centers					
Albuquerque	81	Houston	76	Minneapolis	81
Atlanta	76	Indianapolis	77	New York	70
Boston	78	Jacksonville	80	Oakland	71
Chicago	75	Kansas City	81	Salt Lake City	74
Cleveland	80	Los Angeles	75	Seattle	84
Denver	83	Memphis	80	Washington, D.C.	81
Fort Worth	71	Miami	80		
Terminal Facilities					
Atlanta	74	Houston	77	Ontario TRACON	70
Austin Tower	63	Indianapolis	74	Orlando	73
Baltimore-Washington	76	Jacksonville	60	Pensacola	81
Boston	80	Kansas City	82	Philadelphia	78
Burbank	66	Kennedy Tower, N.Y.	74	Phoenix	79
Charlotte, N.C.	74	LaGuardia Tower	96	Phoenix TRACON	77
Chicago O'Hare	78	Las Vegas	82	Pittsburgh	70
Chicago TRACON	73	Los Angeles	67	Portland TRACON	91
Cleveland	84	Los Angeles TRACON	83	Sacramento	87
Columbus	78	Lubbock	76	St. Louis	a
Dallas-Fort Worth	a	Memphis	65	St. Louis TRACON	63
Dallas-Fort Worth TRACON	80	Miami	72	Salt Lake TRACON	67
Dallas-Love Tower	94	Milwaukee	92	San Antonio	78
Dayton	81	Minneapolis	77	San Diego	64
Denver	82	Nashville	82	San Francisco	72
Denver TRACON	69	Newark	72	Santa Ana, Calif.	90
Detroit	75	New Orleans	82	Seattle TRACON	78
Dulles Tower	68	New York TRACON	76	Tampa	73
Edwards Air Force Base	57	Norfolk	80	Washington National	73
Fort Lauderdale	89	Oakland Tower	56	West Palm Beach	67
Hebron, Ky.	78	Oakland TRACON	84	Windsor Locks, Conn.	82
		Oklahoma City	60		

[a]Not included in ranking individual facilities in this report because of a low number of responses.

Terminal	Number of FPL Controllers		
	Aug. 31, 1988	Aug. 31, 1989	Difference
Atlanta	61	69	+8
Austin	28	29	+1
Baltimore-Washington	37	35	−2
Boston	47	55	+8
Burbank	21	23	+2
Charlotte, N.C.	35	42	+7
Chicago O'Hare	28	29	+1
Chicago TRACON	33	37	+4
Cleveland	24	25	+1
Columbus	30	30	0
Dallas-Fort Worth	23	25	+2
Dallas-Fort Worth TRACON	56	57	+1
Dallas-Love Tower	14	15	+1
Dayton	25	21	−4
Denver Tower	22	19	−3
Denver TRACON	27	19	−8
Detroit	50	49	−1
Dulles	29	32	+3
Edwards Air Force Base	18	18	0
Fort Lauderdale	15	16	+1
Hebron, Ky.	26	30	+4
Houston	45	39	−6
Indianapolis	27	27	0
Jacksonville	25	30	+5
Kansas City	31	32	+1
Kennedy Tower, N.Y.	15	17	+2
LaGuardia	14	15	+1
Las Vegas	25	23	−2
Los Angeles	18	27	+9
Los Angeles TRACON	29	29	0
Lubbock	26	25	−1
Memphis	36	33	−3
Miami	45	40	−5
Milwaukee	25	24	−1
Minneapolis	47	49	+2
Nashville	23	28	+5
Newark	14	15	+1
New Orleans	23	23	0
New York TRACON	98	102	+4
Norfolk	29	28	−1

(continued)

bined with another facility to create a new conglomerate.

We developed these cluster models separately for centers and terminals because of the unique operational differences between these two types of facilities. Finally, three conglomerate facilities, called "clusters" were formed for centers and three separate clusters for terminals for each of the six areas. By studying the mean scores within each cluster, we labeled the cluster—thus the facilities comprising the cluster—as having either a high, medium, or low level of negative responses. Table 1 shows the two extreme clusters, most and least negative, for centers and terminals. Cluster analysis does not provide an individual ranking within a cluster, thus facilities are listed in alphabetical order.

Survey Results

We used stratified sampling at centers and assigned appropriate weights to sampled cases prior to analyzing the survey results. Thus, responses shown for centers represent weighted estimates. These estimates are subject to a certain amount of sampling error (the possible error that arises from taking a sample rather than surveying the entire population). Sampling error is also referred to as a precision of the estimate and is typically given as a plus and minus percentage around the estimated percentage.

We computed sampling errors for the survey questions used in this report. Table II.1 shows how sampling errors varied, from lowest to highest, for different ranges of estimates. We computed all sampling errors at the 95-percent level of statistical confidence.

Table II.1: Minumum and Maximum Sampling Errors by Range of Estimated Values

	Sampling error (plus/minus percent)	
Estimate[a] (percent)	Minimum	Maximum
90 to <100	1.8	4.8
80 to <90	3.7	6.1
70 to <80	5.2	7.2
60 to <70	5.8	8.2
50 to <60	6.0	8.4
40 to <50	6.3	8.4
30 to <40	5.8	8.
20 to <30	5.4	7.
10 to <20	4.2	6.
1 to <10	1.8	4.

[a]Estimates were rounded up from 0.5 or higher to the next whole number.

Objective, Scope, and Methodology

Objective

The Ranking Minority Member, Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation, and the Chairman, House Committee on Public Works and Transportation, requested that we update and replicate our previous evaluation of the air traffic control system.[1] To accomplish this, in May 1988, we mailed separate questionnaires to air traffic controllers, their first-line supervisors, and facility managers at the 84 largest air traffic control facilities. Subsequently, the congressional requesters asked us to rank, in order, the largest air traffic facilities on the basis of controller views of their working conditions, training, safety, and morale.

Scope

We summarized the problems concerning the air traffic control work force in our report, Aviation Safety: Serious Problems Continue to Trouble the Air Traffic Control Work Force (GAO/RCED-89-112, Apr. 21, 1989). The complete responses to all survey questions are contained in our fact sheet, Aviation Safety: Conditions Within the Air Traffic Control Work Force (GAO/RCED-89-113FS, Apr. 24, 1989). A detailed scope and methodology on designing, administering, and estimating the overall results of the questionnaire is included in these reports.

For this request, we focused our efforts on six areas of the controller work force questionnaire—workload, staffing, overtime, training, system safety, and morale. We selected 11 primary questions from these areas, comprising a total of 27 specific questions, which we believe represent a comprehensive cross section of controller opinions and attitudes. The major air traffic control facilities discussed in this report, and the controllers' questionnaire return rates for each facility, are shown in appendix IV.

We performed our review from November 1987 to December 1988, in accordance with generally accepted government auditing standards.

Methodology

For each of our 27 selected questions, controllers were asked to respond by checking 1 of several points on a scale. Scales ranged from positive to negative responses, indicating the degree of the controller's agreement or disagreement, satisfaction or dissatisfaction, etc. For example, a question's possible response could range from "very satisfied" to "very dissatisfied" or "much more than I want" to "much less than I want." We

[1] Aviation Safety: Serious Problems Concerning the Air Traffic Control Work Force (GAO/RCED-86-121, Mar. 6, 1986).

Question 28 (Continued)

Controller morale.

