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Organizational Cultural Assessment of the Princeton Plasma Physics Laboratory



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EXECUTIVE SUMMARY

An Organizational Cultural Assessment (OCA) was performed at the Princeton Plasma Physics Laboratory (PPPL) by administering an Organizational Culture Survey (OCS) that queried employees on the subjects of organizational culture, various aspects of communications, employee commitment, work group cohesion, coordination of work, environmental concerns, hazardous nature of work, safety and overall job satisfaction. Many of these subjects are assessed in the OCS through highly developed and validated scales that have been administered in many different types of organizations. Some of the issues, especially the questions on environmental, safety and health concerns, are newly developed and are still being modified. The purpose of the OCS is to measure in a quantitative and objective way the notion of "culture;" that is, the values, attitudes, and beliefs of the individuals working within the organization. In addition, through the OCS, a broad sample of individuals can be reached that would probably not be interviewed or observed during the course of a typical assessment. The OCS also provides a descriptive profile of the organization at one point in time that can then be compared to a profile taken at a different point in time to assess changes in the culture of the organization.

The OCS administration at PPPL was the third to occur at a Department of Energy facility. The OCS was administered at PPPL in large groups. Of the 814 employees at PPPL, 600 voluntarily completed the survey, for a response rate of 73.7 percent. The distribution of response was varied across departments with a low response rate of 28.0 percent to a high response rate of 121.7 percent. The greater than 100 percent response rate occurred in two departments and was most likely due to the use of a matrix organization where people often spend the majority of their working time in groups other than the ones to which they are administratively assigned. Consequently, the numbers of employees provided by PPPL for each of the departments did not match the categorization of people responding to the OCS. All data from the OCS is presented in group summaries, by department, supervisory level, and staff classification. Statistically significant differences between groups are identified and discussed.

The most notable statistically significant differences obtained in the PPPL sample were between organizational units identified as departments. In particular, consistent organizational profiles emerged for several departments that are worth mentioning. The Safety/Quality Assurance and Theory Departments scored consistently higher on the scales that measured expectations for achievement, self-actualization, humanistic, and affiliative cultural styles than did the Experimental Projects and Controller's Office Departments which scored higher on the scales that measured expectations for approval, conventional, dependent, and avoidance cultural styles. This result is more interesting for the Experimental Projects Department, which is demographically constituted more similarly to the other project departments and yet repeatedly scored lower than those departments on most of the OCS scales. These differences may have to be explained by factors outside the assessment capabilities of the OCA.

The few statistically significant differences obtained in the PPPL sample for staff classification and supervisory level may be explained by several factors. The results from the departmental summaries indicated a strong identification at PPPL with functional groupings. This is probably due to the matrix organizational structure and negates strong differences between staff classifications. The supervisory level differences may have been masked by confusion on the part of employees in identifying themselves as supervisors. In both categories of supervisors used on the demographics sheet of the OCS, Administrative and Scientific/Engineering, greater than 100 percent response rates were obtained. Besides the statistical implications of this discrepancy with respect to the differences reported between supervisory levels, there could be organizational consequences if all these individuals are actually functioning in supervisory capacities.

Few significant differences were obtained in the PPPL sample on the Communication Scales and the mean values on these scales were above the midpoint of the scale, indicating that employees participating in the OCA did not perceive communication to be troublesome in the organization. No differences were obtained on the Job Satisfaction Scale, but the mean value for the sample was high indicating that these employees were satisfied with their jobs. PPPL employees who responded to the OCS appear to be committed to the organization, but in general identify to a greater extent with their own work groups than with the entire organization. This is indicated by the higher mean values obtained on the Cohesion Scale as compared to the Commitment Scale.

While some differences between departments were obtained on the Hazard Scale and on the Onsite and Offsite Environmental Consequences questions, no statistically significant differences were obtained on the Safety Scale. The overall mean on the Safety Scale was high, indicating that regardless of the perceived hazardous nature of their work, the PPPL sample had a high attention and awareness to the behaviors important to safety.

Contrasts in cultural styles in the PPPL sample, as measured by some of the scales on the OCS, are not obvious and a particular style is not dominant. The overall organizational profile which emerges from the results of the PPPL sample is one of cultural ambiguity. The two strongest cultural styles which emerge from the overall means on the OCI are a supportive and yet defensive style. The lack of a dominant cultural style may be indicative of an organization in transition or change.

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ACRONYMS

General

DOE	U.S. Department of Energy
OCA	Organizational Cultural Assessment
OCI	Organizational Culture Inventory
OCS	Organizational Culture Survey
PPPL	Princeton Plasma Physics Laboratory
STD	Standard

Departments

ADM	Administration
BPX	Burning Plasma Experiment
CON	Controller's Office
ENG	Engineering
EXP	Experimental Projects
OTH	Other
SQA	Safety/Quality Assurance
THR	Theory
TFTR	Tokamak Fusion Test Reactor

Staff Classifications

RES	Research
ESS	Engineering and Scientific Staff
ADM	Administration
SLS	Senior Laboratory and Shop
O&C	Office and Clerical
L&S	Laboratory and Shop

Supervisory Levels

SES	Scientific/Engineering Supervision
ADS	Administrative Supervision
NSU	Non-supervisory
SUP	Supervisory

Survey Scales

C1	Humanistic-Encouraging
C2	Affiliative
C3	Approval
C4	Conventional
C5	Dependent
C6	Avoidance
C7	Oppositional

ACRONYMS (Continued)

Survey Scales (Continued)

C8	Power
C9	Competition
C10	Perfectionistic
C11	Achievement
C12	Self-Actualizing

ACCURACY (CMA)	Perceived Accuracy of Communications
AWARENESS (EMA)	Employee Awareness of Workplace Hazards
COHESION (COH)	Cohesion of Work Group
COMMITMT (COT)	Organizational Commitment
COORD (COD)	Coordination
EMPHASIS (MGE)	Management Emphasis of Environmental Issues
HAZARD (HAZ)	Perceived Hazardous Nature of Work
INTERACT (CMI)	Desirability of Interaction with Others
JOBSAT (JOB)	Overall Job Satisfaction
OFFSITE (OFF)	Consequence to Offsite Environment
ONSITE (ONS)	Consequence to Onsite Environment
SAFETY (SAF)	Attention to Safety
SATISFAC (CMS)	Satisfaction with Communications
TRUST (CMT)	Trust in Communications

1. INTRODUCTION

An Organizational Cultural Assessment (OCA) was performed at the Princeton Plasma Physics Laboratory (PPPL) by administering an Organizational Culture Survey (OCS) that queried employees on the subjects of organizational culture, various aspects of communication, employee commitment to PPPL, work group cohesion, coordination of work, environmental, safety, and health concerns, hazardous nature of work, and overall job satisfaction. A description of each of the scales used to assess these subjects is discussed below.

