

1. Report No. FAA-AM-71-30	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle  ATTITUDES AND MOTIVATIONAL FACTORS IN TERMINAL AREA AIR TRAFFIC CONTROL WORK		5. Report Date July 1971	
		6. Performing Organization Code	
7. Author(s) Roger C. Smith, Ph.D., Bart B. Cobb, M.S., and William E. Collins, Ph.D.		8. Performing Organization Report No.	
9. Performing Organization Name and Address FAA Civil Aeromedical Institute P. O. Box 25082 Oklahoma City, Oklahoma 73125		10. Work Unit No.	
		11. Contract or Grant No.	
12. Sponsoring Agency Name and Address Office of Aviation Medicine Federal Aviation Administration 800 Independence Avenue, S.W. Washington, D. C. 20590		13. Type of Report and Period Covered  OAM Report	
		14. Sponsoring Agency Code	
15. Supplementary Notes  This study was done under Tasks AM-B-69-PSY-2, AM-A-70-PSY-2, AM-B-71-PSY-2, and AM-A-71-PSY-20.			
16. Abstract  A sample of 614 journeymen terminal ATCSs at 17 high-density IFR airports, and 514 ATC trainees were administered a questionnaire which asked them to list what they liked best and what they liked least about ATC work in general; in addition, ATCSs made similar lists for work at their assigned facilities. Responses were surveyed for clusters, and nine response categories were established. The frequency of responses within each category was tabulated. With minor variations the pattern of responses from ATCSs was highly similar from one facility to another. The categories of job challenge, job tasks, career characteristics, and salary contained the most positive responses about ATC work, while the categories of management, work schedule, career characteristics, and job tasks had the most negative responses. Trainee attitude patterns were similar. ATCS responses for likes at facilities were most frequently about job tasks, facilities, peers, and job challenge; dislikes focused on facilities, management, job tasks, and work schedules. No relationships between attitudes and age, experience, or level of job performance were found. There was a high degree of similarity between these findings and results obtained in motivational studies of other professions.			
17. Key Words Air Traffic Control Job Attitudes Job Motivation Personnel Psychology		18. Distribution Statement  Availability is unlimited. Document may be released to the National Technical Information Service, Springfield, Virginia 22151, for sale to the public.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages	22. Price \$3.00

# ATTITUDES AND MOTIVATIONAL FACTORS IN TERMINAL AREA AIR TRAFFIC CONTROL WORK

## I. Introduction.

The major focus of much of the previous research dealing with air traffic control (ATC) personnel has been concerned with the identification of factors associated with performance during training, career progress, and degree of job proficiency of journeyman-level controllers.<sup>e.g., 1 5 6</sup> However, relatively little consideration has been given to determining formally the prevailing attitudes and motivations of ATC personnel with respect to their work and job environment, or the extent to which such factors bear upon job performance. Such information concerning controller attitudes may be of considerable relevance to recruitment, selection, and retention programs. The present study represents one approach to describing the nature, incidence, and intensity of such attitudes and their relationship to measures of job performance, experience, and age.

## II. Procedure.

*Subjects.* The basic sample of ATC personnel included 614 journeyman-level Terminal Area Traffic Control Specialists (ATCSs) working at 17 high IFR-density airports. Chronological age for this group ranged from 27 to 64 years with a mean of 36.5 years. Experience as an ATCS with the FAA ranged from 27 to 393 months and averaged 159.0 months (13.25 years). The data from these ATCSs were collected from November 1968 through February 1969. Age and experience distributions appear in Appendix 1.

In order to provide some indication of the motivation and attitudes of individuals presently entering the air traffic control profession, a sample of 514 ATC trainees was also included in this study. They were examined upon their entry

into nine weeks of basic training at the FAA Academy in Oklahoma City during February and March 1970. These students ranged in age from 20 to 51 years with a mean age of 28.67 years, and all but a few had been recently hired and appointed to the position of ATC trainee. Most were either former military tower controllers, or possessed other types and amounts of pre-employment ATC-related experience. However, this experience was not considered in the subsequent analyses, since it was largely outside of the FAA system.

*Questionnaire.* Attitude and motivational responses were obtained through a questionnaire, which was administered with a variety of other testing devices designed to provide data for a comprehensive study of factors bearing upon training performance and, later, on job performance. (Findings relating to the latter aspects of the study will be presented in subsequent reports.) Each ATCS was given a simple questionnaire (Appendix 2) in which he was asked to provide four types of responses, viz., what he *liked best* and what he *liked least* about (a) ATC work in general and (b) ATC work at his specific facility. It was requested that the comments be relatively brief, listed in rank order, and that no more than three be made in response to each of these four sections. Following the fourth section, an additional section was provided with instructions to "briefly list any problem areas, recommendations, or comments" desired. The questionnaire for the ATC trainees differed from the questionnaire administered the ATCSs in that those sections dealing with likes and dislikes at specific facilities were omitted, since the trainees did not have sufficient experience at a facility to make meaningful judgments. In other respects, the questionnaires were identical.

*Scoring.* As noted above, the participants had been requested to make only three statements in

---

Assistance rendered by Terry LaZar, Karen Freeman, and Sharon Bowles during the conduct of this study is gratefully acknowledged.

response to each of the four likes-dislikes sections. Although some individuals submitted four or five statements per section, all responses beyond the third were excluded from the various analyses.

For purposes of data reduction, all statements were examined to establish response clusters. This procedure produced nine response categories, and each statement was then assigned to one, and only one, of the nine categories. A summary description of the categories, which includes the nature and type of responses as well as typical verbatim statements for each is presented in Appendix 3.

Two methods were used to estimate the relative importance which a respondent attached to each of his statements. Derivation of the first measure originated with the printed instructions to order "likes" and "dislikes" from most-to-least important. As each statement was categorized, its position was recorded and used as a multiplicative weight to establish an index of its importance (i.e., an ATCS's first, second, and third responses were assigned a weighted score of 3, 2, and 1, respectively).

A second measure of response importance was obtained by having two judges rate the "intensity" of each statement by an ATCS on a two-point scale. Any response which was considered to be a matter-of-fact statement or a simple, unelaborated description of attitude was assigned a rating of "1," while statements which presumably reflected strong feelings (due to the nature of the descriptor words involved or the length and elaborateness of the statement) were rated "2." The judges' ratings agreed on 5,559 (98.3 per cent) of the 5,654 responses made by the ATCSs. Differences between raters for the remaining 95 statements were resolved by a third judge. Because of the extremely high agreement between judges, only a single judge was used for the ratings of ATC trainee statements.

### III. Results.

#### *Responsiveness: "Likes-Dislikes"*

*Respondent Index.* Participation in the attitude survey was not a mandatory feature of the larger study of which it was a part; however, a relatively high proportion of the ATCSs at each of the 17 facilities responded to all four sections relating to the positive and negative aspects of ATC work. At 13 of the facilities, from 71 to

100 per cent of the ATCSs submitted one or more statements for each item (see Appendix 4). At two of the four remaining facilities, 72 per cent or more of the ATCSs responded to three of the four questions, and while the ATCSs at the remaining two facilities were clearly least responsive of all, no less than 55 per cent of them provided at least one statement per section. Summary data for the combined facilities (Table 1) revealed that 80 to 84 per cent of the 614 ATCSs submitted at least one response under each of the four likes-dislikes sections. Eighty per cent of the 614 ATCSs responded to the "dislikes in general" section and a slightly higher percentage (82 per cent) submitted one or more statements reflecting "likes in general." Although different levels of responsiveness were obtained at the 17 facilities surveyed, the percentages of ATCSs responding to these two categories were remarkably similar for each respective facility. At no facility did the difference between the proportions exceed 10 per cent. At 11 facilities, the ATCSs were slightly more responsive to the "likes in general" section than to the "dislikes in general" section, at three facilities the opposite was true, and at each of the remaining three there was no difference.

Similarly, there was little difference between the overall number of respondents to "likes at facility" (82 per cent) as compared with "dislikes at facility" (84 per cent). At only one facility did the number of respondents in these two categories differ by more than 10 per cent (59 per cent "likes" to 78 per cent "dislikes", Facility C; Appendix 4). Among the 17 facilities, eight had an equal number of ATCSs in the two categories, seven had slightly more respondents to "dislikes" than to "likes," and at two facilities, there were more ATCSs citing "likes" than "dislikes" (Appendix 4).

An overall comparison of the ATCSs with the ATC trainees was not possible since the latter were not required to respond to the sections of the questionnaire concerned with likes and dislikes at their present facility. However, the trainees (97 per cent) were even more responsive than the ATCSs (82 per cent) in citing "likes in general"; this difference between the groups was statistically significant,  $p < .01$ . (These and all subsequent tests for the significance of differences between percentages of responses were made using the chi-square statistic.) In contrast, fewer

Table 1

Responsiveness of ATCSs and ATC trainees to the  
likes-dislikes sections of the questionnaire.

Category	Subjects	% Submitting One or More Statements			% Submitted of Total Possible Statements		
		N	Facility Range (%)	Mean (%)	N	Facility Range (%)	Mean (%)
Likes in general	ATCSs	614	55-100	82	1842	44-85	69
	Trainees	514	-	97	1542	-	93
Dislikes in general	ATCSs	614	62-96	80	1842	53-84	66
	Trainees	514	-	72	1542	-	43
Likes at facility	ATCSs	614	57-97	82	1842	41-86	70
Dislikes at facility	ATCSs	614	60-100	84	1842	48-92	74

trainees (72 per cent) responded to the "dislikes about ATC work in general" item than did ATCSs (80 per cent); this difference was also statistically significant,  $p < .01$ .