Terminal	Rank	Percentage of responses: Low or very low	Neither high nor low	High or very high
San Francisco	1	81	6	13
Kennedy Tower, N.Y.	2	79	14	7
Boston	3	76	11	13
Las Vegas	3	76	12	12
Atlanta	5	71	14	16
Phoenix TRACON	6	69	21	10
Santa Ana, Calif.	7	68	32	0
Orlando	8	67	27	7
Charlotte, N.C.	9	64	18	18
Pensacola	9	64	25	11
Detroit	11	63	22	15
Miami	12	62	14	24
San Antonio	12	62	10	28
Dayton	14	61	17	22
Portland TRACON	14	61	28	11
Burbank	16	60	20	20
Denver	16	60	20	20
Dulles Tower	18	59	19	22
Columbus	19	58	27	15
Philadelphia	19	58	29	13
Dallas-Love Tower	21	57	36	7
Salt Lake City TRACON	21	57	21	21
Washington National	23	53	26	21
San Diego	24	52	38	10
Dallas-Ft. Worth TRACON	25	51	22	27
Chicago TRACON	26	49	26	26
New York TRACON	26	49	26	26
Oakland TRACON	26	49	35	16
Chicago O'Hare	29	48	43	10
Ontario TRACON	30	45	40	15
Nashville	31	44	28	28
New Orleans	31	44	28	28
Los Angeles	33	43	36	21

(continued)

Morale

Question 28

In general, how would you describe your morale as a controller at this facility?

Table I.10: Low Controller Morale

View: low controller morale		
Percentage of controllers' response at a facility	Number of facilities	
	Center	Terminal
90 to 100	0	0
80 to 89	0	1
70 to 79	0	4
60 to 69	1	12
50 to 59	7	8
40 to 49	3	9
30 to 39	4	10
20 to 29	4	12
10 to 19	1	5
1 to 9	0	1
Total	**20**	**62**

Question 27 (Continued)

h. Current controller morale.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Chicago O'Hare	1	100	0	0
Dallas-Love Tower	1	100	0	0
Phoenix TRACON	1	100	0	0
San Diego	1	100	0	0
Detroit	5	98	2	0
Charlotte, N.C.	6	96	4	0
Las Vegas	6	96	4	0
Burbank	8	95	5	0
San Francisco	9	94	6	0
Kennedy Tower, N.Y.	10	93	7	0
Atlanta	11	92	6	2
Dayton	12	91	9	0
Boston	13	90	8	3
Pensacola	13	90	3	7
Philadelphia	13	90	3	8
Nashville	16	88	4	8
Denver	17	87	13	0
San Antonio	17	87	3	10
Los Angeles	19	86	7	7
Washington National	19	86	6	8
Santa Ana, Calif.	21	85	12	4
Oakland TRACON	22	83	10	7
Orlando	22	83	7	10
Denver TRACON	24	82	18	0
LaGuardia Tower	24	82	12	6
Columbus	26	81	8	12
Fort Lauderdale	27	80	13	7
Kansas City	27	80	15	5
Dallas-Ft. Worth TRACON	29	79	17	4
New Orleans	30	78	6	17
Portland TRACON	30	78	22	0
New York TRACON	32	76	14	10

(continued

Question 27 (Continued)

g. Current software reliability.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Edwards Air Force Base	33	67	25	8
Pittsburgh	34	65	15	19
Austin Tower	35	63	21	16
Memphis	35	63	19	19
Kansas City	37	62	19	19
San Diego	37	62	24	14
Denver	39	60	20	20
Jacksonville	39	60	15	25
New Orleans	41	59	6	35
Atlanta	42	58	27	15
Columbus	42	58	15	27
Dayton	44	57	22	22
Miami	44	57	21	21
Houston	46	56	24	20
Las Vegas	46	56	20	24
Indianapolis	48	55	32	14
Seattle TRACON	49	54	27	19
Ontario TRACON	50	52	29	19
Denver TRACON	51	50	27	23
Oakland Tower	51	50	17	33
Sacramento	53	48	24	28
Fort Lauderdale	54	47	40	13
Norfolk	55	46	21	32
Oklahoma City	56	43	38	19
Lubbock	57	41	32	27
Minneapolis	57	41	24	35
Nashville	59	40	24	36
Milwaukee	60	33	19	48
San Antonio	60	33	27	40
Salt Lake City TRACON	62	25	44	31

Question 27 (Continued)

g. Current software reliability.

Center	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Washington, D.C.	1	70	17	13
Chicago	2	58	23	19
Los Angeles	2	58	21	21
Kansas City	4	56	17	27
Oakland	4	56	15	29
Denver	6	54	12	34
Atlanta	7	51	19	30
Boston	7	51	22	27
Miami	7	51	22	27
New York	7	51	24	24
Jacksonville	11	49	19	33
Salt Lake City	12	47	27	26
Albuquerque	13	46	16	39
Indianapolis	14	41	27	32
Seattle	15	40	15	45
Memphis	16	35	20	44
Fort Worth	17	34	32	34
Cleveland	18	29	24	48
Houston	18	29	22	49
Minneapolis	20	28	20	52

Question 27 (Continued)

f. Current hardware reliability.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Dallas-Love Tower	1	100	0	0
Detroit	1	100	0	0
Los Angeles	1	100	0	0
Newark	1	100	0	0
Phoenix	1	100	0	0
Los Angeles TRACON	6	95	3	3
Baltimore-Washington	7	94	3	3
San Francisco	7	94	6	0
Kennedy Tower, N.Y.	9	93	7	0
Chicago O'Hare	10	91	9	0
New York TRACON	11	88	7	5
Washington National	12	86	3	11
Boston	13	85	10	5
Phoenix TRACON	14	83	10	7
St. Louis TRACON	15	82	5	14
Dulles Tower	16	81	7	11
Denver	17	80	7	13
Indianapolis	18	78	9	13
Chicago TRACON	19	77	20	3
Santa Ana, Calif.	19	77	12	12
LaGuardia Tower	21	76	18	6
Windsor Locks, Conn.	22	75	13	13
Memphis	23	74	11	15
Cleveland	24	72	8	20
Hebron, Ky.	24	72	21	7
Oakland TRACON	24	72	21	7
Philadelphia	24	72	15	13
Tampa	24	72	12	16
West Palm Beach	29	71	19	10
Dayton	30	70	13	17
Pittsburgh	31	69	12	19
Charlotte, N.C.	32	68	14	18

(continued)

Question 27 (Continued)

e. Current amount of overtime being worked.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Columbus	32	46	38	15
Phoenix	32	46	54	0
Fort Lauderdale	35	44	50	6
Milwaukee	36	43	48	10
Austin Tower	37	42	42	16
Detroit	37	42	53	5
St. Louis TRACON	39	41	36	23
Newark	40	40	33	27
Sacramento	40	40	40	20
Salt Lake City TRACON	42	38	56	6
Windsor Locks, Conn.	42	38	54	8
Dallas-Love Tower	44	36	50	14
Houston	45	34	59	7
Ontario TRACON	46	33	62	5
Kennedy Tower, N.Y	47	31	69	0
Indianapolis	48	30	65	4
San Antonio	48	30	67	3
Seattle TRACON	50	28	64	8
Denver	51	27	60	13
Denver TRACON	51	27	68	5
Charlotte, N.C.	53	25	68	7
Tampa	54	24	73	2
Dallas-Ft. Worth TRACON	55	23	77	0
Dayton	56	22	65	13
Minneapolis	56	22	70	8
Hebron, Ky.	58	21	72	7
Jacksonville	59	20	70	10
Nashville	59	20	76	4
Lubbock	61	18	77	5
West Palm Beach	62	5	95	0

Question 27 (Continued)

e. Current amount of overtime being worked.