The primary purpose of administering the survey was to attempt to measure, in a more quantitative and objective way the notion of "organizational culture," that is, the values, attitudes, and beliefs of the individuals working within the organization. In particular, those aspects of the working environment which are believed to be important influences on the operations of a facility and on the safety issues relevant to the organization were assessed.

In addition, by conducting a survey, a broad sampling of the individuals in the organization can be obtained. This is especially important when the survey is utilized in conjunction with an assessment or inspection team which typically has only a limited amount of resources to address many issues. The OCS provides a broad, but more comprehensive picture of the organization by querying a much larger number of individuals than could be reached through the assessment team alone.

Finally, the OCS provides a descriptive profile of the organization at one point in time. This profile can then be used as a baseline point against which comparisons of other points in time can be made. Such comparisons may prove valuable and would help to assess changes in the organizational culture. Comparisons of the profiles can also be made across similar facilities.

2. METHODOLOGY

The Organizational Culture Survey (OCS) was administered to the employees of the Princeton Plasma Physics Laboratory (PPPL) on January 24 and 25, 1991. Groups were scheduled at various times over the two days to complete the survey in a large auditorium. Prior to the survey administration, a memorandum from the Director of PPPL was circulated to all employees encouraging them to participate in the survey administration. The memorandum also contained the times at which various groups of employees were scheduled to report to the auditorium and complete the survey. Included with the survey booklet was a cover letter explaining the purpose and use of the survey results. A demographics sheet attached to the survey requested information pertaining to the department in which the respondent was located, the number of years they had been working at PPPL, their staff classification, and supervisory and educational levels.

Two technical specialists familiar with the survey were at PPPL to administer the survey and to answer any questions which employees may have had while completing the questionnaire. PPPL has a total of 814 employees, and 600 usable surveys were completed, for a response rate of 73.7 percent.

The completed surveys were taken from PPPL for data entry and analysis. Quality control checks were conducted on 10 percent of the data entered to ensure that the error rate for data entry was not excessive. All identified errors were corrected prior to data analysis.

Overall means, standard errors, and standard deviations were computed for each scale assessed in the OCS. A one-way analysis of variance was also performed on each OCS scale using the scale score as the dependent variable and separate analyses using department, staff classification, and supervisory level as the independent variables. In order to control the false positive rate (Type I error rate), the Bonferroni correction was applied to all the analyses of variance performed for each independent variable. Since there were 26 one-way analyses of variance for each independent variable, the significance level for each analysis was reduced to $.05/26 = .0019$. Where the analysis of variance showed a significant difference among the group means at the .0019 level, a Tukey HSD (Honestly Significant Difference) (Hays, 1988) procedure was applied to identify those means that were statistically significantly different from each other. Consequently, the results that are reported to be significantly different from each other represent a very conservative approach in the interpretation of the data analysis performed.

Included in this report are the overall results for PPPL on each of the scales used in the OCS. In addition, any statistically significant differences between departments, staff classifications, and supervisory levels are also presented.

3. ORGANIZATIONAL DESCRIPTION

The Princeton Plasma Physics Laboratory (PPPL) identifies its organizational units as departments. The demographics sheet used in the administration of the Organizational Culture Survey (OCS) included eight of these departments, and an additional department called "Other." The "Other" Department consisted of the following four departments: Scheduling, Technology Transfer, Departmental Offices, and the Director's Office. The departments and their abbreviations, as used in this report, are presented in Table 3.1. Also presented in this table are the response rates for each department. The response rate is computed by dividing the number of surveys returned by the number of employees in that department.

Table 3.1. Response Rates by Department for PPPL

Department	Number of Responses	Number of Employees	Response Rate
Administration (ADM)	88	182	48.4
Burning Plasma Experiment (BPX)	19	20	95.0
Controller's Office (CON)	22	31	71.0
Engineering (ENG)	142	210	67.6
Experimental Projects (EXP)	28	23	121.7 ¹
Other (OTH) ²	25	23	108.7 ¹
Safety/Quality Assurance (SQA)	29	33	87.9
Theory (THR)	14	50	28.0
Tokamak Fusion Test Reactor (TFTR)	183	242	75.6
Unknown	50	----	----
TOTAL:	600	814	73.7

Notes: ¹ For both the EXP and OTH Departments, the response rates are greater than 100 percent, which may be a result of the matrix organization at PPPL.

² OTH consists of the following departments: Scheduling; Technology Transfer; Departmental Offices; and Director's Office.

In interpreting the results by departments, staff classifications, and supervisory level, it is important to note those groups which have less than a 50 percent response rate. For the groups in which the response rate is less than 50 percent (and in particular the Theory Department which has a response rate of 28 percent), the results may not be representative of the majority of employees within that group.

PPPL employees were also given six staff classifications on the demographic sheet in which to categorize themselves. Table 3.2 presents these staff classifications, and their abbreviations, as used in this report. Also presented in this table are the response rates for each staff classification.

Table 3.2. Response Rates by Staff Classifications for PPPL

Staff Classification	Number of Responses	Number of Employees	Response Rate
Research (RES)	71	109	65.1
Engineering & Scientific Staff (ESS)	156	172	90.7
Administration (ADM)	89	104	85.6
Senior Laboratory & Shop (SLS)	75	126	59.5
Office & Clerical (O&C)	54	75	72.0
Laboratory & Shop (L&S)	99	228	43.4
Unknown	56	----	----

The OCS demographics questions used at PPPL also provided three categories of supervisory levels by which an employee could identify him/herself. In computing the response rate for these supervisory levels, the numbers for each level provided by PPPL did not match the number of employees who identified themselves as belonging to that level in two of the categories. In particular, PPPL indicated that 35 employees were classified as Administrative Supervisors. However, of the 600 PPPL employees who took the OCS, 74 indicated that they were Administrative Supervisors (a response rate of 211.4 percent). In the Scientific/Engineering Supervisory category, 134 individuals identified themselves as belonging to this group. PPPL indicated that 92 employees were classified as Scientific/Engineering Supervisors, for a response rate of 145.7 percent. For this reason, Table 3.3a presents the percent of the total sample which the three categories represent, rather than the response rate for each supervisory level.