*Total Responses Index.* An additional index of the responsiveness to the likes-dislikes sections of the questionnaire was obtained by dividing the total number of responses by three times the number of individuals surveyed at each facility. Inasmuch as three statements had been requested for each section, the quotient represented the percentage of the desired number of responses which were actually elicited. The resulting percentages (Table 1 and Appendix 5) were lower than those obtained by the method noted earlier since many individuals submitted only one or two statements rather than the three which were requested. Nevertheless, the similarity in the rank ordering of the facilities, according to the percentages obtained by the two methods, was striking; Spearman coefficients of correlation between the rank orders of the percentages were .95 for "likes in general," .93 for "dislikes in general," .88 for "dislikes at the facility," and .84 for "likes at the facility." All of these correlations were highly significant,  $p < .01$ . Thus, as might be anticipated, facilities with a relatively high percentage of respondents tended to give more multi-

ple responses than did facilities with a relatively low percentage of respondents.

Moreover, there were almost no differences, overall, between the percentages obtained of total possible responses (Table 1) for "likes in general" (69 per cent) compared with "dislikes in general" (66 per cent), and for "likes at facility" (70 per cent) compared with "dislikes at facility" (74 per cent). In fact, 13 facilities had slightly more "likes in general" statements than "dislikes in general," three facilities had more of the latter, while the remaining facility had an equal number in each of these two categories; at no facility did the differences between these two categories exceed 10 per cent (Appendix 5). In the same regard, the trainees showed a considerable difference (Table 1) between the number of statements referring to "likes in general" (93 per cent of the number possible) and those indicating "dislikes in general" (only 43 per cent of the number possible). The difference favoring "likes in general" was considerably greater for the trainees under this index of responsiveness than under the "Respondent Index" outlined earlier.

At six facilities, "likes at facility" statements were more frequent than "dislikes at facility"; the opposite was the case at 10 other facilities,

while at the remaining facility, an equal number of statements was made under each category (Appendix 5). However, the index yielded differences between facility likes and dislikes which exceeded 10 per cent in seven cases; at five of these facilities, statements about dislikes occurred more often (11 to 28 per cent) than statements about likes, whereas at the other two facilities, there were more likes (13 to 15 per cent) than dislikes expressed (Appendix 5). Although these differences suggest the possibility of a pattern (e.g., a possible relationship to the perceived quality of working conditions) among the facilities in question, later analyses revealed none (see Appendices 10 and 11).

#### *Responsiveness: "Comments"*

In general, the ATCSs were less responsive to the last section of the questionnaire (in which they were asked to list problem areas, recommendations, or comments) than they were to any of the four likes-dislikes items. The percentages of ATCSs, by facility, who submitted one or more responses ranged from 43-77 per cent (see Appendix 6). Fifty-seven per cent of the entire group provided at least one comment but all of the responses totaled only 574, an average of approximately one per subject. Only 12 per cent of the newly-hired ATC trainees submitted one or more comments. This difference between the proportions of ATCSs and ATC trainees who responded was statistically significant. ( $p < .01$ ).

#### *"Likes in General" Section*

*ATCSs.* To assess the response trends among the "likes in general" statements (as well as for the "Comments" and the other likes-dislikes sections), the number of responses in each of the nine previously-established response categories was converted to a percentage of the total number of statements submitted (regardless of category) for that facility. The procedure was successively employed to obtain an array of percentages for each facility (Appendix 7) and also for the entire group of facilities (Figure 1).

The category ranking highest across all facilities was "Job Challenge" which accounted for 42.7 per cent of all statements concerning "likes about ATC work in general." "Job Tasks" emerged second, with 17.9 per cent, a significantly lower value than that obtained for the highest ranked category. The next two categories had significantly lower percentages than the first two. They were "Career Characteristics" and "Salary," with percentages of 13.3 and 11.0, respectively. As a group, the remaining five categories accounted for only about 15 per cent of the total "likes in general" statements.

There was relatively little divergence among facilities in the rank order of their likes. Thus, the data presented in Figure 1 are reasonably representative of any single facility. Spearman rank correlations between the rankings at each separate facility and the ranking for the entire

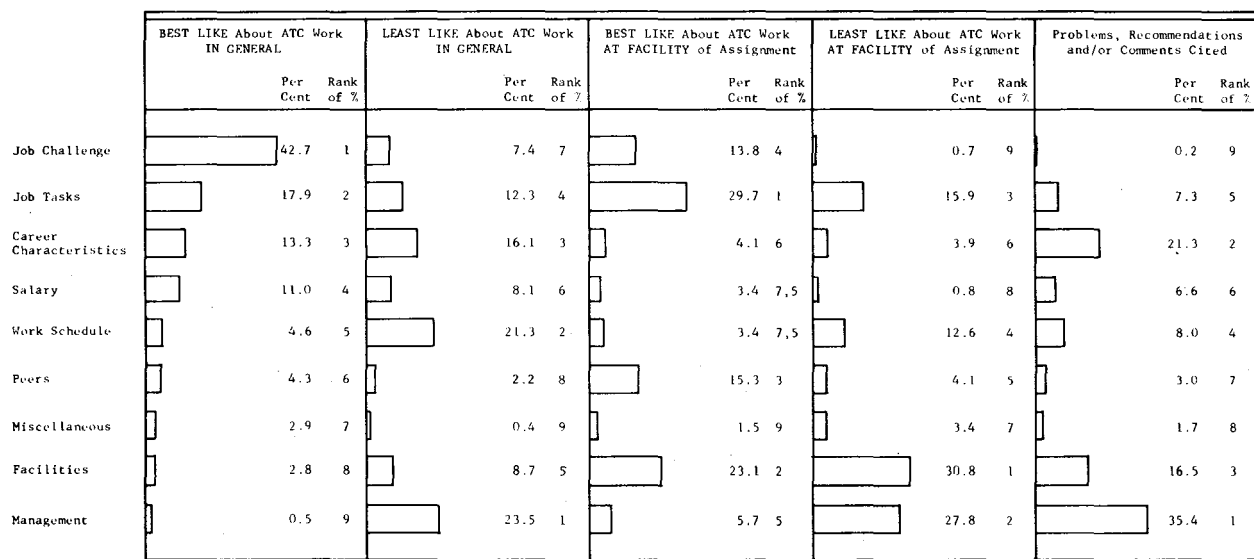


FIGURE 1. Frequency distributions (in percentages) and rankings of categorized responses made by the ATCSs.

group of ATCSs yielded rho coefficients ranging, with two exceptions, from .80-.97 (see Appendix 12). The exceptions ( $r=.69$  and  $.74$ ) were the result of ranking discrepancies among the most infrequently mentioned categories. However, these two facilities were similar to the group in that "Job Challenge," "Job Tasks," and "Career Characteristics" were ranked first, second, and third, respectively.

Among the nine response categories, two of them ("Job Tasks" and "Career Characteristics") included statements which could be assigned to sub-categories. Of the 210 responses assigned to the "Job Tasks" category, 96 (42 per cent) pertained to positive attitudes toward work with aircraft and aviation, while 61 responses (about 27 per cent) reflected the appeal of constantly changing situations. The remaining 31 per cent included miscellaneous positive comments about job tasks. Of 169 statements classified under "Career Characteristics," 36 per cent were concerned with the respect and prestige which is

presumably associated with the ATC profession, and 34 per cent cited the perceived value and importance of services performed for pilots and general aviation as major positive career features.

*Comparison of ATCSs with Trainees.* While the arrays of percentages reflecting the rank-ordered and categorized "likes in general" responses of the ATCSs and trainee groups were generally similar, as reflected in a moderately high and statistically significant ( $p<.05$ ) Spearman rank correlation of .77 between the two groups, there were several instances in which the two controller groups differed rather markedly in regard to the proportion of responses classified under specific categories. "Job Challenge" was first in rank order for both groups but accounted for only 29.6 per cent of the ATC trainees' responses, whereas 42.7 per cent of the ATCSs' statements were assigned to this category. (Categorized percentages for trainees are presented in Figure 2.) "Career Characteristics," which ranked second and accounted for 26.4 per