		Percentage of responses		
Center	Rank	Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Indianapolis	1	78	18	4
Washington, D.C.	2	77	13	10
Kansas City	3	72	23	5
Boston	4	71	18	11
Los Angeles	5	68	26	7
Salt Lake City	6	57	38	5
Jacksonville	7	55	34	11
New York	8	54	35	11
Atlanta	9	48	45	7
Chicago	10	44	49	7
Denver	11	43	50	6
Seattle	11	43	53	4
Memphis	13	42	50	8
Oakland	14	34	61	4
Miami	15	28	65	7
Cleveland	16	20	73	6
Fort Worth	17	17	82	1
Minneapolis	18	16	77	7
Houston	19	13	83	4
Albuquerque	20	9	89	2

Question 27 (Continued)

d. Current amount of traffic workload.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Burbank	1	100	0	0
Phoenix TRACON	2	97	0	3
Nashville	3	96	0	4
Washington National	4	94	3	3
Orlando	5	93	3	3
Los Angeles TRACON	6	92	3	5
Santa Ana, Calif.	6	92	4	4
Seattle TRACON	6	92	4	4
Dallas-Ft. Worth TRACON	9	90	8	2
New York TRACON	9	90	6	4
Ontario TRACON	9	90	10	0
Philadelphia	9	90	8	3
Baltimore-Washington	13	88	9	3
Charlotte, N.C.	14	86	14	0
Chicago O'Hare	14	86	14	0
Kennedy Tower, N.Y.	14	86	14	0
Oakland TRACON	14	86	9	5
Pensacola	14	86	14	0
Las Vegas	19	84	16	0
Dayton	20	83	17	0
LaGuardia Tower	21	82	18	0
Boston	22	81	16	3
Columbus	22	81	19	0
San Francisco	22	81	13	6
Tampa	22	81	14	5
Windsor Locks, Conn.	26	79	21	0
Phoenix	27	77	23	0
Houston	28	76	22	2
Edwards Air Force Base	29	75	8	17
Salt Lake City TRACON	29	75	19	6
Atlanta	31	74	25	2
Chicago TRACON	31	74	26	0

(continued)

Question 27 (Continued)

c. Current number of FPL controllers available.

		Percentage of responses		
Terminal	Rank	Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Indianapolis	33	74	13	13
Norfolk	33	74	7	19
Pensacola	35	72	17	10
Oklahoma City	36	71	10	19
Memphis	37	70	19	11
Phoenix TRACON	37	70	3	27
Detroit	39	69	5	26
Dulles Tower	40	68	11	21
New Orleans	41	67	17	17
Philadelphia	41	67	8	26
Denver TRACON	43	64	27	9
Fort Lauderdale	44	63	13	25
St. Louis TRACON	45	59	9	32
Los Angeles	46	57	29	14
Milwaukee	46	57	10	33
San Diego	46	57	14	29
Dallas-Ft. Worth TRACON	49	56	21	23
Newark	50	53	0	47
West Palm Beach	51	52	14	33
Cleveland	52	48	12	40
Nashville	52	48	28	24
Denver	54	47	20	33
Jacksonville	55	45	20	35
Lubbock	55	45	27	27
Tampa	57	42	5	53
Sacramento	58	36	28	36
Minneapolis	59	35	19	46
Austin Tower	60	32	37	32
Hebron, Ky.	61	31	17	52
Phoenix	61	31	15	54

Question 27 (Continued)

c. Current number of FPL controllers available.

Center	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Indianapolis	1	92	3	5
Washington, D.C.	2	90	4	6
Boston	3	85	6	9
Seattle	3	85	5	10
Los Angeles	5	82	9	9
New York	6	80	8	11
Atlanta	7	79	8	13
Denver	8	76	8	16
Jacksonville	8	76	10	14
Chicago	10	72	5	24
Salt Lake City	11	71	14	15
Kansas City	12	68	7	25
Miami	13	64	11	25
Memphis	14	63	13	24
Oakland	15	57	12	31
Fort Worth	16	46	25	29
Houston	17	39	25	36
Cleveland	18	38	22	41
Minneapolis	19	26	22	52
Albuquerque	20	19	27	54

Question 27 (Continued)

b. Current number of developmental controllers available.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
LaGuardia Tower	1	82	12	6
Ontario TRACON	2	81	10	10
Santa Ana, Calif.	3	77	15	8
Las Vegas	4	76	20	4
Oakland TRACON	5	74	9	16
Portland TRACON	6	72	28	0
Dallas-Love Tower	7	71	29	0
Houston	7	71	20	10
San Francisco	7	71	29	0
Boston	10	68	29	3
Edwards Air Force Base	11	67	25	8
San Antonio	11	67	13	20
Atlanta	13	64	15	21
Denver TRACON	13	64	36	0
Miami	15	62	24	14
Pittsburgh	15	62	38	0
Kennedy Tower, N.Y.	17	60	33	7
New York TRACON	17	60	35	6
Orlando	17	60	27	13
Phoenix TRACON	17	60	23	17
Oakland Tower	21	58	33	8
Oklahoma City	22	57	24	19
San Diego	22	57	19	24
Washington National	24	56	25	19
Baltimore-Washington	25	55	32	13
Burbank	25	55	20	25
Charlotte, N.C.	27	54	32	14
Columbus	27	54	19	27
Detroit	29	53	30	16
Indianapolis	30	52	35	13
Los Angeles TRACON	31	51	30	19
Norfolk	32	50	36	14

(continued)

Question 27 (Continued)

a. Current skill level of developmental controllers.

Terminal	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Lubbock	31	36	55	9
Boston	34	34	50	16
Edwards Air Force Base	35	33	42	25
Memphis	35	33	19	48
Oakland Tower	35	33	42	25
Austin Tower	38	32	42	26
Cleveland	38	32	36	32
Baltimore-Washington	40	31	34	34
Fort Lauderdale	40	31	38	31
Phoenix	40	31	38	31
Salt Lake City TRACON	40	31	38	31
Chicago TRACON	44	29	40	31
Oklahoma City	44	29	43	29
Windsor Locks, Conn.	44	29	42	29
Nashville	47	28	20	52
Portland TRACON	47	28	33	39
Minneapolis	49	27	27	46
Indianapolis	50	26	39	35
Charlotte, N.C.	51	25	32	43
Dulles Tower	51	25	25	50
Hebron, Ky.	53	24	21	55
Sacramento	53	24	36	40
West Palm Beach	53	24	48	29
St. Louis TRACON	56	23	41	36
Washington National	57	22	28	50
Tampa	58	21	21	57
Newark	59	20	27	53
Jacksonville	60	15	45	40
Kansas City	61	14	43	43
Milwaukee	62	10	48	43

Question 27

a. Current skill level of developmental controllers.

Center	Rank	Percentage of responses: Somewhat or strongly hinders	No impact	Somewhat or strongly helps
Chicago	1	69	16	16
Miami	2	64	19	17
Atlanta	3	63	17	20
Los Angeles	4	61	21	18
Cleveland	5	60	27	13
Kansas City	6	59	24	18
Oakland	6	59	29	12
Indianapolis	8	56	24	20
New York	8	56	24	20
Boston	10	55	32	13
Jacksonville	11	54	33	13
Memphis	11	54	24	22
Seattle	13	51	28	21
Denver	14	48	32	21
Washington, D.C.	15	46	28	26
Salt Lake City	16	45	32	23
Fort Worth	17	43	30	27
Houston	18	36	40	23
Albuquerque	19	28	38	35
Minneapolis	20	21	46	34

Question 26 (Continued)

Rating of system safety.