In an attempt to understand which individuals might have misclassified themselves as supervisors (either Administrative or Scientific/Engineering), frequency counts of staff classifications within each of these two supervisory levels were conducted. Table 3.3b depicts the staff classifications for individuals who chose the Scientific/Engineering Supervisory level. Table 3.3c has a similar breakdown of staff classifications for those PPPL employees who classified themselves as Administrative Supervisors. PPPL management will have to examine these frequencies to attempt to identify where the discrepancies in the numbers may be.

Table 3.4 presents information on the number of years the OCS respondents had been at PPPL. Approximately 12 percent of the OCS respondents had been at PPPL five years or less. Just over 57 percent of the respondents had been employed at PPPL between six and 15 years. Sixty-three respondents, or 10.5 percent, chose not to indicate the number of years they had been at PPPL.

Table 3.3a. Response by Supervisory Level for PPPL

Supervisory Level	Number of Responses	Percent of Total Sample (600)
Non-Supervisory (NSU)	329	54.8
Scientific/Engineering Supervision (SES)	134	22.3
Administrative Supervision (ADS)	74	12.3
Unknown	61	10.2

Table 3.3b. Staff Classifications for Scientific/Engineering Supervisors

Staff Classification	Frequency
Research (RES)	35
Engineering & Scientific Staff (ESS)	70
Senior Laboratory & Shop (SLS)	20
Laboratory & Shop (L&S)	3
Unknown	6

Table 3.3c. Staff Classifications for Administrative Supervisors

Staff Classification	Frequency
Research (RES)	2
Engineering & Scientific Staff (ESS)	2
Administration (ADM)	54
Senior Laboratory & Shop (SLS)	7
Office & Clerical (O&C)	3
Laboratory & Shop (L&S)	4
Unknown	2

Table 3.4. Number of Years at PPPL

Years at PPPL	Number of Responses	Percent of Total Sample
0 to 5	70	11.7
6 to 10	155	25.8
11 to 15	188	31.3
16 to 20	62	10.3
21 to 25	25	4.2
26 to 30	22	3.7
31 to 35	11	1.8
36 to 40	4	0.6
Unknown	63	10.5

Table 3.5 depicts the number returned and the percent of the total sample by educational level that number represents for PPPL. The majority of respondents at PPPL had some college education or a higher educational level, and in fact, the largest percentage of the returned sample had a graduate degree (27.5 percent).

Table 3.5. Educational Levels at PPPL

Educational Level	No. of Responses	Percent of Total Sample
Some High School	6	1.0
High School Degree	67	11.2
Some Technical School	48	8.0
2-Year Technical Degree	40	6.7
Some College	133	22.2
College Degree	93	15.5
Some Graduate Work	24	4.0
Graduate Degree	165	27.5
Unknown	24	4.0

Table 3.6 presents the modal educational level and mean number of years at PPPL for the survey respondents in each department. In the Administration Department, the Controller's Office and the Other Department, the modal educational level was some college, while in the Safety/Quality Assurance

Department, the modal educational level was a College Degree. In all other departments, as well as for PPPL overall, the modal educational level was a graduate degree.

Table 3.6. Modal Educational Level and Mean Number of Years at PPPL for each Department

Department	Years at PPPL	Educational Level ²
Over All Departments	12.6	8
Administration (ADM)	12.2	5
Burning Plasma Experiment (BPX)	13.4	8
Controller's Office (CON)	8.1	5
Engineering (ENG)	13.7	8
Experimental Projects (EXP)	15.5	8
Other (OTH) ¹	9.0	5
Safety/Quality Assurance (SQA)	9.3	6
Tokamak Fusion Test Reactor (TFTR)	13.2	8
Theory (THR)	14.2	8
Unknown	11.5	5

Notes: ¹ Other Department consists of the following departments: Scheduling; Technology Transfer; Departmental Offices; and Director's Office.

² For educational level: 5 = Some College; 6 = College Degree; 7 = Some Graduate School, 8 = Graduate Degree.

The mean number of years employed at PPPL for the facility as a whole, based on this sample, was 12.6. The Controller's Office had the lowest mean number of years at PPPL (8.1 years), while employees the Experimental Projects Department had the longest tenure at PPPL, averaging 15.5 years.

4. ORGANIZATIONAL CULTURE SURVEY SCALES AND RESULTS

The Organizational Culture Survey (OCS) administered at Princeton Plasma Physics Laboratory (PPPL) was comprised of the Organizational Culture Inventory (OCI), consisting of 12 scales describing different organizational cultural styles, and scales assessing communication processes, commitment to the organization, cohesiveness to work group, coordination of work, overall job satisfaction, perceived hazardous nature of work, and questions concerning environmental, safety, and health issues. The results from each of these scales are discussed in the sections that follow. Each section presents the overall results for PPPL on that scale(s), the results by department, by staff classification, and by supervisory level.

4.1 Organizational Culture Inventory

4.1.1 Description

The philosophy of management, the mission of the organization, and the strategic choices management makes determine the culture of the organization (Cooke and Burack, 1987). The aspect of culture most immediately affected by these factors is what is valued by the organization. The extent to which these values are recognized and shared reflects the strength of the organization's culture. Organizational factors, along with these shared values, influence the operating structures of the organization, its human resource management practices, and the styles of its managers and supervisors. To the extent that these shared values and behavioral norms can be measured and evaluated, data collection of this type is important in understanding the organizational factors that influence performance.

The Organizational Culture Inventory (OCI) (Human Synergetics, 1987) is a paper-and-pencil diagnostic system for measuring the aspects of organizational culture that have the greatest impact on the activities of members and the functioning of the organization. Respondents are asked to review 120 statements which describe some of the thinking and behavioral styles that members of an organization may be expected to adopt in carrying out their work and in interacting with others. These statements measure 12 different cultural styles, some of which are indicative of a positive and supportive environment, while others are useful in identifying potentially dysfunctional environments. All of the styles measured by the OCI are related to, and result from, organizational structural variables, reward systems, managerial styles and philosophies, and other factors that can be changed, at least to some extent, by those in leadership positions.

The 12 organizational culture styles, with examples of the items used to assess each one, are described below.

C1: HUMANISTIC-ENCOURAGING: Organizations which are managed in a participative and person-centered way. Members are expected to be supportive, constructive, and open to influence in their dealings with one another.