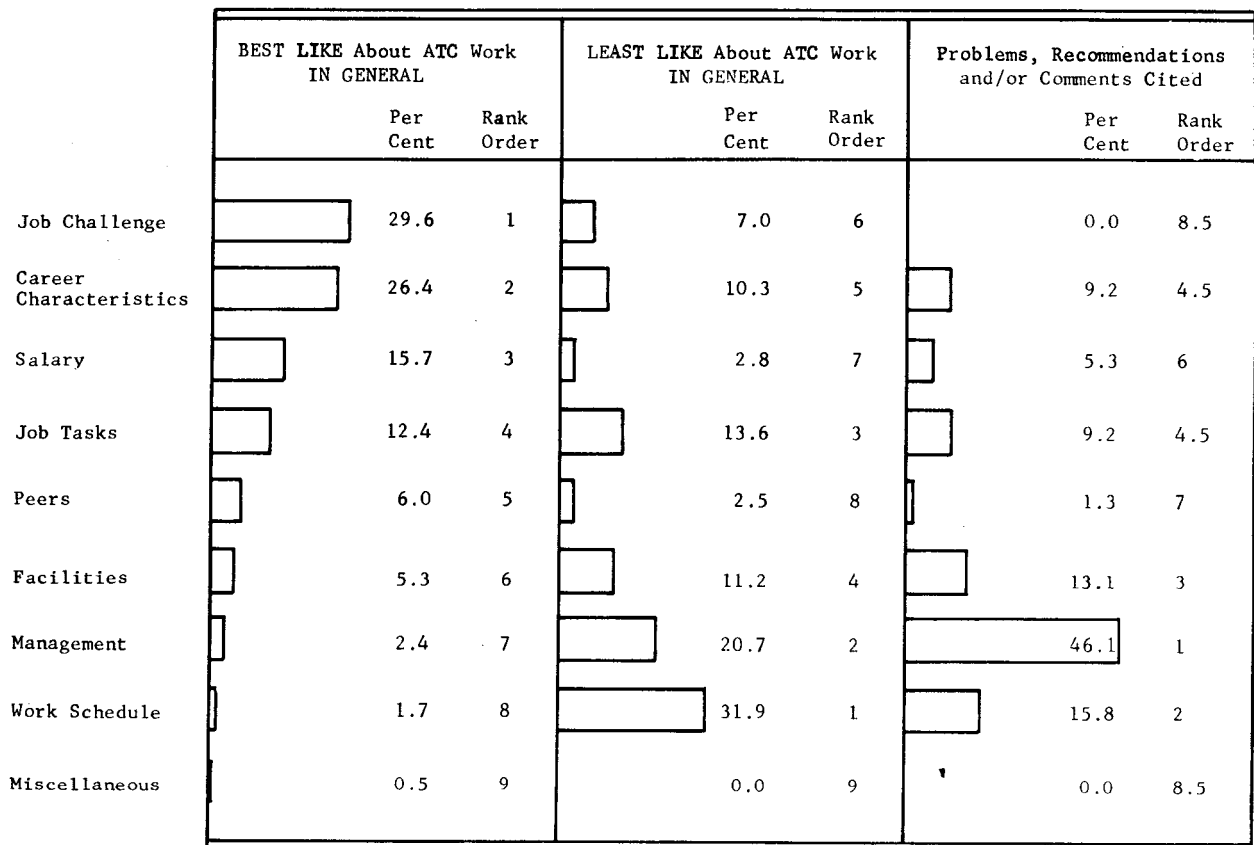


FIGURE 2. Frequency distributions (in percentages) and rankings of categorized responses made by the ATC trainees.

cent of the trainees' comments, was ranked third with 13.3 per cent of the ATCSs' responses. "Salary" and "Job Tasks," with percentages ranging from 11 to 17.9 for the two groups, ranked third and fourth among trainees, and fourth and second, respectively, among ATCSs. All of these between-groups differences were statistically significant ( $p < .01$ ). Nevertheless, "Job Challenge," "Career Characteristics," "Salary" and "Job Tasks" represented the four highest ranked categories for both samples and, when considered as a group, accounted for 84 per cent of the trainees' responses and 85 per cent of the statements submitted by ATCSs.

About 22 per cent of the trainees' comments in regard to "Career Characteristics" pertained, like those of the ATCSs, to the prestige associated with ATC work. However, various aspects of job development and security were viewed as even more important and accounted for about 52 per cent of the statements in this category. Under "Job Tasks," the trainees were again like experienced personnel in citing "contact with aircraft and aviation" as a major positive aspect of ATC work.

#### *"Dislikes in General" Section*

*ATCSs.* The two categories receiving the most statements concerning general dislikes were "Management," which accounted for 23.5 per cent, and "Work Schedule," which included 21.3 per cent of the responses to this section (Figure 1). These two categories, which were essentially equal in the frequency with which they were cited, were followed in order by "Career Characteristics" and "Job Tasks" with percentages of 16.1 and 12.3, respectively. Both of these percentages were significantly lower ( $p < .01$ ) than those for the highest two categories, while the percentage of statements in the "Job Tasks" category was significantly lower ( $p < .05$ ) than that for the "Career Characteristics" category. None of the remaining categories included as much as 10 per cent of the responses.

Of the responses in the most frequently cited category, "Management," 36 per cent were concerned with what the ATCSs viewed as inadequate or poor quality management, while 17 per cent of the responses focused on the shortage of trained air controllers, and 16 per cent of the statements mentioned dissatisfaction with policy-making procedures. Under the category of

"Career Characteristics," 36 per cent of the statements alluded to limited opportunities for promotion, while 29 per cent of the responses dealt with perceived deficiencies in the retirement program. Within the category of "Job Tasks," 28 per cent of the responses expressed dissatisfaction with the procedures required in ATC operations, 27 per cent reflected dislike of extra duties which were not directly related to air traffic control, and 22 per cent of the statements mentioned problems in relations between controllers and pilots.

As previously found for the "likes in general" section, the rank-orders of percentages of responses to the "dislikes in general" item by ATCSs at the different facilities were generally similar to each other (Appendix 8) and to the rank-order for the combined ATCS group. All the rank-correlations were significant, and only two fell below .80 (Appendix 12).

*Comparison of ATCSs with Trainees.* Although, as noted previously, the ATC trainees tended to make fewer statements in the "dislikes in general" section than did ATCSs, the rank orders of the response categories (according to number of statements) were very similar, as shown by the significant Spearman rank correlation of .92 ( $p < .01$ ). In comparing the two groups (Figures 1 and 2), only three between-group differences were significant: trainees gave proportionally fewer responses pertaining to "Salary" and to "Career Characteristics" ( $p < .01$ ), and more relating to "Work Schedules" ( $p < .01$ ) than did ATCSs.

Within the first ranked category of "Work Schedule" and the second ranked category of "Facilities," most of the trainee dislikes were of a general nature, and did not fall into clearly defined sub-categories. On the other hand, within the second-ranked category of "Management," 31 per cent of the responses mentioned perceived deficiencies in facility ATC training programs, while 28 per cent of the statements centered upon difficulties in obtaining assignments at facilities of choice. Under the category of "Job Tasks," 31 per cent of the trainee statements mentioned dislike of extra non-ATC duties, while 19 per cent involved criticism of workloads. Within the category of "Career Characteristics," 33 per cent of the responses reflected displeasure with being under Civil Service control, and 26 per cent were concerned with what the ATCS's felt were poor promotion opportunities.

### *"Likes at Facility" Section*

Statements reflecting what the ATCSs best liked about work at their facility of assignment were analyzed in the same manner as the "likes in general" responses. Almost 30 per cent of the "likes at facility" statements were assigned to the "Job Tasks" category and about 23 per cent were placed under the "Facilities" category (see Figure 1). The difference between the percentages of statements assigned to each of these two highest-ranked categories was statistically significant ( $p < .01$ ). Next in rank order were statements categorized under "Peers" (15.3 per cent) and "Job Challenge" (13.8 per cent); both were mentioned significantly less often than "Job Tasks" and "Facilities" ( $p < .01$ ), but significantly more often ( $p < .01$ ) than "Management," (the next-ranked category), which accounted for only 5.7 per cent of the responses to this section of the questionnaire. None of the remaining categories included more than five per cent of the responses to this section. Comparisons readily indicate that the rank order of the nine categories under which the "likes at facility" responses were classified was quite different from that established with the "likes in general" statements (the Spearman rho was an insignificant .14). Thus, these two questionnaire sections elicited different patterns of the positive side of ATC work.

Of those statements categorized under "Job Tasks," approximately 22 per cent were concerned with the "amount of traffic," 18 per cent pertained to "rotation through various ATC positions" and about 17 per cent mentioned the variety and/or type of aircraft controlled. Of those statements categorized under "Facility," approximately 45 per cent pertained to the facility's location, 25 per cent referred to the working conditions, and about 18 per cent mentioned equipment. There were no clearly defined subcategories for statements relating to "Peers" or "Job Challenge."

As with the analysis of the "likes in general" section, the "likes at facility" responses from the ATCSs of a given facility were generally very similar to those of other facilities and to those of the 614 ATCSs as a group (Appendix 9). All correlations between the rank orders of the categories for the respective facilities and that established for the total ATCS group were

statistically significant and all but three were of a magnitude of .80 or larger (Appendix 12).

### *"Dislikes at Facility" Section*

Almost 31 per cent of the ATCSs' responses to this section were assigned to the "Facilities" category; nearly 28 per cent were classified under "Management" (Figure 1). The category containing the next highest number of statements (15.9 per cent), "Job Tasks," had significantly fewer statements assigned to it than either of the two highest-ranked categories. The only other category to receive more than 10 per cent of the responses was "Work Schedules" with nearly 13 per cent; those remaining each contained less than 5 per cent of the statements. A correlation of .57 (which was not significant) was obtained between the ranked categories of responses to the "dislikes in general" and "dislikes at facility" sections, indicating that somewhat different patterns of dislikes were elicited for these two sections of the questionnaire.

Under "Facilities," 28 per cent of the complaints were centered upon equipment, 20 per cent were directed at airport layouts, and an additional 20 per cent mentioned working conditions. Within the "Management" classification, quality and quantity of supervision received 16 per cent of the responses, while perceived shortages of controller personnel accounted for another 14 per cent of these responses. Unhappiness with ATC procedures was expressed in 46 per cent of the responses assigned to "Job Tasks," while 21 per cent of the statements so classified dealt with problems of handling aviation traffic of mixed types (i.e., jets and turbo-prop or piston-engine aircraft).

The rank ordering of response categories according to frequency of statements at any given facility again tended to match closely the order for the entire ATCS group (Appendix 10). The lowest correlation obtained was .76 (Appendix 12).