Terminal	Rank	Percentage of responses: Poor or very poor	Adequate	Good or excellent
Cleveland	34	12	36	52
Dallas-Ft. Worth TRACON	34	12	35	54
Houston	34	12	32	56
Nashville	34	12	28	60
New Orleans	34	12	18	71
Charlotte, N.C.	39	11	46	43
Norfolk	39	11	46	43
Hebron, Ky.	41	10	31	59
Lubbock	41	10	15	75
Baltimore-Washington	43	9	53	38
Chicago O'Hare	43	9	18	73
Milwaukee	43	9	26	65
Oakland TRACON	43	9	42	49
St. Louis TRACON	43	9	14	77
Atlanta	48	8	49	43
Oakland Tower	48	8	33	58
Kennedy Tower, N.Y.	50	7	33	60
Chicago TRACON	51	6	49	46
Fort Lauderdale	51	6	19	75
LaGuardia Tower	51	6	41	53
San Francisco	51	6	47	47
Austin Tower	55	5	47	47
Jacksonville	55	5	30	65
Minneapolis	55	5	22	73
West Palm Beach	55	5	43	52
Indianapolis	59	4	35	61
Kansas City	60	0	38	62
Salt Lake City TRACON	60	0	63	38
Sacramento	60	0	40	60

Question 26 (Continued)

Rating of system safety.

Center	Rank	Percentage of responses		
		Poor or very poor	Adequate	Good or excellent
Washington, D.C.	1	37	40	23
Boston	2	28	50	21
Indianapolis	3	26	32	42
Los Angeles	4	23	32	45
New York	5	22	44	35
Atlanta	6	20	46	34
Kansas City	7	18	37	44
Denver	8	16	38	47
Jacksonville	8	16	42	42
Miami	10	14	32	54
Oakland	10	14	30	55
Albuquerque	12	12	26	62
Chicago	12	12	41	47
Cleveland	14	10	33	56
Houston	15	8	25	6
Memphis	15	8	33	5
Salt Lake City	15	8	41	5
Seattle	15	8	43	4
Fort Worth	19	7	27	6
Minneapolis	20	4	24	7

Question 21 (Continued)

Sufficiency of training involving live traffic.

Terminal	Rank	Percentage of responses: Probably or definitely not	Uncertain	Probably or definitely yes
Washington National	32	20	6	74
West Palm Beach	32	20	15	65
Charlotte, N.C.	35	19	19	63
Memphis	35	19	4	78
Cleveland	37	16	0	84
Nashville	37	16	20	64
Sacramento	37	16	4	80
Chicago TRACON	40	15	9	76
Newark	40	15	0	85
Phoenix	40	15	8	77
Boston	43	14	8	78
Dallas-Ft. Worth TRACON	43	14	0	86
Orlando	43	14	10	76
St. Louis TRACON	43	14	5	82
Denver	47	13	7	80
Milwaukee	47	13	13	74
Santa Ana, Calif.	47	13	0	88
Windsor Locks, Conn.	47	13	4	83
Oakland TRACON	51	12	12	77
Portland TRACON	51	12	6	82
Tampa	51	12	10	78
San Diego	54	11	5	84
Baltimore-Washington	55	10	13	77
Indianapolis	55	10	14	76
Jacksonville	55	10	5	85
Hebron, Ky.	58	7	3	90
Salt Lake City TRACON	58	7	7	87
Fort Lauderdale	60	6	13	81
LaGuardia Tower	60	6	6	88
New Orleans	60	6	0	94

Question 21

Do you believe developmental controllers are provided with sufficient training involving live traffic before being certified on a position?

Center	Rank	Percentage of responses		
		Probably or definitely not	Uncertain	Probably or definitely yes
Kansas City	1	50	10	41
Boston	2	49	10	40
Chicago	3	47	11	42
Salt Lake City	4	46	8	45
Jacksonville	5	45	11	44
New York	5	45	6	49
Indianapolis	7	42	8	51
Washington, D.C.	8	38	3	59
Cleveland	9	35	11	54
Oakland	9	35	10	55
Memphis	11	33	13	54
Atlanta	12	32	12	56
Denver	13	31	12	57
Fort Worth	13	31	6	63
Miami	15	30	11	59
Los Angeles	16	27	12	61
Houston	17	23	14	63
Minneapolis	17	23	6	71
Seattle	19	22	7	71
Albuquerque	20	19	3	78

Question 20 (Continued)

Quality of on-the-job training.

Terminal	Rank	Percentage of responses: Poor or very poor	Adequate	Good or excellent
Chicago O'Hare	1	55	35	10
Dayton	2	52	43	4
New Orleans	3	50	33	17
Kennedy Tower, N.Y.	4	40	40	20
Houston	5	39	39	22
Atlanta	6	38	23	38
Pittsburgh	6	38	38	23
Austin Tower	8	37	42	21
Detroit	8	37	51	12
Los Angeles	10	36	43	21
Oakland Tower	10	36	45	18
Jacksonville	12	35	25	40
West Palm Beach	12	35	35	30
San Antonio	14	33	50	17
Miami	15	32	34	34
Norfolk	15	32	61	7
Phoenix	17	31	31	38
Washington National	17	31	40	29
Burbank	19	30	50	20
Indianapolis	20	29	48	24
Seattle TRACON	20	29	33	38
Dulles Tower	22	28	55	17
Las Vegas	22	28	44	28
Philadelphia	22	28	49	23
New York TRACON	25	27	36	37
Charlotte, N.C.	26	26	26	48
Edwards Air Force Base	27	25	50	25
Kansas City	28	24	29	48
Portland TRACON	28	24	29	47
San Francisco	28	24	59	18
Denver TRACON	31	23	45	32
Milwaukee	32	22	61	17

(continued)

Question 20

Overall, how do you rate the quality of on-the-job training (OJT) that developmentals currently receive at your facility?

Table I.7: Poor Overall Quality of Developmental OJT

Percentage of controllers' response at a facility	Number of facilities	
	Center	Terminal
60 to 100	0	0
50 to 59	1	3
40 to 49	1	1
30 to 39	9	15
20 to 29	7	21
10 to 19	2	15
1 to 9	0	7
Total	**20**	**62**

Question 19 (Continued)

j. Flow control procedures.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Detroit	1	69	23	8
Charlotte, N.C.	2	63	26	11
Phoenix TRACON	3	61	25	14
Dallas-Ft. Worth TRACON	4	60	30	10
Seattle TRACON	4	60	20	20
New York TRACON	6	59	28	13
Salt Lake City TRACON	7	57	21	21
Orlando	8	56	22	22
Houston	9	54	24	22
Dulles Tower	10	52	38	10
Kennedy Tower, N.Y.	11	50	36	14
Denver TRACON	12	48	43	10
Sacramento	13	46	21	33
Atlanta	14	43	35	22
Dallas-Love Tower	14	43	57	0
Chicago TRACON	16	42	30	27
Miami	17	41	36	23
Baltimore-Washington	18	40	40	20
St. Louis TRACON	18	40	30	30
Oakland TRACON	20	38	40	23
San Francisco	20	38	31	31
Las Vegas	22	36	28	36
Pensacola	22	36	27	36
Philadelphia	22	36	50	14
Memphis	25	35	43	22
Washington National	26	34	38	28
Norfolk	27	33	48	19
Phoenix	27	33	25	42
Tampa	27	33	43	25
Boston	30	32	38	29
Jacksonville	30	32	42	26
Kansas City	32	30	50	20

(continued)

Question 19 (Continued)

i. Phraseology.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Tampa	32	12	51	37
Jacksonville	34	11	21	68
New Orleans	34	11	56	33
Norfolk	34	11	64	25
Orlando	34	11	61	29
San Diego	34	11	42	47
Indianapolis	39	10	45	45
Miami	39	10	32	59
Windsor Locks, Conn.	41	9	57	35
Boston	42	8	25	67
Minneapolis	42	8	22	69
Nashville	42	8	48	44
Newark	42	8	23	69
Sacramento	42	8	50	42
Charlotte, N.C.	47	7	41	52
Hebron, Ky.	47	7	24	69
Salt Lake City TRACON	47	7	7	87
LaGuardia Tower	50	6	25	69
Portland TRACON	50	6	59	35
Denver TRACON	52	5	32	64
Oakland TRACON	52	5	28	67
Ontario TRACON	52	5	20	75
West Palm Beach	52	5	60	35
Milwaukee	56	4	30	65
Pensacola	56	4	40	56
Baltimore-Washington	58	3	58	39
Austin Tower	59	0	67	33
Los Angeles	59	0	29	71
Los Angeles TRACON	59	0	26	74

Question 19 (Continued)

i. Phraseology.