- Involving subordinates in decisions;
- Showing concern for the needs of others;
- Giving positive rewards to others.

C2: AFFILIATIVE: Organizations which place high priority on constructive personal relations. The members are expected to be friendly, open, and sensitive to the satisfaction of their work group.

- Thinking in terms of the group satisfaction;
- Using good human relations skills;
- Motivating others with friendliness.

C3: APPROVAL: Organizations in which conflicts are avoided and personal relations are pleasant, at least superficially. Members feel they should agree with and gain approval of others.

- Staying on the good side of superiors;
- Making sure people accept you;
- Setting goals that please others.

C4: CONVENTIONAL: Organizations that are conservative, traditional, and bureaucratically controlled. Members are expected to conform, follow rules, and make a good impression.

- Always following policies and practices;
- Avoiding confrontations;
- Fitting into the "mold."

C5: DEPENDENT: Organizations that are hierarchically controlled and non-participative. Centralized decision-making leads members to do only what they are told and to clear all decisions with superiors.

- Accepting goals without questioning them;
- Never challenging superiors;
- Willingly obeying orders.

C6: AVOIDANCE: Organizations that do not reward success but punish failures. Negative rewards lead members to shift responsibility to others and avoid being blamed for mistakes.

- Taking few chances;
- Laying "low" when things get tough;
- Pushing decisions upward.

C7: OPPOSITIONAL: Organizations in which confrontation prevails and negativism is rewarded. Members gain status and influence by being critical and are encouraged to oppose the ideas of others.

- Pointing out flaws;
- Remaining aloof from the situation;
- Playing the role of the "loyal opposition."

C8: POWER: Non-participative organizations which are structured on the basis of authority in members' positions. Members expect to take charge, control subordinates, and respond to demands of superiors.

- Demanding loyalty;
- Acting forceful;
- Maintaining unquestioned authority.

C9: COMPETITION: Organizations where winning is valued and rewards are given for out-performing others. Members operate in a "win-lose" framework and work against their peers to be noticed.

- Always trying to be right;
- Out-performing one's peers;
- Turning the job into a contest.

C10: PERFECTIONISTIC: Organizations in which persistence, hard work, and perfectionism are highly valued. Members feel they must avoid all mistakes, keep track of everything, and work long hours to attain specific objectives.

- Setting unrealistically high goals;
- Viewing work as more important than anything else;
- Persisting, enduring.

C11: ACHIEVEMENT: Organizations that do things well and value members who set and accomplish their own goals. Members set challenging, but realistic goals, and plan and pursue them with enthusiasm.

- Exploring alternatives before acting;
- Pursuing a standard of excellence;
- Openly showing enthusiasm.

C12: SELF-ACTUALIZING: Organizations that value creativity, quality over quantity, tasks, and individual growth. Members are encouraged to gain satisfaction from their work, develop themselves, and take on new activities.

- Thinking in unique and independent ways;
- Communicating ideas;
- Being spontaneous.

From these twelve scales, three cultural styles are described. The first style is comprised of the Humanistic-Encouraging Scale (C1), the Affiliative Scale (C2), the Achievement Scale (C11), and the Self-Actualizing Scale (C12). These scales are considered "Constructive Styles;" in other words, organizations which score high on these four scales tend to promote behaviors which are conducive to the satisfaction of the organizational members.

The second cultural style is the "Passive/Defensive Style." This style is made up of the Approval Scale (C3), the Conventional Scale (C4), the Dependent Scale (C5), and the Avoidance Scale (C6). In organizations which score high on these scales, a culture exists which leads employees of the organization to act and react in a defensive way and at the same time, act in a way which does not pose a threat to one's own security within that organization.

A third cultural style is made up of the Oppositional Scale (C7), the Power Scale (C8), the Competitive Scale (C9), and the Perfectionistic Scale (C10). Organizations which score high on these scales often expect members to act in a way that is both forceful and which protects one's position and status. In other words, members adopt an "Aggressive/Defensive Style" in order to be successful within the organization.

4.1.2 Overall Profile

The overall mean scores on the OCI scales for the entire sample of PPPL employees who responded to the Organizational Culture Survey (OCS) are depicted in Figure 4.1. The scales are identified by number and are described in the preceding section. The scores represent the mean score for the entire sample where the score 1 equals *not at all* and the score 5 equals *a great extent*.

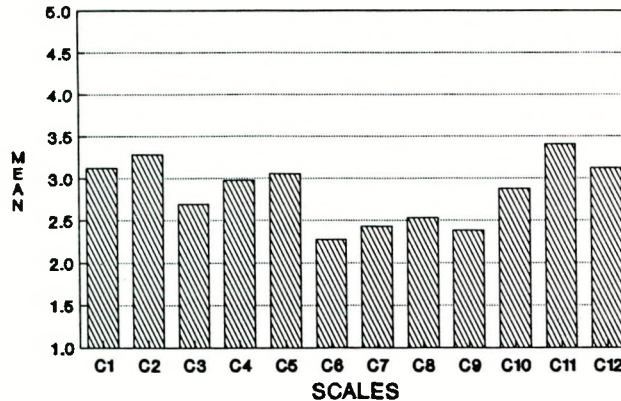


Figure 4.1. Overall means on OCI for PPPL

The organizational profile which emerges from the OCS sample at PPPL is not indicative of a dominant cultural style. The highest mean values do occur on the Constructive Scales, C1, C2, C11, and C12; however, the mean values on three of the four Passive/Defensive Scales, C3, C4, and C5 are also high. Three of the four Aggressive/Defensive Scales, C7, C8, and C9 are the lowest mean values in the profile. The clearest characterization of this profile is that it is flat, with little discrimination between the more positive constructive cultural style and the more negative passive/defensive cultural style.

The members of this organization do perceive achievement, affiliation, self-actualization, and humanistic behaviors as those valued by the organization, but they also perceive the organization to value conventionalism and hierarchical management and control. They do not perceive an overreliance on punishment and, consequently, do not avoid responsibility as evidenced by the low mean score on the Avoidance Scale (C6). PPPL can be described as a constructive organization, with employees who tend to perceive defensiveness, not aggressiveness, as necessary to succeed in their work environment.

4.1.3 Differences Between Departments on the OCI

This section will concentrate on presenting the greatest statistically significant differences obtained between departments in the PPPL sample. While other statistical differences may exist, they will not be discussed here. For those interested in all significant differences between departments on all scales, the data is presented in Appendix A.