### *"Problems, Comments, and Recommendations" Section*

*ATCSs.* Over 35 per cent of the problems, comments, and recommendations cited by the ATCSs were directed toward "Management," its policies, or practices (see Figure 1). "Career Characteristics," accounted for 21.3 per cent and ranked second, while "Facilities," with 16.5 per



cent ranked third. Of the remaining statements, most pertained to either "Work Schedule" or "Job Tasks." Complaints concerning "Peers" were, as previously found in regard to "dislikes at facility" statements, quite rare.

Only a small proportion of the responses to this section of the questionnaire were positive in nature. This was reflected in the fact that the rank order of the categories to which these statements were assigned correlated .87 ( $p < .01$ ) with that based on "dislikes in general" and .72 ( $p < .05$ ) with that established for "dislikes at the facility," while corresponding correlations with the "likes in general" and with "likes at facility" were substantially lower ( $-.42$  and  $.12$  respectively) and not statistically significant. The majority of the statements were specifically directed toward identification of certain problem areas or perceived difficulties and most of the comments and recommendations suggested remedial action, changes in policy, and so forth.

The rank ordering of the categories (by percentage of statements was similar from one facility to another and from any given facility to the ATCS group as a whole (Appendix 11);

however, the rank correlations were generally slightly lower than those obtained in the analyses of the likes-dislikes sections (Appendix 12).

*Comparison of ATCSs with Trainees.* Although the trainees had fewer suggestions to make than ATCSs, the order of the statement categories according to the percentages of responses assigned to each was generally consistent across the two groups (compare Figures 1 and 2). In fact, the rank correlation between the two orders was .91, a clearly significant positive relationship ( $p < .01$ ).

### *Attitudes and Age*

The age of ATCSs seemed to have little effect upon the attitudes expressed in their responses. As can be seen in Table 2, the percentages of responses assigned to each category for ATCSs over 35 and those 35 years of age or younger were very similar within each item. The age of 35 years was used as a cutting point since it separated the 614 ATCSs into nearly equal groups of 316 and 298. In addition, this age has been shown to be useful as a cutting point for predicting success in ATC training. Al-

Table 2  
Percentages of categorized responses to the likes-dislikes  
sections of the questionnaire by ATCSs 35 years of age  
or younger and those 36 years of age or older

Category	Likes in General		Dislikes in General		Likes at Facility		Dislikes at Facility	
	Age (years)							
	35 & younger	36 & older	35 & younger	36 & older	35 & younger	36 & older	35 & younger	36 & older
Job Challenge	45.4	39.6	6.6	8.3	11.7	16.3	0.7	0.8
Job Tasks	18.1	17.7	14.0	10.1	31.8	27.8	18.2	13.4
Career Characteristics	12.4	14.4	14.2	18.9	4.7	3.4	2.5	5.3
Salary	9.0	13.0	9.4	6.5	3.0	3.9	1.3	0.3
Work Schedule	4.4	4.8	20.0	22.4	3.8	3.1	11.3	13.9
Peers	4.8	3.7	2.6	1.8	14.2	16.6	4.8	3.3
Miscellaneous	3.0	2.8	0.3	0.5	1.5	1.4	3.1	3.8
Facilities	2.5	3.3	9.0	8.3	23.5	21.7	29.7	32.0
Management	0.3	0.7	23.7	23.2	5.8	5.8	28.4	27.2

Table 3

Percentages of categorized responses to the likes-dislikes section  
of the questionnaire by ATCSs having 155 months or less and  
those having 156 months or more of FAA-ATC experience

Category	Likes in General		Dislikes in General		Likes at Facility		Dislikes at Facility	
	Months of FAA-ATC Experience							
	155 & Less	156 & More	155 & Less	156 & More	155 & Less	156 & More	155 & Less	156 & More
Job Challenge	44.3	41.3	7.3	7.6	14.3	13.5	0.6	0.9
Job Tasks	18.3	17.5	13.2	11.3	30.6	29.5	15.4	16.5
Career Characteristics	13.1	13.5	16.2	16.1	3.5	4.5	3.3	4.4
Salary	11.2	10.6	8.7	7.6	3.7	3.2	0.9	0.7
Work Schedule	4.1	4.9	20.6	22.3	4.2	2.7	12.0	13.1
Peers	3.9	4.8	2.8	1.7	13.6	15.3	4.2	4.0
Miscellaneous	3.6	2.3	0.3	0.5	1.6	1.4	3.5	3.4
Facilities	1.3	4.3	7.6	9.9	22.3	24.8	33.2	28.4
Management	0.2	0.8	23.3	23.0	6.4	5.1	26.9	28.5

ternative age groupings were also examined, but in view of the relatively narrow age distribution of the ATCS sample (83 per cent were between ages 30 and 40 and none was younger than 27) little change in findings was expected or found. The correlations between the ranks of the categories for controllers older than 35 and those 35 years of age or younger were .97 for "likes in general," .95 each for "likes at the facility" and "dislikes in general," and .90 for "dislikes at the facility." There were no significant differences between the age group in the proportion of responses assigned to each of the nine categories.

#### *Attitudes and Length of FAA-ATC Experience*

As with age, tenure as an ATCS had little effect on the responses to the questionnaire. Using 155 months in FAA ATC work as the dividing point (again making two nearly equal groups of 317 and 297 ATCSs), the percentages of responses classified as belonging in each of the response categories for the resulting two groups of ATCSs were very nearly equal under each of the four likes-dislikes sections (Table 3). This was reflected in the lack of significant differences between the two experience groupings in the proportion of responses classified under

each response category and in the high correlations between the category orders of .98 for "likes in general," .97 for "dislikes in general," and .92 each for "likes at facilities" and "dislikes at facilities." As with age, further partition of the groups by experience resulted in similar findings, a not unexpected result since only 16 per cent of the ATCSs had less than 10 years of experience, and 19 controllers (3 per cent) had less than 8 years of experience.

#### *Attitudes and Level of Job Performance*

As participants in the general study of which the attitude survey was a part, each ATCS was evaluated with respect to level of job performance by one or two watch supervisors, by one to three crew chiefs under which he had worked, and by two to five crew members. Through use of a seven-point rating scale, each rater was asked to evaluate the performance of a controller on: (a) twenty items or technical aspects of *Radar Control*; (b) twenty technical aspects of *Local Control*; (c) nine items pertaining to *general* or non-technical attributes and (d) a single item reflecting the "overall proficiency of the controller *relative* to all controllers" (known by

the rater). Four mean global (or average) ratings, designated as "R(adar)," "L," "G," and "R(elative)" and an equal-weighted composite mean rating, designated as "RLGR," were then computed from the data submitted by *each* rater. By maintaining separateness of the rating forms by rating groups, mean supervisory ratings, mean crew chief ratings, and mean peer ratings were obtained for each ATCS for the separate areas "R," "L," "G," and "R," and for the combined areas "RLGR." Overall averages for each of the five measures were then obtained. Of the latter, the Overall R-Relative Rating and the Overall Composite RLGR Rating were selected as criterion variables for investigation of the relationships between attitudes and job performance.

Based on an examination of the frequency distribution of the R-Relative Ratings, coarse grouping procedures were applied to establish three groups: ATCSs with "high" ratings of 6.00 or better; those with mean ratings in the

"intermediate" range of 4.75 to 5.99, and those with "low" ratings of 4.74 or lower (Table 4). When the frequencies of the categorized "likes in general" statements were converted to percentages, no major differences were found between the high-, intermediate-, and low-rated groups. The rank orders of the nine response categories were remarkably similar to each other and all intercorrelations (i.e., of the three groups of data) were very high; they averaged .93. The same was generally true in regard to "likes at facility," for which the rank-order correlations averaged .94, and also for the "dislikes in general" and "dislikes at facility," which yielded mean intercorrelations among the groupings of .94 and .93, respectively.

Corresponding analyses were undertaken with the Overall Composite RLGR Rating. Again, the ATCSs were divided into "high" (RLGR ratings of 6.00 and above), "intermediate" (those rated 4.75 to 5.99), and "low" (those rated

Table 4  
Percentages of categorized responses to the likes-dislikes sections of  
the questionnaire by ATCSs who received high (6.00 and greater),  
intermediate (4.75-5.99), or low (4.74 and lower)  
R-relative job performance ratings.

Category	Likes in General			Dislikes in General			Likes at Facility			Dislikes at Facility		
	R-Relative Job Performance Ratings											
	Low	Inter	High	Low	Inter	High	Low	Inter	High	Low	Inter	High
Job Challenge	41.0	42.8	44.4	7.7	7.8	6.4	16.0	12.1	14.8	1.1	0.7	0.5
Job Tasks	16.4	18.2	18.5	10.9	12.8	12.6	32.4	29.0	28.3	13.6	17.1	16.1
Career Characteristics	14.4	12.1	14.3	18.0	17.3	12.3	4.0	4.5	3.4	4.2	4.2	3.1
Salary	11.0	11.0	10.6	7.7	7.9	8.8	3.0	4.5	1.9	0.9	1.0	0.5
Work Schedule	4.6	4.6	4.5	25.3	20.6	19.0	1.2	4.3	3.8	15.3	12.4	10.5
Peers	4.3	5.3	2.9	1.6	1.8	3.5	14.2	14.6	18.0	4.2	3.8	4.5
Miscellaneous	3.4	2.5	3.2	1.3	0	0.3	1.2	2.2	0.5	2.6	3.9	3.6
Facilities	4.6	2.8	1.3	7.1	8.7	10.2	21.6	23.0	29.4	30.4	26.3	37.2
Management	0.3	0.7	0.3	20.4	23.1	26.9	6.4	5.8	4.9	27.6	30.6	24.0

Table 5

Percentages of categorized responses to the likes-dislikes sections of the questionnaire by ATCSs who received high, intermediate, or low overall RLGR job proficiency ratings.