Center	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Fort Worth	1	30	34	36
Cleveland	2	27	41	33
Chicago	3	25	40	35
Denver	3	25	27	48
Kansas City	5	21	46	33
Washington, D.C.	5	21	44	35
Atlanta	7	20	41	39
Boston	8	19	52	29
New York	8	19	38	43
Salt Lake City	8	19	44	37
Indianapolis	11	18	42	40
Jacksonville	12	17	44	40
Memphis	12	17	39	44
Oakland	14	16	40	44
Houston	15	15	38	47
Albuquerque	16	14	32	54
Miami	16	14	47	39
Seattle	16	14	40	46
Los Angeles	19	6	42	52
Minneapolis	20	5	38	57

Question 19 (Continued)

h. Control techniques.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Dayton	1	57	35	9
Detroit	2	45	33	23
Denver TRACON	3	41	36	23
West Palm Beach	4	40	25	35
Houston	5	37	39	24
San Diego	5	37	42	21
Pittsburgh	7	35	38	27
New Orleans	8	33	50	17
Atlanta	9	32	26	42
Philadelphia	9	32	42	26
Phoenix	11	31	31	38
Dallas-Love Tower	12	29	64	7
Los Angeles	12	29	36	36
Miami	12	29	32	39
Pensacola	12	29	42	29
Sacramento	12	29	38	33
Chicago O'Hare	17	28	28	44
Dulles Tower	17	28	34	38
Las Vegas	17	28	28	44
Seattle TRACON	17	28	28	44
Edwards Air Force Base	21	27	55	18
Washington National	22	26	20	54
Boston	23	25	36	39
Burbank	23	25	30	45
San Francisco	23	25	25	50
Cleveland	26	24	24	52
Kansas City	26	24	48	29
New York TRACON	26	24	34	42
Portland TRACON	26	24	47	29
Santa Ana, Calif.	26	24	16	60
Charlotte, N.C.	31	23	42	35
Newark	31	23	46	31

(continued)

Question 19 (Continued)

g. Direct routings (expediting traffic).

Terminal	Rank	Percentage of responses		
		Less than adequate or poor	Adequate	Good or excellent
Denver	30	25	50	25
Kansas City	30	25	50	25
Newark	30	25	25	50
Sacramento	30	25	46	29
Cleveland	37	24	52	24
Hebron, Ky.	37	24	55	21
New Orleans	37	24	35	41
Santa Ana, Calif.	37	24	40	36
Windsor Locks, Conn.	37	24	71	5
Chicago TRACON	42	23	45	32
Los Angeles TRACON	42	23	40	37
New York TRACON	44	22	46	33
Norfolk	45	21	61	18
San Francisco	45	21	36	43
Orlando	47	20	64	16
Indianapolis	48	19	71	10
Memphis	48	19	50	31
San Diego	50	18	71	12
Oakland TRACON	51	17	51	32
Columbus	52	16	56	28
Dallas-Ft. Worth TRACON	52	16	51	33
Oklahoma City	52	16	47	37
Ontario TRACON	55	15	60	25
Washington National	55	15	56	29
Portland TRACON	57	13	75	13
Lubbock	58	11	74	16
LaGuardia Tower	59	7	29	64
St. Louis TRACON	60	5	47	47

Question 19 (Continued)

g. Direct routings (expediting traffic).

Center	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Boston	1	42	43	15
Atlanta	2	41	35	24
Washington, D.C.	3	39	50	11
Denver	4	34	38	28
Kansas City	5	31	42	28
Chicago	6	28	38	34
Cleveland	7	27	48	25
Fort Worth	7	27	46	26
Jacksonville	7	27	50	24
New York	7	27	50	23
Oakland	7	27	46	27
Salt Lake City	7	27	39	34
Indianapolis	13	26	47	27
Seattle	14	24	45	31
Memphis	15	23	57	21
Minneapolis	15	23	33	44
Los Angeles	17	21	44	35
Miami	17	21	55	24
Houston	19	17	61	21
Albuquerque	20	14	36	50

Question 19 (Continued)

f. Operational characteristics of types of aircraft.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Milwaukee	1	59	41	0
Los Angeles	2	57	29	14
Las Vegas	3	56	16	28
New York TRACON	4	55	24	21
Detroit	5	53	30	18
Edwards Air Force Base	6	50	50	0
Seattle TRACON	6	50	23	27
Dayton	8	48	39	13
Indianapolis	9	47	37	16
Kennedy Tower, N.Y.	9	47	27	27
Salt Lake City TRACON	9	47	27	27
Orlando	12	46	32	21
Tampa	13	44	34	22
Columbus	14	42	35	23
Jacksonville	14	42	32	26
Denver TRACON	16	41	50	9
Houston	16	41	33	26
Pensacola	18	40	32	28
San Antonio	18	40	33	27
Austin Tower	20	39	44	17
Lubbock	20	39	39	22
Phoenix TRACON	20	39	50	11
Dulles Tower	23	38	38	24
Hebron, Ky.	23	38	45	17
Newark	23	38	38	23
Philadelphia	23	38	41	21
Phoenix	23	38	31	31
Sacramento	23	38	42	21
San Francisco	23	38	31	31
Chicago O'Hare	30	37	47	16
San Diego	30	37	58	5
Denver	32	36	29	36

(continued)

Question 19 (Continued)

e. Holding patterns.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Orlando	31	61	36	4
San Antonio	31	61	36	4
Seattle TRACON	31	61	33	6
Fort Lauderdale	36	60	20	20
Columbus	37	57	30	13
Baltimore-Washington	38	55	35	10
Sacramento	38	55	40	5
Minneapolis	40	54	38	8
Oakland TRACON	40	54	38	8
Lubbock	42	53	35	12
Ontario TRACON	42	53	37	11
West Palm Beach	42	53	42	5
Windsor Locks, Conn.	45	52	39	9
Edwards Air Force Base	46	50	42	8
Portland TRACON	47	47	35	18
St. Louis TRACON	48	42	47	11
Chicago TRACON	49	41	22	38
Pensacola	50	39	48	13
Philadelphia	51	38	44	18
Jacksonville	52	33	61	6
Newark	53	25	50	25

Question 19 (Continued)

e. Holding patterns.