As indicated in Figure 4.2, the mean score for the Experimental Projects Department was statistically significantly lower than the mean scores for the Controller's Office, the Other, the Safety/Quality Assurance, and the Theory Departments on the Humanistic-Encouraging Scale (C1). The Safety/Quality Assurance Department had the highest mean score on this scale. No other statistically significant differences were found.

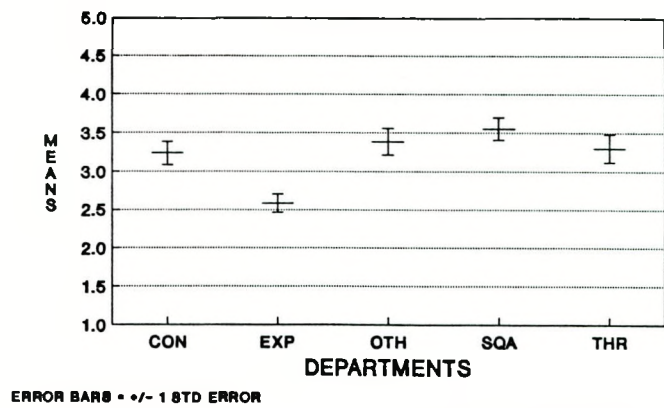


Figure 4.2. Significant differences between departments on humanistic/encouraging scale

Statistically significant differences between departments on the Affiliative Scale (C2) are depicted in Figure 4.3. The Experimental Projects Department scored significantly lower on this scale than the Burning Plasma Experiment, the Theory, the Controller’s Office, the Administration, the Safety/Quality Assurance, and the Other Departments. The Safety/Quality Assurance Department had the highest mean value on the Affiliative Scale. No other significant differences between departments were found.

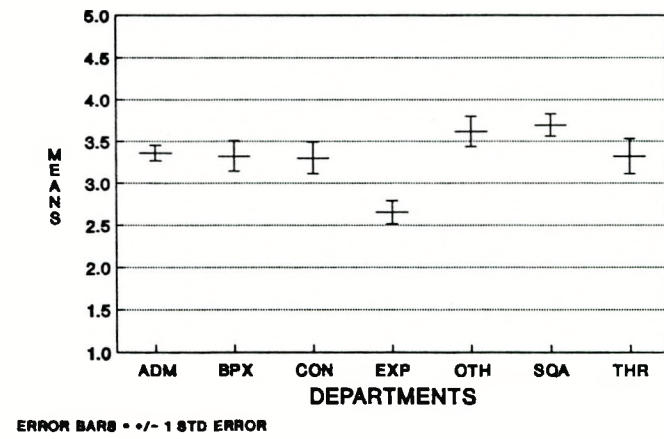


Figure 4.3. Significant differences between departments on affiliative scale

Statistically significant differences between departments on the Approval Scale (C3) are depicted in Figure 4.4. Both the Controller’s Office and the Experimental Projects Departments scored significantly higher on this scale than the Safety/Quality Assurance and Theory Departments, with the Controller’s Office having the highest mean value. The Theory Department had the lowest mean value on the Approval Scale. Other significant differences are presented in Appendix A.

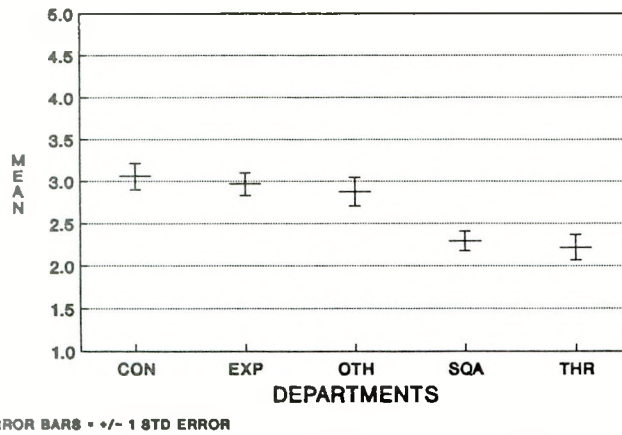


Figure 4.4. Significant differences between departments on approval scale

On the Conventional Scale (C4) (Figure 4.5), the Controller's Office and the Experimental Projects Departments scored significantly higher than the Safety/Quality Assurance and Theory Departments. The Experimental Projects Department had the highest mean value on this scale, while the Theory Department had the lowest. Other significant differences are presented in Appendix A.

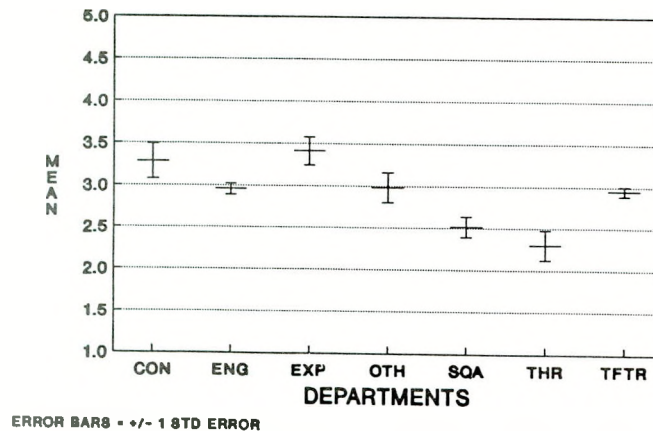


Figure 4.5. Significant differences between departments on conventional scale

Statistically significant differences between departments on the Dependent Scale (C5) are presented in Figure 4.6. On this scale, the Theory Department had the lowest mean value and was statistically significantly different from the Experimental Projects, Tokamak Fusion Test Reactor, Burning Plasma Experiment, Engineering, Controller's Office, Administration, and Other Departments. The Experimental Projects Department had the highest mean value on this scale. Other significant differences between departments on the Dependent Scale are presented in Appendix A.