Category	Likes in General			Dislikes in General			Likes at Facility			Dislikes at Facility		
	Overall RLGR Job Proficiency Ratings											
	Low	Inter	High	Low	Inter	High	Low	Inter	High	Low	Inter	High
Job Challenge	41.6	40.9	45.3	7.6	7.9	6.6	14.1	14.2	13.2	1.1	0.4	0.8
Job Tasks	17.1	18.2	18.2	9.9	13.9	12.0	32.8	28.2	29.2	15.2	14.8	17.8
Career Characteristics	13.4	13.4	13.2	18.2	16.0	14.6	3.4	4.5	3.9	3.4	3.9	4.0
Salary	10.9	12.2	9.6	7.6	8.2	8.5	4.0	3.4	3.1	0.6	1.3	0.4
Work Schedule	4.3	3.6	5.8	25.1	21.0	19.1	2.5	3.9	3.5	29.4	31.9	30.6
Peers	5.0	4.4	3.8	1.3	2.1	3.1	13.8	15.4	16.2	3.7	4.1	4.6
Miscellaneous	3.1	2.9	2.8	1.3	0	0.2	1.2	1.8	1.3	2.9	3.9	3.4
Facilities	4.3	3.6	1.1	6.9	8.9	9.7	22.7	23.1	23.5	29.4	31.9	30.6
Management	0.3	0.8	0.2	22.1	23.0	26.2	5.5	5.5	6.1	28.3	28.6	26.3

4.74 and lower) groups. The percentages of categorized responses for each of these three proficiency levels are presented in Table 5. Comparative study of the arrays indicated no substantial differences among the groups. The averages of the rank-order correlations among the three performance groups were all very high. For both "likes in general" and "likes at facility," the intercorrelations averaged .96; for "dislikes in general" and "dislikes at facility" they averaged .94 and .97, respectively.

#### *Attitudes and Relative Importance of Statements*

As noted earlier, one of the methods used to evaluate the relative importance which an individual respondent presumably attached to each of his statements involved the application of a multiplicative weight of 1, 2, or 3 to the statement in accordance with its order in the respondent's listing of responses under each section of the questionnaire. However, the rank orders of the summary data reflecting the weighted and categorized statements (of the entire ATCS group) within each section were almost identical to those based on frequencies and percentages only. Therefore, no further analyses of "weighted-response" data of this type were at-

tempted because the findings would have merely duplicated those obtained in previous analyses.

The second measure of statement "importance" was the "intensity rating" which represented a subjective evaluation of each statement in terms of a two-point rating scale (i.e., elaborate or strongly worded statements were assigned a rating of "2" while others were rated "1"). As might be anticipated, significantly greater proportions of the "dislikes" statements reflected strong and intensive feelings than did the "likes" responses (Table 6). Under the "dislikes in general" section, over 20 per cent of the statements in each category except "Work Schedule" and "Salary" received intensity ratings of "2". The same was true with regard to the "dislikes at facility" section with the exception of responses pertaining to "Work Schedule," "Salary" and "Job Tasks." None of the categories under either of the "likes" sections showed a proportion of "strong" ratings as great as 20 per cent.

*Comparison of ATCSs with Trainees.* Like the ATCSs, the trainee group appeared to have stronger feelings associated with their statements about "dislikes" than with their responses

Table 6

Percentages of categorized responses to the questionnaire which  
were assigned "strong" intensity ratings.

Category	Likes in General		Dislikes in General		Likes at Facility	
	ATCSs	Trainees	ATCSs	Trainees	ATCSs	ATCSs
Job Challenge	15.0	7.3	38.2	36.2	14.0	30.0
Job Tasks	8.8	2.2	30.4	20.9	4.7	19.4
Career Characteristics	0	5.5	33.5	20.3	9.4	32.1
Salary	5.8	4.0	18.4	10.5	0	18.2
Work Schedule	17.2	4.0	14.0	6.1	9.1	15.2
Peers	12.7	8.1	40.7	52.9	10.6	42.8
Miscellaneous	5.4	2.7	20.0	16.0	11.0	19.1
Facilities	0	8.8	21.0	14.2	9.4	21.2
Management	16.7	0	28.9	0	16.2	32.0
Overall Percentage	11.5	5.4	26.0	15.7	9.2	24.4

reflecting "likes" about ATC work (Table 6). However, the overall proportion of "strong" ratings differed significantly ( $p < .01$ ) between the two groups; the ATCSs gave a greater percentage of statements reflecting strong feelings in both the "likes in general" and "dislikes in general" sections.

#### IV. Discussion.

*ATCSs.* One of the major findings of the present survey was the relative unanimity of opinion from facility to facility. What was seen as a problem, or as a motivating attribute, in ATC work by the ATCSs at a given facility was generally representative of the responses made by ATCSs at other facilities. This suggests that the prevailing attitudes of the 614 participants in this study may also be fairly representative of those held by ATCSs at other similar facilities. However, the degree to which these findings reflect motivations and the attitudes of ATC personnel at other types of installations remains a matter of conjecture.

This study has clearly demonstrated that ATC personnel are able to describe as many positive

as negative aspects of their profession, as evidenced by the near equality between the number of statements made to the positive ("likes") and to the negative ("dislikes") item. On the positive side, a major appeal appeared to be the challenging, fast-paced, constantly changing nature of ATC work. Most controllers also seem to like the kinds of tasks which are involved in ATC work, particularly those directly related to control activities. Another significant factor appeared to be the pride which they held for their profession, which they viewed as having a considerable level of prestige. This may have been partly a function of their falling under the "charisma" of aviation, but it also was a result, as some of the controllers stated, of the self-satisfaction associated with successful performance at a difficult job—a job which many people cannot fulfill.

The primary dislike mentioned by ATCSs was management. Overall, these responses seemed to reflect an attitude that management had been unresponsive to problems, complaints, and suggestions. However, when positive comments did occur with respect to management, they almost

invariably concerned the local supervisory staff. This suggests a trend to view local management more positively than non-local management. The genesis of this disenchantment with management is not clear; however, it appears that many controllers believe that they are unable to communicate effectively with the individuals responsible for policy-making decisions; that is, they seem to feel they have little or no role in agency policy-making decisions.

The other problems frequently listed, i.e., work schedule, career-plan deficiencies (especially in the area of retirement), annoyance with job tasks not directly related to control of air traffic, and distress over presumably outmoded or inadequate facilities, are generally self-explanatory and suggest areas which are in need of improvement from the ATCS point of view.

*Comparison of ATCSs with ATC Trainees.* The responses of the trainees provide evidence about certain aspects of ATC work which serve as inducements to enter the profession. The challenge of the job, prestige, professional development, job security, association with aviation, and salary seem to be the most important factors attracting these individuals. It is of special interest that these factors continue to be viewed as significant positive aspects of ATC work after an appreciable amount of actual work experience with only two major changes, viz. job challenge assumes proportionately greater importance while security and opportunities to develop in responsibility tend to decline in relative importance (compare Figures 1 and 2).

Similarly, specific aspects of ATC work which least appeal to the trainees are the same as those which experienced controllers cite as dislikes, i.e., management, work schedules, career characteristics, job tasks, and facilities. Dissatisfaction with work schedules declines somewhat in relative importance for the ATCSs as compared with the trainees, while dislikes with career characteristics increase somewhat (dissatisfaction with promotion and retirement policies seem to account for this rise). The relative importance of the other dislike categories does not change much.

While there was a general correspondence between ATCS and trainee attitudes, the latter appeared more positively oriented toward ATC work in that they expressed relatively few com-

plaints. Such a difference between groups would be expected in most situations where new and old employees were compared. The differences in findings may also be due, in part, to changes in the characteristics of individuals now being employed to start in the ATC profession when compared to ATCSs hired 10 or more years ago. The extent to which this is a factor will have to be determined by longitudinal follow-up studies.

*Comparison of ATCSs with other professions.* When other professions have been surveyed for employee attitudes, several distinct factors influencing job satisfaction have emerged. In reviewing over 16 studies of employee attitudes (including groups of engineers, housekeepers, accountants, military officers, teachers, and many others), Herzberg<sup>2 3</sup> noted that the major factors which yielded job satisfaction in each study were achievement, recognition, the work itself, responsibility, and growth or advancement. He also found consistency among the sources of dissatisfaction which included company policy and administration, supervision (both technical and interpersonal), and working conditions.

The similarity between the various factors listed by Herzberg and the findings from ATCSs in this study is striking. The categories of job challenge, job tasks, and career characteristics which ranked high among likes for ATCSs closely parallel the basic job satisfiers noted above for the other professions. By the same token, the ATCSs listed management, work schedules, and facilities (working conditions) at the top of the list of dislikes, which again is consistent with the results obtained from other vocations.<sup>2 3</sup> As Herzberg<sup>2 3 4</sup> has noted, not infrequently salary changes have been introduced in organizations and industries as a means of improving motivation, and generally without any notable success. The ATCSs and ATC trainees who participated in this study cited "salary" relatively infrequently as a dislike; the overall frequency of its occurrence ranged from 0.8 to 8.1 per cent. In fact, it was more frequently regarded as a positive feature (3.4-15.7 per cent). The relatively low ranking of salary as either a positive or a negative factor for ATC personnel also agrees with the findings from other occupational groups.