Center	Rank	Percentage of responses		
		Less than adequate or poor	Adequate	Good or excellent
Los Angeles	1	77	17	6
Miami	2	74	24	2
Jacksonville	3	73	23	4
Albuquerque	4	66	29	6
Salt Lake City	5	65	24	11
Indianapolis	6	60	37	3
Fort Worth	7	58	35	7
Houston	7	58	35	6
Washington, D.C.	7	58	34	8
Memphis	10	56	38	6
Boston	11	48	37	15
Cleveland	12	47	36	16
Kansas City	13	44	39	17
New York	13	44	37	19
Seattle	13	44	43	12
Atlanta	16	43	37	20
Chicago	16	43	36	20
Denver	18	41	35	24
Oakland	19	36	42	22
Minneapolis	20	35	43	22

Question 19 (Continued)

d. Handling heavy traffic.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
San Francisco	1	56	6	38
Edwards Air Force Base	2	50	42	8
New Orleans	2	50	39	11
San Antonio	2	50	30	20
Dayton	5	48	43	9
Phoenix	6	46	8	46
Lubbock	7	45	40	15
Austin Tower	8	44	33	22
San Diego	9	42	47	11
Oklahoma City	10	40	45	15
Houston	11	39	34	27
Detroit	12	38	33	30
Los Angeles	13	36	29	36
Norfolk	13	36	32	32
Phoenix TRACON	13	36	36	29
Burbank	16	35	25	40
Ontario TRACON	16	35	20	45
Portland TRACON	16	35	41	24
Indianapolis	19	33	48	19
Newark	19	33	25	42
Columbus	21	32	40	28
Orlando	21	32	36	32
Pittsburgh	21	32	32	36
Seattle TRACON	21	32	24	44
Dulles Tower	25	31	34	34
New York TRACON	25	31	27	42
Charlotte, N.C.	27	30	19	52
Milwaukee	27	30	43	26
Windsor Locks, Conn.	27	30	26	43
Dallas-Love Tower	30	29	57	14
Kansas City	30	29	33	38
Sacramento	30	29	33	38

(continued)

Question 19 (Continued)

c. Emergency procedures.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Dallas-Ft. Worth TRACON	33	49	39	12
Columbus	34	48	40	12
Houston	34	48	38	15
Sacramento	34	48	30	22
Oakland TRACON	37	47	33	21
San Diego	37	47	42	11
Newark	39	46	15	38
Norfolk	39	46	43	11
Fort Lauderdale	41	44	31	25
Pensacola	41	44	40	16
Philadelphia	41	44	49	8
Kennedy Tower, N.Y	44	40	47	13
Oklahoma City	44	40	50	10
San Francisco	44	40	53	7
New Orleans	47	39	44	17
Orlando	47	39	50	11
Charlotte, N.C.	49	38	50	12
Dallas-Love Tower	50	36	64	0
Minneapolis	50	36	47	17
West Palm Beach	52	35	55	10
St. Louis TRACON	53	33	52	14
Lubbock	54	30	60	10
Tampa	54	30	50	20
Windsor Locks, Conn.	54	30	65	4
Miami	57	29	54	17
Nashville	58	28	48	24
San Antonio	59	27	67	7
Santa Ana, Calif.	60	24	28	48
Jacksonville	61	21	74	5

Question 19 (Continued)

c. Emergency procedures.

Center	Rank	Percentage of responses		
		Less than adequate or poor	Adequate	Good or excellent
Indianapolis	1	71	21	7
Oakland	2	70	24	7
New York	3	68	21	11
Kansas City	4	66	25	9
Salt Lake City	4	66	26	8
Washington, D.C.	6	65	30	5
Atlanta	7	64	27	10
Boston	7	64	28	8
Chicago	9	62	32	6
Cleveland	9	62	31	7
Fort Worth	11	60	31	9
Houston	12	58	31	11
Los Angeles	13	57	34	9
Denver	14	56	36	8
Jacksonville	14	56	36	8
Minneapolis	16	52	38	10
Seattle	17	51	40	10
Memphis	18	50	42	8
Albuquerque	19	47	37	16
Miami	20	43	46	10

Question 19 (Continued)

b. Controlling traffic in bad weather.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Chicago O'Hare	1	89	5	5
Dayton	2	83	13	4
Phoenix	3	77	15	8
Edwards Air Force Base	4	75	25	0
Lubbock	5	70	20	10
Phoenix TRACON	5	70	26	4
San Francisco	7	69	19	13
Cleveland	8	68	16	16
Detroit	8	68	30	3
Milwaukee	10	65	26	9
Las Vegas	11	64	32	4
Baltimore-Washington	12	58	29	13
Denver	13	57	29	14
Los Angeles	13	57	14	29
Fort Lauderdale	15	56	31	13
Indianapolis	16	55	40	5
Los Angeles TRACON	16	55	24	21
Orlando	18	54	25	21
Pittsburgh	18	54	35	12
Salt Lake City TRACON	20	53	33	13
Columbus	21	52	24	24
Hebron, Ky.	21	52	34	14
New York TRACON	23	51	32	17
Austin Tower	24	50	44	6
Burbank	24	50	35	15
Dallas-Love Tower	24	50	50	0
Denver TRACON	24	50	32	18
Philadelphia	28	49	44	8
Dulles Tower	29	48	48	3
Houston	29	48	35	18
Atlanta	31	47	31	22
Newark	32	46	15	38

(continued)

Question 19 (Continued)

a. Using backup systems.

Terminal	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Charlotte, N.C.	33	54	35	12
Oklahoma City	34	53	37	11
Cleveland	35	52	36	12
Sacramento	35	52	35	13
Tampa	37	51	36	13
Houston	38	50	42	8
Minneapolis	38	50	41	9
Columbus	40	48	36	16
Norfolk	40	48	41	11
Portland TRACON	42	47	41	12
San Antonio	43	46	39	14
Atlanta	44	45	37	18
Chicago TRACON	44	45	52	3
Indianapolis	44	45	45	10
Chicago O'Hare	47	44	39	17
Philadelphia	47	44	46	10
Dallas-Love Tower	49	43	50	7
Denver	49	43	50	7
New York TRACON	49	43	39	18
LaGuardia Tower	52	40	47	13
Pensacola	53	39	61	0
Dallas-Ft. Worth TRACON	54	38	38	24
Newark	54	38	31	31
Santa Ana, Calif.	54	38	33	29
Nashville	57	32	48	20
Orlando	57	32	54	14
Boston	59	31	43	26
St. Louis TRACON	60	30	55	15
Fort Lauderdale	61	19	63	19

Question 19 (Continued)

a. Using backup systems.

Center	Rank	Percentage of responses: Less than adequate or poor	Adequate	Good or excellent
Boston	1	77	19	4
Houston	2	74	18	8
Miami	3	73	21	6
Atlanta	4	72	22	6
Oakland	4	72	27	1
Indianapolis	6	71	20	9
New York	6	71	20	9
Chicago	8	69	28	4
Washington, D.C.	8	69	28	3
Jacksonville	10	67	26	7
Los Angeles	10	67	23	11
Seattle	12	63	27	9
Salt Lake City	13	59	38	4
Cleveland	14	58	30	12
Fort Worth	14	58	32	10
Kansas City	14	58	34	8
Albuquerque	17	56	33	11
Denver	18	53	35	12
Memphis	19	47	38	15
Minneapolis	20	46	38	16

Question 17 (Continued)

Facility overtime situation.

Terminal	Rank[b]	Percentage of responses[a] Too much overtime	Too little overtime	Overtime appropriate/no overtime needed
San Antonio	31	4	64	29
Minneapolis	33	3	42	56
Tampa	33	3	50	45
Austin Tower	35	0	72	22
Cleveland	35	0	71	29
Columbus	35	0	76	20
Dallas-Ft. Worth TRACON	35	0	55	41
Dallas-Love Tower	35	0	64	36
Denver	35	0	57	29
Denver TRACON	35	0	59	36
Edwards Air Force Base	35	0	64	36
Fort Lauderdale	35	0	60	33
Hebron, Ky.	35	0	38	62
Houston	35	0	68	29
Indianapolis	35	0	61	39
Jacksonville	35	0	50	45
Kansas City	35	0	55	35
LaGuardia Tower	35	0	88	0
Lubbock	35	0	35	55
Miami	35	0	93	7
Milwaukee	35	0	68	27
New Orleans	35	0	72	22
Norfolk	35	0	93	7
Oklahoma City	35	0	80	15
Ontario TRACON	35	0	79	21
Phoenix	35	0	23	69
Portland TRACON	35	0	65	29
Salt Lake City TRACON	35	0	25	56
Seattle TRACON	35	0	69	23
Washington National	35	0	65	10
West Palm Beach	35	0	19	81

[a]Totals do not add to 100 percent since "other" responses are not shown.