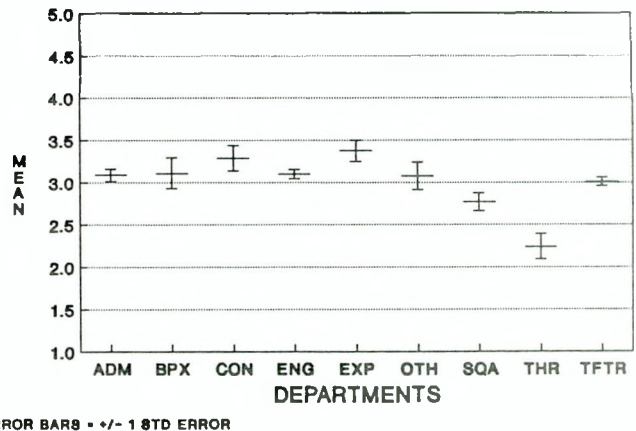


Figure 4.6. Significant differences between departments on dependent scale

On the Avoidance Scale (C6), the Controller’s Office had the highest mean value and, along with the Experimental Projects Department, was statistically significantly different from the Safety/Quality Assurance and Theory Departments. The Theory Department had the lowest mean value on this scale (Figure 4.7). Other significant differences between departments are presented in Appendix A.

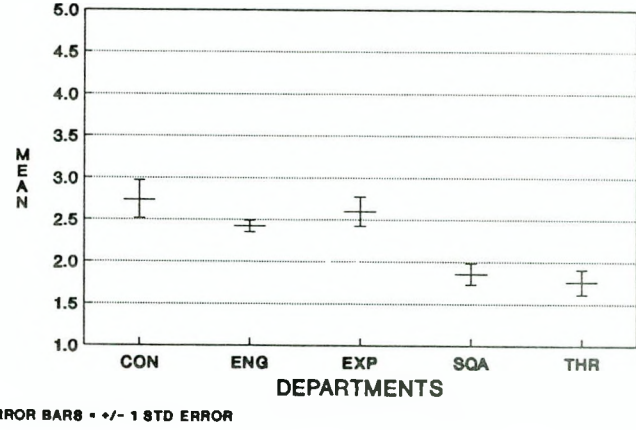


Figure 4.7. Significant differences between departments on avoidance scale

No significant differences were found between any departments on the Oppositional (C7), the Power (C8), the Competitive (C9), and the Perfectionistic (C10) Scales. This is an interesting result as these four scales make up the Aggressive/Defensive Cultural Style, which was also the least dominant cultural style for the PPPL sample.

Mean scores obtained on the Achievement Scale (C11) (Figure 4.8) indicated that personnel in the Tokamak Fusion Test Reactor, Theory, Safety/Quality Assurance, and Other Departments perceived achievement as an important organizational value significantly more than personnel in the Experimental Projects Department. The Safety/Quality Assurance Department had the highest mean value on this scale.

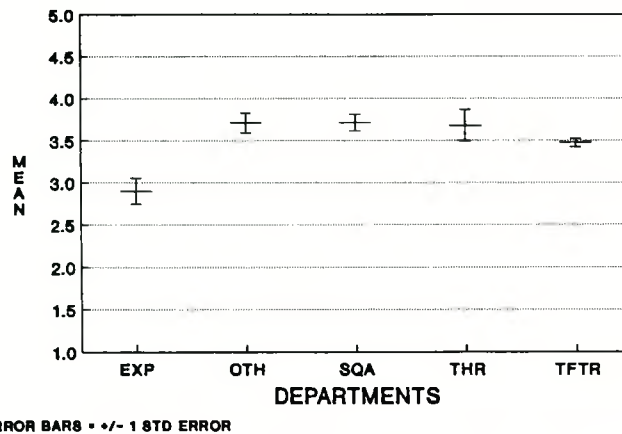


Figure 4.8. Significant differences between departments on achievement scale

Similar results were obtained for the Self-Actualizing Scale (Figure 4.9). On this scale, the Experimental Projects Department had the lowest mean value and was statistically significantly different from the Other, Safety/Quality Assurance, and Theory Departments. The Theory Department had the highest mean value on this scale. No other differences between departments were obtained for this scale.

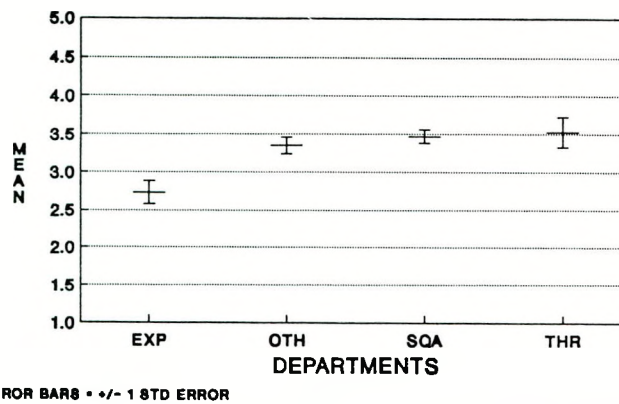


Figure 4.9. Significant differences between departments on self-actualizing scale

Appendix D contains figures which compare each department to the overall mean value of the PPPL sample on each of the OCI scales. Statistical tests were not performed on these comparisons, since each department is a subset of the overall sample of the population. The figures are descriptively useful in comparing each division to the overall sample.

4.4.1 Differences Between Staff Classifications on the OCI

Statistically significant differences between staff classifications were obtained on only one scale of the OCI. However, Appendix B presents the mean values for each staff classification for each scale.

The scale on which differences were obtained is the Affiliative Scale (C2). The results are presented in Figure 4.10. On this scale, the Office and Clerical Staff are statistically significantly more affiliative than are the Research, Engineering and Scientific, Administration, and Laboratory and Shop staff. Research staff scored the lowest on the Affiliative Scale. No other statistically significant differences were obtained.

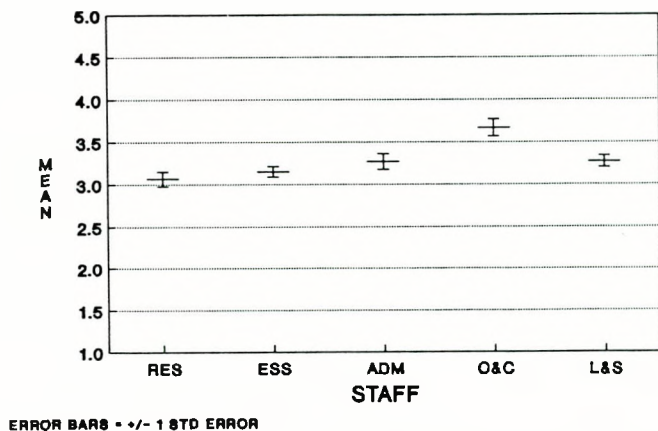


Figure 4.10. Significant differences between staff on affiliative scale

4.1.5 Differences Between Supervisory Levels on the OCI

Significant differences between supervisory levels were assessed in two ways. The first way utilized the three supervisory levels listed on the PPPL demographics sheet: Non-Supervisory, Scientific/Engineering Supervisors, and Administrative Supervisors. The second way involved analyses of supervisors versus non-supervisors. Supervisors were defined as those individuals who selected either Scientific/Engineering Supervisors or Administrative Supervisors and non-supervisors were those who classified themselves as such.