The similarity in findings between ATCSs and other professions is perhaps more impressive when variations in procedures are considered. In this study, the determination of the categories

into which the responses were sorted was accomplished by individuals (college graduates) who were completely naive with respect to Herzberg's and others' findings. The categories were determined simply by inspection of the data for response trends and without reference to any other system of classification. Thus, the similarities in job satisfiers and dissatisfiers was a complete function of the data, rather than the molding of judgments to fit a preconceived notion of important factors.

In sum, these comparisons suggest that, although air traffic control work is considerably

different from that of other professions, the job features which ATC personnel rank high as "likes" and those which they rank high as "dislikes" are not very different in category from those of personnel in other professions. As such, considerable benefit can be reaped by those interested in improving motivation, job attitudes, and/or job performance in ATC specialties by an examination of the approaches successfully used to improve these aspects of work in other industries, despite differences in the nature of the occupations.

## REFERENCES

1. Cobb, B. B.: The Relationships of Chronological Age, Length of Experience, and Indices of Job Performance for Air Route Traffic Control Specialists. *AEROSPACE MEDICINE*, 39:119-124, 1968.
2. Herzberg, F.: *Work and the Nature of Man*. New York, World Publishing Co., 1966.
3. Herzberg, F.: One more time: How do you motivate employees? *HARVARD BUSINESS REVIEW*, 46:53-62, 1968.
4. Herzberg, F., B. Mausner, and B. B. Snyderman: *The Motivation to Work*. London, Chapman and Hall, Limited, 1959.
5. Trites, D. K., and B. B. Cobb: CARI Research on Air Traffic Control Specialists: Age, Aptitude, and Experience as Predictors of Performance. An non-technical report, Civil Aeromedical Research Institute, FAA, Oklahoma City, Oklahoma, 1964.
6. Trites, D. K., C. M. Miller, and B. B. Cobb: Problems in Air Traffic Management: VII. Job and Training Performance of Air Traffic Control Specialists—Measurement, Structure, and Prediction. *AEROSPACE MEDICINE*, 36:1131-1138, 1965.

# Appendix 1

Age distributions (years) for the ATCS and trainees samples  
and experience distribution (months) for ATCSs

<u>Age</u>	<u>Number of</u>		<u>Experience</u>	<u>Number of</u> <u>ATCSs</u>
	<u>ATCSs</u>	<u>Trainees*</u>		
			27-99	20
20		2		
21		3	100-109	21
22		27		
23		56	110-119	60
24		40		
25		51	120-129	38
26		38		
27	2	42	130-139	59
28	1	40		
29	9	34	140-149	65
30	21	24		
31	59	14	150-159	87
32	61	22		
33	53	16	160-169	58
34	43	6		
35	67	10	170-179	32
36	63	7		
37	45	5	180-189	63
38	32	14		
39	45	14	190-199	48
40	21	9		
41-45	42	18	200-249	35
46-50	29	8		
51 or older	21	2	250-400	28

\*Age information was not recorded for 12 trainees



Appendix 2  
Sample page of the questionnaire

PURPOSE AND DIRECTIONS

The Items Below Concern YOUR LIKES AND DISLIKES

about ATC WORK AT THIS FACILITY &  
about ATC WORK IN GENERAL

Try to list your comments in rank order. First, list that which you consider most important; second, that which is next most important, etc.

It is requested that your comments be brief. Please write legibly or print.

- I. Cite 3 specific aspects which you BEST LIKE about ATC work at this facility.  
(1st)

(2nd)

(3rd)

- II. Cite 3 specific aspects which you LEAST LIKE about ATC work at this facility.  
(1st)

(2nd)

(3rd)

- III. Cite 3 specific aspects which you best like ABOUT ATC WORK IN GENERAL.  
(1st)

(2nd)

(3rd)

- IV. Cite 3 specific aspects which you least like ABOUT ATC WORK IN GENERAL.  
(1st)

(2nd)

(3rd)

- V. Briefly list any problem areas, recommendations or comments you desire.

## FORM A

Name of ATCS (print) \_\_\_\_\_ Facility \_\_\_\_\_ Today's Date \_\_\_\_\_

Social Security Number \_\_\_\_\_ Birthdate \_\_\_\_\_ GS Grade \_\_\_\_\_ E.O.D. with FAA or CAA \_\_\_\_\_  
Mo. Day Yr. Mo. Day Yr. Mo. Day Yr.

YOUR AIR TRAFFIC CONTROL EXPERIENCE:  
 \_\_\_\_yrs \_\_\_\_mos of ATC work in the  
                                   FAA and/or CAA.  
 \_\_\_\_yrs \_\_\_\_mos of military ATC work  
                                   before FAA/CAA tenure.  
                                   Branch? \_\_\_\_  
 \_\_\_\_yrs \_\_\_\_mos total of combined FAA-  
                                   CAA-military exp.

INITIAL SELECTION:  
When applying for entry into  
FAA or CAA air traffic control  
training, were you required to  
take a written test of aptitudes  
and abilities? Yes No

AGE-AND-APTITUDE FOLLOWUP STUDIES:  
Did you attend the Academy's  
basic ATC training course in  
Oklahoma City?.....Yes No  
If yes, were you a participant  
in an experimental program in-  
volving physical, medical, or  
aptitude-test measures?  
Yes No

SUMMARY OF YOUR ATC EXPERIENCE IN THE FAA AND/OR CAA:  
(Please provide requested data; make estimates when necessary)

	Ground	Local	Radar	Other?
F.D. _____	Control	Control	Control	Specify

Based on a recent normal week of your work at this facility,  
ESTIMATE THE APPROXIMATE PERCENTAGE OF DUTY TIME you spend  
at each position or activity.

FACILITY ASSIGNMENTS OR TOURS

Name each facility, beginning with the present and ending with your earliest.

Dates of Assignment  
from to  
mo yr mo yr

[illegible]

Indicate (below) the number of months of each facility tour during which you were fully qualified for each position or activity. Please add vertically to show total of each type.

	Ground	Local	Radar	Other?
F.D.	Control	Control	Control	Specify

### Appendix 3

#### Description of response categories

Response Category	General Content	Typical Statements			
		"Likes in General"	"Dislikes in General"	"Likes at Facility"	"Dislikes at Facility"
Salary	Fiscal compensation	"Pay is good"	"Pay not enough"	"Salary"	"Compensation versus responsibility"
Work Schedule	Overtime, shift work, leave	"Work hours are flexible"	"Shift work"	"Fair working schedule"	"Rotating days off"
Facilities	Equipment, buildings, location, airport layout, parking	"Comfortable working quarters"	"Physically confining, faulty equipment"	"Good working conditions"	"Dislike the area"
Management	Policies, amount, quality, communications	"Management's interest in controller problems"	"Failure of management to keep up with aviation"	"Understanding supervisors"	"Poor supervision"
Peers	Co-workers' abilities and attitudes	"Type of people involved in the work"	"Retention of unqualified controllers"	"The crew I work with"	"Insincerity displayed by some"
Job Challenge	Responsibility, demanding nature of ATC work	"The challenge of air traffic control"	"The pressure knowing that an error can put many lives in danger"	"The work is challenging"	"Terrific pressure during busy periods"
Career Characteristics	Security, promotions, retirement, pride, civil service	"Promotion opportunities"	"Poor retirement"	"Steady job--no layoffs"	"No promotions in near future"
Job Tasks	Procedures, extra duties, type of traffic, radar work	"Working with aviation and radar work"	"Workload sometimes too heavy"	"Rotation among various positions"	"Working without proper coordination"
Miscellaneous	All responses not otherwise classified	"Enjoy communicating with public"	"Public's lack of knowledge about ATC work"	"Cooperation from local flying interests"	"Pilot resistance to control"

# Appendix 4

Percentage of ATCSs who submitted one or more statements for  
each of the first four sections of the questionnaire

Facility	N	Likes in General		Likes at Facility		Dislikes in General		Dislikes at Facility	
		Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order
A	49	90	8.5	90	9	88	7.5	90	8
B	42	55	17	57	17	62	16.5	60	17
C	32	75	13	59	16	75	12	78	13
D	31	71	15	77	13	74	13.5	77	14
E	34	94	5	91	7.5	91	4	94	5.5
F	40	98	2	93	5.5	90	5.5	98	2
G	22	95	4	95	3	95	2	95	4
H	33	79	12	79	11.5	85	9	85	10
I	28	82	9.5	82	10	79	11	82	11
J	58	66	16	66	15	62	16.5	64	16
K	28	100	1	96	2	96	1	96	3
L	35	91	6.5	91	7.5	83	10	91	7
M	38	82	9.5	79	11.5	74	13.5	79	12
N	32	91	6.5	94	4	88	7.5	94	5.5
O	29	90	8.5	93	5.5	90	5.5	86	9
P	32	97	3	97	1	94	3	100	1
Q	51	72	14	75	14	65	15	76	15
ATCS Group	614	82		82		80		84	
ATCT Group	514	97		--		72		--	

# Appendix 5

Percentage elicited of total possible responses to each section  
of the questionnaire from ATCSs at each facility

Facility	N	Likes in General		Likes at Facility		Dislikes in General		Dislikes at Facility	
		Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order
A	49	77	7	82	4	71	7.5	75	9
B	42	44	17	41	17	53	16	56	16
C	32	53	16	47	16	57	12.5	75	9
D	31	59	13	63	12	54	14	63	14.5
E	34	82	4	76	10	75	4	87	5
F	40	84	2	81	6	84	1	90	3.5
G	22	83	3	80	8	73	5	92	1
H	33	69	10	59	15	70	9.5	80	7
I	28	67	11.5	81	6	63	11	75	9
J	58	56	14.5	61	13.5	53	16	48	17
K	28	85	1	85	2	82	2	90	3.5
L	35	76	8.5	77	9	72	6	74	11
M	38	67	11.5	61	13.5	57	12.5	68	13
N	32	76	8.5	81	6	70	9.5	91	2
O	29	78	6	86	1	71	7.5	71	12
P	32	81	5	84	3	76	3	86	6
Q	51	56	14.5	64	11	53	16	63	14.5
ATCS Group	614	69		70		66		74	
ATCT Group	514	93		--		43		--	