[b]Ranking based on "too much overtime."

Question 17

Which of the following best describes the current situation in regard to overtime at your facility?

		Percentage of responses		
Center	Rank[b]	Too much overtime	Too little overtime	Overtime appropriate/no overtime needed
Kansas City	1	55	27	12
Los Angeles	2	47	32	17
Washington, D.C.	3	46	36	4
Boston	4	40	30	22
Indianapolis	5	31	57	3
Oakland	6	20	22	49
New York	7	15	61	12
Jacksonville	8	11	54	19
Chicago	9	8	61	23
Atlanta	10	7	69	21
Memphis	11	6	57	34
Cleveland	12	3	53	41
Minneapolis	13	2	39	53
Miami	14	1	64	34
Albuquerque	15	0	30	65
Denver	15	0	75	17
Fort Worth	15	0	43	53
Houston	15	0	39	52
Salt Lake City	15	0	91	5
Seattle	15	0	82	13

[a]Totals do not add to 100 percent since "other" responses are not shown.

[b]Ranking based on "too much overtime."

Question 17 (Continued)

Facility overtime situation.

Terminal	Rank[b]	Percentage of responses[a]		
		Too little overtime	Too much overtime	Overtime appropriate/no overtime needed
Miami	1	93	0	7
Norfolk	1	93	0	7
LaGuardia Tower	3	88	0	0
Oklahoma City	4	80	0	15
Pittsburgh	4	80	8	4
Ontario TRACON	6	79	0	21
Newark	7	77	8	15
Columbus	8	76	0	20
Charlotte, N.C.	9	74	11	15
Austin Tower	10	72	0	22
New Orleans	10	72	0	22
Cleveland	12	71	0	29
Philadelphia	12	71	13	13
Orlando	14	69	7	17
Seattle TRACON	14	69	0	23
Houston	16	68	0	29
Milwaukee	16	68	0	27
Kennedy Tower, N.Y.	18	67	7	20
Portland TRACON	19	65	0	29
Washington National	19	65	0	10
Dallas-Love Tower	21	64	0	36
Edwards Air Force Base	21	64	0	36
San Antonio	21	64	4	29
Indianapolis	24	61	0	39
Fort Lauderdale	25	60	0	33
St. Louis TRACON	25	60	5	25
Denver TRACON	27	59	0	36
Denver	28	57	0	29
Dallas-Ft. Worth TRACON	29	55	0	41
Kansas City	29	55	0	35
Dayton	31	52	4	26

(continued)

Overtime

Question 17

Which of the following best describes the current situation in regard to overtime at your facility?

Table I.5: Overtime Assigned

View: Facility overtime

Percentage of controllers' response at a facility	Too little overtime		Too much overtime	
	Number of facilities		Number of facilities	
	Center	Terminal	Center	Terminal
100	0	0	0	0
90 to 99	1	2	0	3
80 to 89	1	3	0	1
70 to 79	1	8	0	3
60 to 69	4	13	0	2
50 to 59	4	9	1	2
40 to 49	1	5	3	3
30 to 39	6	5	1	1
20 to 29	2	4	1	3
10 to 19	0	3	2	5
1 to 9	0	8	6	11
0	0	2	6	28
Total	**20**	**62**	**20**	**62**

Question 12 (Continued)

Too few developmental controllers to meet future needs.

Terminal	Rank	Percentage of responses		
		Somewhat or much too few	Appropriate number	Somewhat or much too many
Phoenix TRACON	1	100	0	0
Ontario TRACON	2	95	5	0
LaGuardia Tower	3	94	6	0
Portland TRACON	3	94	6	0
Dallas-Love Tower	5	93	7	0
Miami	5	93	7	0
Oakland TRACON	5	93	2	5
Columbus	8	92	4	4
Oakland Tower	8	92	8	0
Baltimore-Washington	10	91	9	0
San Diego	11	90	10	0
Boston	12	89	8	3
Washington National	12	89	8	3
Indianapolis	14	87	13	0
Denver TRACON	15	86	14	0
Atlanta	16	85	13	2
Santa Ana, Calif.	16	85	12	4
Las Vegas	18	84	16	0
Edwards Air Force Base	19	83	17	0
Houston	19	83	15	2
Orlando	19	83	13	3
San Antonio	19	83	17	0
San Francisco	23	82	18	0
Pittsburgh	24	81	15	4
Salt Lake City TRACON	24	81	19	0
Kennedy Tower, N.Y.	26	80	20	0
Dayton	27	78	22	0
Seattle TRACON	27	78	22	0
Dulles Tower	29	76	24	0
Oklahoma City	29	76	24	0
Burbank	31	75	25	0
Charlotte, N.C.	31	75	25	0

(continued)

Question 12

In your opinion, do you currently have too many, too few, or an appropriate number of developmental controllers to meet future controller needs? If you work at an en route center, answer for your area of specialization; if you work at a terminal, answer for your schedule.

Table I.4: Too Few Developmental Controllers to Meet Future Needs

View: Too few developmental controllers		
Percentage of controllers' response at a facility	Number of facilities	
	Center	Terminal
100	0	1
90 to 99	0	10
80 to 89	4	15
70 to 79	5	13
60 to 69	5	8
50 to 59	1	5
40 to 49	2	2
30 to 39	3	4
20 to 29	0	3
10 to 19	0	0
1 to 9	0	1
Total	**20**	**62**

Question 11.B (Continued)

Current number of FPLs.

Terminal	Rank	Percentage of responses: Somewhat or much lower than needed	Appropriate number	Somewhat or much higher than needed
Baltimore-Washington	1	100	0	0
Boston	1	100	0	0
Burbank	1	100	0	0
Charlotte, N.C.	1	100	0	0
Dallas-Love Tower	1	100	0	0
Kennedy Tower, N.Y.	1	100	0	0
LaGuardia Tower	1	100	0	0
Las Vegas	1	100	0	0
Memphis	1	100	0	0
Oakland TRACON	1	100	0	0
Oklahoma City	1	100	0	0
Salt Lake City TRACON	1	100	0	0
San Francisco	1	100	0	0
Santa Ana, Calif.	1	100	0	0
Washington National	1	100	0	0
Miami	16	98	2	0
New York TRACON	16	98	2	0
Chicago TRACON	18	97	0	3
Orlando	18	97	3	0
Philadelphia	18	97	3	0
Phoenix TRACON	18	97	3	0
San Antonio	18	97	3	0
Atlanta	23	96	2	2
Norfolk	23	96	4	0
Pittsburgh	23	96	4	0
Windsor Locks, Conn.	23	96	4	0
Chicago O'Hare	27	95	5	0
Los Angeles TRACON	27	95	0	5
Ontario TRACON	27	95	5	0
New Orleans	30	94	6	0
Portland TRACON	30	94	6	0
Newark	32	93	7	0

(continued)

Staffing

Question 11.B

In your opinion, is the current number of . . . FPLs (full performance level controllers) . . . higher than needed, lower than needed, or at the appropriate level? If you work at a center, answer for your area of specialization; if you work at a terminal, answer for your schedule.

Table I.3: Too Few FPLs

View: number of FPLs too low		
Percentage of controllers' response at a facility	**Number of facilities**	
	Center	**Terminal**
100	2	15
90 to 99	10	24
80 to 89	3	8
70 to 79	1	6
60 to 69	2	2
50 to 59	0	3
40 to 49	1	2
30 to 39	1	2
1 to 29	0	0
Total	**20**	**62**

Question 9 (Continued)

Working without a break.