Statistically significant differences between supervisory levels were obtained on only one of the OCI scales, the Humanistic-Encouraging Scale (C1), and this difference was obtained only when Supervisors were compared to Non-supervisors (Figure 4.11), with Supervisors scoring statistically significantly higher than Non-supervisors.

For the interested reader, the means on each scale for supervisory levels, as well as all statistically significant differences, are presented in Appendix C.

4.2 Communication Scales

4.2.1 Description

Communication is a critical process for effective operations in any organization. However, because it is a process rather than a variable, it is very difficult to measure. The scales used in the questionnaire administered at PPPL were developed by Roberts and O'Reilly (1974). They have been administered to various organizations with good reliability and success in analyzing several facets of the communication process.

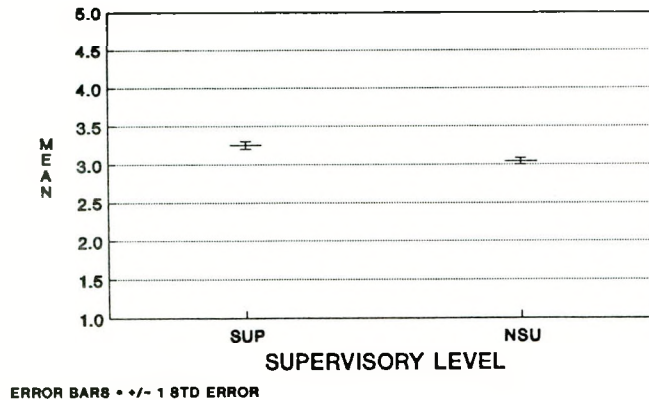


Figure 4.11. Significant differences between supervisors and nonsupervisors on humanistic-encouraging scale

Four communication scales were administered and are described below. The range on each scale is from a low score of 1 to a high score of 7.

- TRUST:** Freedom to discuss the problems and difficulties in the job with an immediate supervisor without jeopardy.
- ACCURACY:** Perception of the accuracy of information received from other organizational levels (superior, same, and subordinate levels).
- INTERACT:** Desirability of frequent contact with others in the organization (superiors, same, and subordinate).
- SATISFAC:** Overall satisfaction with the communication process in the organization.

4.2.2 Overall PPPL Results

The overall means for PPPL on each of the communication scales described above are presented in Figure 4.12. All four scales have relatively high mean values. PPPL employees desire a high level of interaction with others across the organization and perceive the information they receive from others to be accurate. PPPL employees also trust their superiors and are happy with the overall communication process at PPPL.

4.2.3 Results for Departments

No statistically significant differences between departments were obtained on any of the communication scales. The interested reader is referred to Appendix A for the mean values for each department on each of the communication scales. In addition, Appendix E presents the comparison of each PPPL department to the overall PPPL mean value for each of the four communication scales.

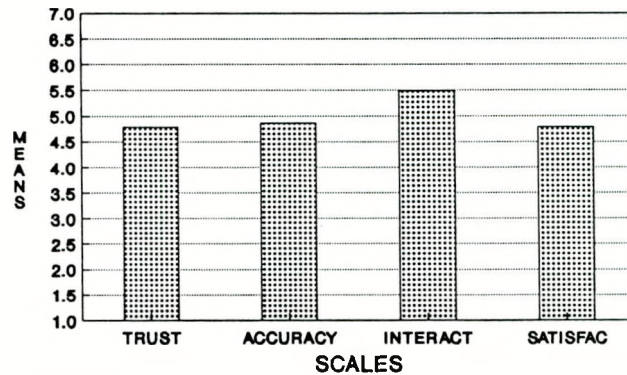


Figure 4.12. Overall means on communication scales for PPPL.

4.2.4 Results for Staff Classifications

Statistically significant differences between staff classifications were obtained on one of the four communication scales: Accuracy. As depicted in Figure 4.13, the Research Staff had the highest mean value on this scale, while the Laboratory and Shop Staff had the lowest. These two staff classifications were statistically significantly different from one another. In addition, Research Staff were significantly different from Administration, Senior Laboratory and Shop, and Office and Clerical Staff. Laboratory and Shop Staff were significantly different from the Engineering and Scientific Staff as well as from Research Staff.

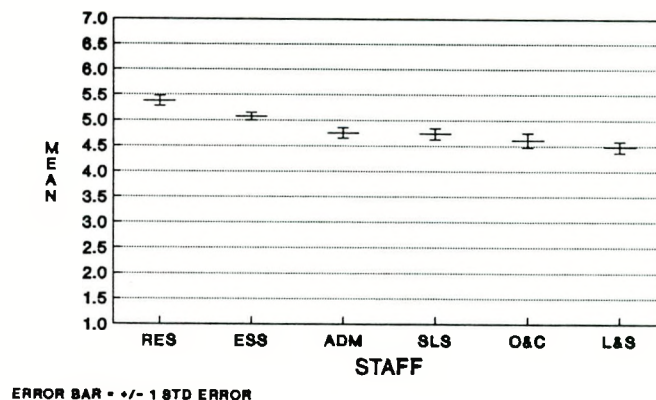


Figure 4.13. Significant differences between staff on perceived accuracy of communications scale

4.2.5 Results for Supervisory Levels

It will be recalled that supervisory level was analyzed in two different ways. The first involved utilizing those categories included on the demographics sheet for Non-supervisory, Scientific/Engineering Supervisors, and Administrative Supervisors. The second analysis consisted of combining the Scientific/Engineering with the Administrative Supervisors into one group called Supervisors and comparing this group to the Non-supervisors.

On the four communication scales, statistically significant differences were obtained on two of the Communication scales, Accuracy and Desire for Interaction, for supervisory levels. On the Accuracy of Communication Scale (Figure 4.14), the Scientific/Engineering Supervisors scored statistically significantly higher than either the Non-Supervisors or the Administrative Supervisors. The Administrative Supervisors had the lowest mean value on this scale of the three groups.