# Appendix 6

Percentage of ATCSs who submitted one or more statements under the  
"Problems, Recommendations, and/or Comments" section

Facility	Total N	N Responding	Percent Responding	Total Number of Responses	Mean Response Per Subject
A	49	28	57	44	0.90
B	42	24	57	45	1.07
C	32	14	44	33	1.03
D	31	17	55	44	1.42
E	34	22	65	20	0.59
F	40	28	70	29	0.73
G	22	17	77	42	1.91
H	33	19	58	22	0.67
I	28	12	43	32	1.14
J	58	27	47	18	0.31
K	28	15	54	29	1.04
L	35	19	54	23	0.66
M	38	25	66	51	1.34
N	32	16	50	46	1.44
O	29	18	62	29	1.00
P	32	24	75	35	1.09
Q	51	23	45	32	0.63
ATCS Group	614	350	57	574	0.93
ATCT Group	514	62	12	76	0.15

Facility	Response Category																	
	Job Challenge		Job Tasks		Career Characteristics		Salary		Work Schedule		Peers		Miscellaneous		Facilities		Management	
	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order
A	40.7	1	17.7	2	7.1	5	12.4	3	6.2	6	9.7	4	3.5	7	2.7	8	0.0	9
B	53.6	1	16.1	2.5	16.1	2.5	7.1	4	3.6	5	0.0	8.5	1.8	6.5	1.8	6.5	0.0	8.5
C	54.0	1	24.0	2	8.0	4	10.0	3	2.0	5.5	0.0	8	0.0	8	2.0	5.5	0.0	8
D	41.8	1	20.0	2	10.9	3	3.6	7	3.6	7	3.6	7	9.3	4	3.6	7	3.6	7
E	35.7	1	21.4	2	15.5	3.5	15.5	3.5	1.2	8	4.8	5	2.4	7	3.6	6	0.0	9
F	40.6	1	24.7	2	13.9	3	11.9	4	5.0	5	2.0	6.5	2.0	6.5	0.0	8.5	0.0	8.5
G	47.3	1	18.2	2	10.9	3	9.1	4.5	0.0	9	9.1	4.5	1.8	7	1.8	7	1.8	7
H	47.0	1	5.9	6	14.7	2	13.2	3	7.4	4.5	7.4	4.5	1.5	8	2.9	7	0.0	9
I	37.5	1	10.7	4	12.4	3	16.1	2	8.9	5	5.4	6	3.6	7.5	3.6	7.5	1.8	9
J	45.3	1	18.5	2	15.5	3	7.2	4	5.2	5	3.1	6.5	2.1	8	3.1	6.5	0.0	9
K	36.6	1	23.9	2	11.3	3	7.0	4.5	7.0	4.5	4.2	7.5	5.8	6	4.2	7.5	0.0	9
L	40.0	1	17.5	2	11.3	4	12.5	3	7.5	5	0.0	8.5	5.0	7	6.2	6	0.0	9.5
M	44.7	1	15.8	2.5	15.8	2.5	6.6	4.5	3.8	7	6.6	4.5	5.3	6	1.3	8	0.0	9
N	48.6	1	20.8	2	13.9	3	6.9	4	1.4	7.5	1.4	7.5	4.2	5	0.0	9	2.8	6
O	36.8	1	19.1	2	13.2	4	16.2	3	5.9	6	1.5	7	0.0	8.5	7.3	5	0.0	8.5
P	37.2	1	11.6	4	17.9	2	17.2	3	5.1	6	6.4	5	2.6	7	1.3	8	0.0	9
Q	46.5	1	15.1	3	17.4	2	9.3	4	2.3	7	5.8	5	0.0	8.5	3.6	6	0.0	8.5
ATCS Group	42.7	1	17.9	2	13.3	3	11.0	4	4.6	5	4.3	6	2.9	7	2.8	8	0.5	9
p*	.01		.01		NS		.01		NS		NS		NS		.01			

\*The values represent the significance level of the differences between proportions of statements assigned to each of the adjacent categories.

## Appendix 8

Percentage of ATCSs' "dislikes in general" statements classified under each of the nine response categories.

Facility	Response Category																	
	Management		Work Schedule		Career Characteristics		Job Tasks		Facilities		Salary		Job Challenge		Peers		Miscellaneous	
	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order
A	15.2	3.5	15.2	3.5	19.0	1	16.2	2	12.4	5	10.5	6	6.7	7	4.8	8	0.0	9
B	26.9	1	23.9	2	13.4	3.5	13.4	3.5	9.0	5	6.0	6.5	6.0	6.5	1.4	8	0.0	9
C	29.1	1	18.2	2	12.7	4	9.1	6	12.7	4	12.7	4	5.5	7	0.0	8.5	0.0	8.5
D	28.0	1	16.0	2.5	10.0	5.5	16.0	2.5	10.0	5.5	12.0	4	4.0	7	2.0	8.5	2.0	8.5
E	21.0	2	28.9	1	18.4	3	13.2	4	5.3	6	5.3	6	5.3	6	2.6	8	0.0	9
F	18.8	2.5	24.8	1	18.8	2.5	7.9	6.5	11.9	4	8.9	5	7.9	6.5	0.0	9	1.0	8
G	25.0	1	18.8	2.5	12.5	4	8.3	5.5	18.8	2.5	6.2	7	8.3	5.5	2.1	8	0.0	9
H	36.2	1	7.3	6.5	13.0	2.5	13.0	2.5	8.7	5	11.6	4	7.3	6.5	2.9	8	0.0	9
I	24.5	1	13.2	4	18.9	3	20.8	2	5.7	7	7.5	5.5	7.5	5.5	1.9	8	0.0	9
J	22.8	1	19.6	2	17.5	3	12.0	4	4.3	7	10.9	5.5	10.9	5.5	2.2	8	0.0	9
K	24.6	2	31.9	1	10.1	4	10.1	4	5.8	6.5	5.8	6.5	10.1	4	1.6	8	0.0	9
L	25.0	1	21.1	2	15.8	3.5	15.8	3.5	3.9	7	2.6	8	10.5	5	5.3	6	0.0	9
M	23.1	2	29.2	1	20.0	3	4.6	6	3.1	7.5	7.7	4.5	3.1	7.5	7.7	4.5	1.5	9
N	21.2	2	42.4	1	6.1	6	6.1	6	9.1	3	6.1	6	7.5	4	0.0	9	1.5	8
O	25.8	1	12.9	4	17.7	2	16.2	3	11.3	5	8.1	6	4.8	7	1.6	8.5	1.6	8.5
P	19.2	2.5	20.1	1	19.2	2.5	6.8	5.5	6.8	5.5	5.8	7	12.1	4	0.0	8.5	0.0	8.5
Q	23.5	1	8.6	6	22.2	2	18.5	3	11.1	4	9.9	5	4.9	7	1.3	8	0.0	9
ATCS Group	23.5	1	21.3	2	16.1	3	12.3	4	8.7	5	8.1	6	7.4	7	2.2	8	0.4	9
p*	NS		.01		.05		.01		NS		NS		.01		.05			

\*The values represent the significance level of the differences between proportions of statements assigned to each of the adjacent categories.



Appendix 9  
Percentage of ATCSs' "likes at facility" statements classified under each of the nine response categories.

Facility	Response Category																	
	Job Tasks		Facilities		Peers		Job Challenge		Management		Career Characteristics		Salary		Work Schedule		Miscellaneous	
	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order
A	38.8	1	13.2	2.5	13.2	2.5	9.1	5	5.8	6	9.9	4	4.1	7	3.3	8	2.5	9
B	19.2	3	36.9	1	9.6	4	21.0	2	3.8	6	3.8	6	3.8	6	0.0	9	1.9	8
C	28.9	1	20.0	2	17.8	3	8.9	4.5	6.7	6	4.4	7.5	4.4	7.5	8.9	4.5	0.0	9
D	20.3	1	15.2	4	18.6	2	16.9	3	6.8	6.5	13.6	5	1.7	8	6.8	6.5	0.0	9
E	33.3	2	39.7	1	5.1	4	12.8	3	2.6	6.5	3.8	5	0.0	8.5	0.0	8.5	2.6	6.5
F	34.0	1	18.5	3	15.5	4	19.6	2	3.1	6	0.0	9	7.2	5	1.0	7.5	1.0	7.5
G	34.6	1	15.4	2.5	15.4	2.5	13.5	4	7.7	5	1.9	8	5.8	6.5	5.8	6.5	0.0	9
H	41.4	1	24.1	2	13.8	3	8.6	4	5.2	5.5	0.0	8.5	1.7	7	5.2	5.5	0.0	8.5
I	14.9	4	26.9	1	22.4	2	16.4	3	7.5	5	6.0	6	0.0	9	4.5	7	1.5	8
J	31.8	1	29.0	2	12.1	4	14.0	3	5.6	5	2.8	6	1.9	7.5	1.9	7.5	0.9	9
K	35.2	1	28.2	2	18.3	3	5.6	4.5	5.6	4.5	4.2	6	0.0	9	1.4	7.5	1.4	7.5
L	22.2	2	24.7	1	17.3	3	11.1	5	12.3	4	2.5	8	3.7	7	6.2	6	0.0	9
M	25.7	2	30.0	1	18.6	3	10.0	4	5.7	5	2.9	7	1.4	8.5	4.3	6	1.4	8.5
N	43.6	1	16.7	3	23.1	2	6.4	4	1.3	7	0.0	8.5	3.8	6	5.1	5	0.0	8.5
O	21.3	2	25.0	1	13.3	4	13.3	4	13.3	4	0.0	9	5.3	7	6.7	6	1.3	8
P	16.3	4	26.0	1	21.3	2	17.5	3	5.0	6	0.0	9	7.5	5	2.5	8	3.7	7
Q	32.7	1	11.2	3	9.2	5	26.5	2	2.0	8	10.2	4	4.1	6.5	0.0	9	4.1	6.5
ATCS Group	29.7	1	23.1	2	15.3	3	13.8	4	5.7	5	4.1	6	3.4	7.5	3.4	7.5	1.5	9
p*	.01		.01		NS		.01		NS		NS		NS		.01			

\*The values represent the significance level of the differences between proportions of statements assigned to each of the adjacent categories.