Terminal	Rank	Percentage of responses		
		Somewhat or much too long	Appropriate	Somewhat or much too short
Boston	1	95	5	0
Chicago O'Hare	2	91	9	0
Santa Ana, Calif.	3	88	12	0
Kennedy Tower, N.Y.	4	87	13	0
Oakland TRACON	5	86	14	0
LaGuardia Tower	6	82	12	6
Ontario TRACON	7	80	20	0
Miami	8	79	17	5
Chicago TRACON	9	77	23	0
Philadelphia	10	76	24	0
Atlanta	11	75	25	0
Orlando	12	73	27	0
Phoenix TRACON	12	73	27	0
Baltimore-Washington	14	72	28	0
San Francisco	15	71	29	0
New York TRACON	16	70	30	0
Salt Lake City TRACON	17	69	31	0
Columbus	18	68	32	0
Los Angeles TRACON	19	66	34	0
Nashville	20	64	36	0
Washington National	20	64	36	0
Seattle TRACON	22	63	37	0
Los Angeles	23	62	38	0
Dayton	24	61	39	0
Burbank	25	60	40	0
Jacksonville	25	60	40	0
Newark	25	60	40	0
Dulles Tower	28	59	34	7
Pensacola	29	55	45	0
Phoenix	30	54	46	0
Windsor Locks, Conn.	30	54	46	0
Cleveland	32	52	48	0

(continued)

Question 9

Do you believe the amount of time you are typically required to continuously work a position without a break during peak periods is too long, too short, or appropriate?

Table I.2: Working Too Long During Peak Periods

View: working too long on position		
Percentage of controllers' response at a facility	Number of facilities	
	Center	Terminal
100	0	0
90 to 99	0	2
80 to 89	3	5
70 to 79	3	9
60 to 69	6	11
50 to 59	3	9
40 to 49	1	8
30 to 39	1	11
20 to 29	3	5
10 to 19	0	1
1 to 9	0	1
Total	**20**	**62**

Question 2 (Continued)

Amount of traffic handled.

Terminal	Rank	Percentage of responses: Somewhat or much more traffic	Appropriate level of traffic	Somewhat or much less traffic
Orlando	1	97	3	0
Phoenix TRACON	2	90	10	0
Seattle TRACON	3	89	11	0
Washington National	3	89	8	3
Baltimore-Washington	5	88	13	0
LaGuardia Tower	5	88	12	0
New York TRACON	7	86	14	0
Ontario TRACON	7	86	14	0
Santa Ana, Calif.	9	85	15	0
Philadelphia	10	82	18	0
Burbank	11	80	20	0
Chicago TRACON	11	80	17	3
Charlotte, N.C.	13	79	18	4
Las Vegas	13	79	21	0
Los Angeles TRACON	13	79	21	0
Tampa	16	77	23	0
Miami	17	76	21	2
Pensacola	17	76	24	0
Dallas-Ft. Worth TRACON	19	75	25	0
Edwards Air Force Base	19	75	25	0
Salt Lake City TRACON	19	75	19	6
Nashville	22	72	28	0
Oakland TRACON	22	72	28	0
Portland TRACON	22	72	28	0
Columbus	25	69	31	0
Phoenix	25	69	31	0
Boston	27	68	29	3
Norfolk	27	68	32	0
Windsor Locks, Conn.	27	68	32	0
Kennedy Tower, N.Y.	30	67	33	0
West Palm Beach	30	67	33	0
Dulles Tower	32	66	31	3

(continued)

Distribution and Ranking of FAA Facilities by Controller Responses to Selected Air Traffic Control Survey Questions

Workload

Question 2

Consider the complexity of the sectors you work and your capabilities as a controller. While working radar during typical daily peak periods, do you believe you are typically required to handle more traffic than you should be handling, less traffic than you should be handling, or an appropriate amount of traffic?

Table I.1: Handling Too Much Traffic During Peak Periods

View: handling too much traffic		
Percentage of controllers' response at a facility	Number of facilities	
	Center	Terminal
100	0	0
90 to 99	0	2
80 to 89	5	10
70 to 79	3	12
60 to 69	5	14
50 to 59	3	7
40 to 49	1	8
30 to 39	3	4
20 to 29	0	3
10 to 19	0	2
1 to 9	0	0
Total	**20**	**62**

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workload, and morale. Also, FAA conducted a 1988 survey of all its personnel, including air traffic controllers.

In June 1989, we briefed over 100 managers of the busiest air traffic facilities on controller work force concerns. FAA requested, and we agreed to separately provide each facility manager (1) the complete controller survey results of their respective facilities and (2) a report that provides a broader comparative perspective showing how controllers at individual facilities viewed their working conditions, training, safety, and morale. According to Air Traffic headquarters' officials, FAA plans to use our data, along with its own survey and operational data, to analyze controllers' responses and address controllers' concerns.

Conclusions

There is a growing recognition by FAA of the need to more fully understand the unique concerns and conditions existing at FAA's largest air traffic control facilities. Our results demonstrate the diversity of views and provide a basis for FAA to address controllers' concerns at specific facilities. When used with operating and site-specific technical data available to FAA, the controllers' views can supplement the information already known to more fully identify both facility and system problems. As noted, FAA plans to use our data, along with its own survey and operational data, to address controller concerns.

Objective, Scope, and Methodology

Our objective was to rank, in order, the largest air traffic facilities on the basis of controller views of their working conditions, training, safety, and morale. To accomplish this, we identified 27 questions, in 6 areas (workload, staffing, overtime, training, system safety, and morale), which we believe provide a comprehensive cross section of controllers' perceptions. We collapsed the percentage responses to each question into three categories: negative, positive, and neutral. Using the percentages from the negative category, we ranked the facilities by ordering them from highest (most negative) to lowest (least negative).

To provide a broader facility perspective of how controllers viewed all six areas of concern, we used a mathematical technique called "cluster analysis" to create most negative and least negative facility groups. This technique differs from our prior analysis because it uses the statistical correlations among questions rather than evaluating facilities by each question separately.

route traffic control centers and 62 of the largest terminal facilities[2] (level 4 and 5), on the basis of the extent of controllers' negative responses for 27 key questions. Appendix II describes our scope and methodology in more detail.

Results in Brief

Controllers are troubled by working conditions at air traffic control facilities. The extent of their concern varies between facilities and on the basis of the specific working condition. Overall, controllers at Boston and Washington centers had the most negative survey views of working conditions, training, safety, and morale, whereas Albuquerque, Houston, and Minneapolis had the least negative views. Similarly, controllers at 12 terminals (including Boston, Kennedy, Orlando, and Washington National) had the most negative views, whereas controllers at another 11 terminals (including Jacksonville, Lubbock, Sacramento, and Tampa) had the least negative views.

Background

Between May 2 and August 5, 1988, we surveyed the air traffic control work force at the 84 largest air traffic control facilities in the continental United States. Overall, 5,098 of 6,469 questionnaires were returned. We summarized the problems concerning the air traffic control work force in our April 21, 1989, report. The complete responses to all survey questions are contained in our April 24, 1989, fact sheet.

FAA controller strengths show only slight improvements since our survey. For example, the number of full performance level (FPL) controllers has increased from 9,858 on September 30, 1988, to 9,905 on June 30, 1989. While FAA has been trying to improve its staffing level, the volume of air traffic has increased every year since the controllers' strike of 1981.

Facilities With Most and Least Negative Controller Views

Our overall analysis (see app. II for a detailed methodology description) of the controllers' collective views on the six areas—workload, staffing, overtime, training, safety, and morale—at each of their respective facilities shows that controllers are more concerned at some facilities than others. Table 1 identifies in alphabetical order those facilities having contrasting controller views. For example, based on a comparison of

[2]A network of 20 centers in the contiguous United States provides for control and separation of aircraft between destinations and over oceanic routes. Terminal facilities control aircraft within the area of one or more airports.