# Appendix 10

Percentage of ATCSs' "dislikes at facilities" statements classified under each of the nine response categories.

Facility	Response Category																	
	Facilities		Management		Job Tasks		Work Schedule		Peers		Career Characteristics		Miscellaneous		Salary		Job Challenge	
	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order
A	25.4	2	26.4	1	9.1	4	16.4	3	4.5	6.5	4.5	6.5	6.4	5	3.6	8.5	3.6	8.5
B	12.9	2	60.0	1	4.3	5.5	7.1	4	2.8	7	4.3	5.5	8.6	3	0.0	8.5	0.0	8.5
C	25.0	2	43.0	1	16.7	3	8.3	4	4.2	5	1.4	6.5	1.4	6.5	0.0	8.5	0.0	8.5
D	30.5	2	33.9	1	16.9	3	5.1	5	6.8	4	1.7	7.5	3.4	6	0.0	9	1.7	7.5
E	19.1	3	22.5	2	23.6	1	13.5	4	4.5	6.5	4.5	6.5	10.1	5	0.0	9	2.2	8
F	31.5	1	18.5	3	13.0	4	23.1	2	5.6	6	7.4	5	0.9	7	0.0	8.5	0.0	8.5
G	30.0	2	31.7	1	6.7	4.5	20.0	3	6.7	4.5	3.3	6	1.7	7	0.0	8.5	0.0	8.5
H	50.6	1	13.9	3.5	13.9	3.5	15.2	2	3.8	5	1.3	6.5	0.0	8.5	1.3	6.5	0.0	8.5
I	29.0	1	21.0	2	16.1	3.5	8.1	5	1.6	7.5	6.5	6	16.1	3.5	0.0	9	1.6	7.5
J	28.7	1	24.5	3	25.5	2	12.8	4	3.2	6	4.2	5	0.0	8.5	1.1	7	0.0	8.5
K	27.6	2	30.3	1	18.4	3	13.1	4	2.6	7	3.9	5.5	3.9	5.5	0.0	8.5	0.0	8.5
L	23.4	2	20.5	3	15.1	4	28.2	1	6.4	5	5.1	6	1.3	7	0.0	8.5	0.0	8.5
M	19.5	2	50.6	1	11.7	3	5.2	4.5	2.6	6.5	5.2	4.5	1.3	8.5	2.6	6.5	1.3	8.5
N	60.9	1	14.7	2	11.5	3	6.9	4	1.1	6.5	3.4	5	1.1	6.5	0.0	8.5	0.0	8.5
O	16.1	3	37.1	1	27.4	2	11.3	4	1.6	7	1.6	7	3.2	5	1.6	7	0.0	9
P	36.6	1	25.6	2	15.9	3	11.0	4	8.5	5	1.2	6.5	1.2	6.5	0.0	8.5	0.0	8.5
Q	45.4	1	15.5	3	24.7	2	3.1	5.5	3.1	5.5	4.1	4	1.0	8.5	2.1	7	1.0	8.5
ATCS Group	30.8	1	27.8	2	15.9	3	12.6	4	4.1	5	3.9	6	3.4	7	0.8	8	0.7	9
p*	NS		.01		.05		.01		NS		NS		.01		NS		NS	

\*The values represent the significance level of the differences between proportions of statements assigned to each of the adjacent categories.

# Appendix 11

Percentage of ATCSs' "problems, comments, and recommendations" statements classified under each of the nine response categories.

Facility	Response Category																	
	Management		Career Characteristics		Facilities		Work Schedule		Job Tasks		Salary		Peers		Miscellaneous		Job Challenge	
	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order	Per Cent	Rank Order
A	21.7	2	28.3	1	19.6	3	4.3	6	10.9	5	13.0	4	2.2	7	0.0	8.5	0.0	8.5
B	52.3	1	29.6	2	4.5	4.5	4.5	4.5	0.0	8	0.0	8	2.3	6	6.8	3	0.0	8
C	34.8	1	17.4	3	21.7	2	4.3	6	8.8	5	13.0	4	0.0	8	0.0	8	0.0	8
D	48.3	1	13.9	3	24.1	2	6.9	4	0.0	8	3.4	5.5	3.4	5.5	0.0	8	0.0	8
E	33.3	1	18.2	3	24.2	2	6.1	5.5	12.1	4	0.0	8	6.1	5.5	0.0	8	0.0	8
F	16.0	3	29.6	1	25.0	2	9.1	4	6.8	5	4.5	7	4.5	7	4.5	7	0.0	9
G	38.0	1	24.1	2	20.7	3	6.9	4.5	0.0	8	0.0	8	6.9	4.5	0.0	8	3.4	6
H	28.1	1	22.0	3	25.0	2	6.2	5	3.1	6	15.6	4	0.0	8	0.0	8	0.0	8
I	61.1	1	16.8	2	5.5	4.5	5.5	4.5	11.1	3	0.0	7.5	0.0	7.5	0.0	7.5	0.0	7.5
J	25.5	1	23.5	2	17.6	3	13.7	4	2.0	7.5	11.8	5	2.0	7.5	3.9	6	0.0	9
K	40.0	1	5.0	5.5	5.0	5.5	30.0	2	10.0	3	5.0	5.5	0.0	8.5	5.0	5.5	0.0	8.5
L	28.1	1.5	9.5	5	28.1	1.5	12.5	3.5	12.5	3.5	6.2	6	3.1	7	0.0	8.5	0.0	8.5
M	53.3	1	11.1	2.5	8.9	4	2.2	7.5	11.1	2.5	4.4	6	6.8	5	2.2	7.5	0.0	9
N	31.8	1	22.9	2	4.5	6.5	18.2	3	4.5	6.5	4.5	6.5	9.1	4	4.5	6.5	0.0	9
O	38.0	1	27.6	2	6.9	4.5	3.4	6	17.2	3	6.9	4.5	0.0	8	0.0	8	0.0	8
P	47.6	1	14.3	3	23.8	2	2.4	6	2.4	6	7.1	4	2.4	6	0.0	8.5	0.0	8.5
Q	20.0	2	34.3	1	5.7	6	11.4	4.5	17.2	3	11.4	4.5	0.0	8	0.0	8	0.0	8
ATCS Group	35.4	1	21.3	2	16.5	3	8.0	4	7.3	5	6.6	6	3.0	7	1.7	8	0.2	9
p*	.01		NS		.01		NS		NS		.01		NS		.01			
*The values represent the significance level of the differences between proportions of statements assigned to each of the adjacent categories.																		

# Appendix 12

Correlations between the rank order of response categories for each facility according to the percentage of statements assigned to each category and the rank order for the total ATCS group

Facility	Likes in General		Likes at Facility		Dislikes in General		Dislikes at Facility		Problems, Comments & Recommendations	
	$\underline{r}_s$	$P^*$	$\underline{r}_s$	P	$\underline{r}_s$	P	$\underline{r}_s$	P	$\underline{r}_s$	P
A	.91	.01	.93	.01	.86	.01	.91	.01	.91	.01
B	.95	.01	.83	.01	.99	.01	.76	.05	.64	.05
C	.88	.01	.87	.01	.91	.01	.97	.01	.90	.01
D	.69	.05	.90	.01	.88	.01	.89	.01	.88	.01
E	.88	.01	.87	.01	.97	.01	.87	.01	.86	.01
F	.95	.01	.77	.05	.88	.01	.90	.01	.93	.01
G	.80	.01	.95	.01	.94	.01	.95	.01	.75	.05
H	.80	.01	.92	.01	.84	.01	.91	.01	.91	.01
I	.93	.01	.85	.01	.88	.01	.81	.01	.92	.01
J	.97	.01	.98	.01	.95	.01	.93	.01	.90	.01
K	.96	.01	.94	.01	.88	.01	.92	.01	.70	.05
L	.84	.01	.90	.01	.86	.01	.95	.01	.88	.01
M	.90	.01	.92	.01	.77	.05	.89	.01	.80	.01
N	.74	.05	.81	.01	.75	.05	.97	.01	.76	.05
O	.87	.01	.85	.01	.95	.01	.85	.01	.88	.01
P	.92	.01	.70	.05	.86	.01	.97	.01	.89	.01
Q	.89	.01	.63	.05	.83	.01	.89	.01	.83	.01

\* $P$  = probability that the correlation would have occurred by chance.