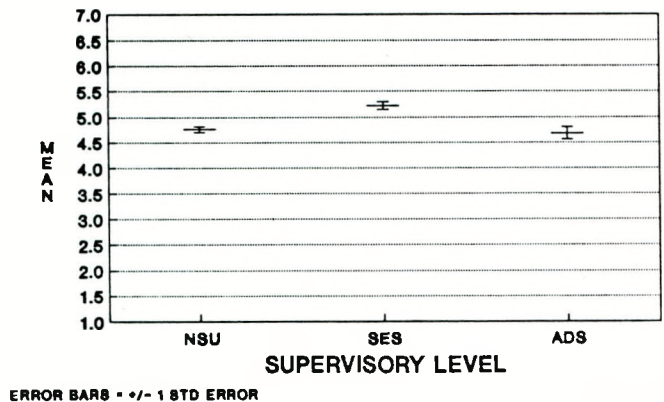


Figure 4.14. Significant differences between supervisory levels on perceived accuracy of communications

When the Scientific/Engineering Supervisors and the Administrative Supervisors were combined into one group called Supervisors, they had a statistically significantly greater mean value on the Accuracy of Communication scale than the Non-Supervisors (Figure 4.15).

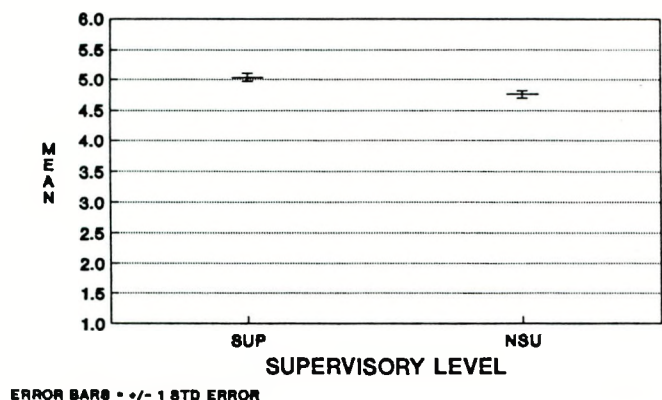


Figure 4.15. Significant differences between supervisors and nonsupervisors on perceived accuracy of communication

On the Desire for Interaction Scale, the Non-Supervisors scored statistically significantly lower than both the Scientific/Engineering Supervisors and the Administrative Supervisors (Figure 4.16). The Scientific/Engineering Supervisors had the highest mean score on the Desire for Interaction Scale of the three supervisory levels. When the two supervisory levels were combined into one level called

Supervisors, and compared to Non-supervisors on the Desire for Interaction scale, the Supervisors had a statistically significantly greater mean value on the scale than the Non-Supervisors (Figure 4.17).

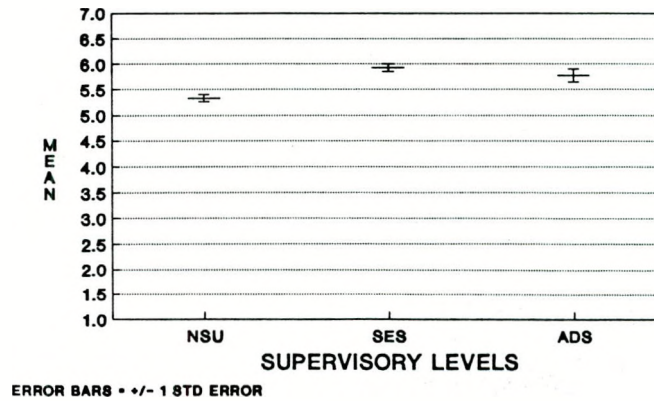


Figure 4.16. Significant differences between supervisory levels on desire for interaction scale

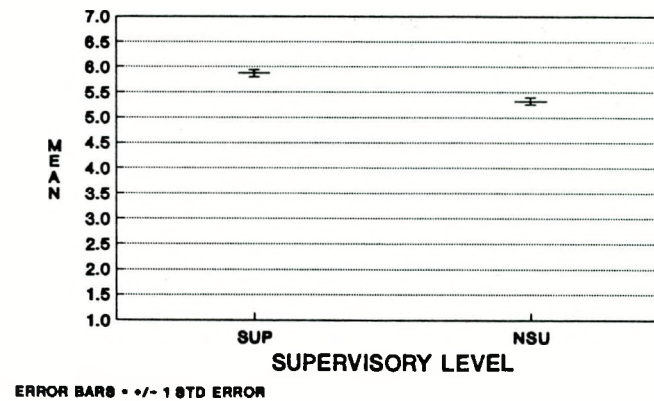


Figure 4.17. Significant differences between supervisors and nonsupervisors on the desire for interaction scale

4.3 Commitment Scale

4.3.1 Scale Description

The Commitment Scale is defined as the relative strength of an individual's identification with and involvement in a particular organization (Mowday & Steers, 1979). This commitment extends to the goals of the organization and the desire to maintain membership in the organization to facilitate these goals. The range on this scale is from a low score of 1 (low commitment) to a high score of 7 (high commitment).

4.3.2 Overall PPPL Results

The mean score for the PPPL sample on the Commitment Scale was 4.63, as shown in Figure 4.18. Mean scores for additional scales are also shown in this figure and will be discussed later. Employees of PPPL who responded to the survey appear to be moderately committed to the organization.

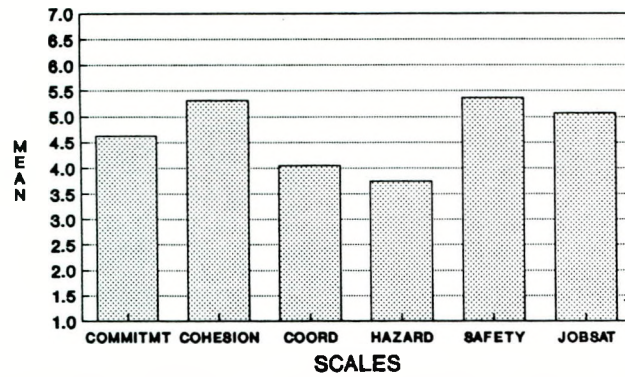


Figure 4.18. Overall means on additional scales for PPPL

4.3.3 Results for Departments

The Experimental Projects Department scored statistically significantly lower on the Commitment Scale than the Safety/Quality Assurance, Theory, and Burning Plasma Experiment Departments (Figure 4.19). The Safety/Quality Assurance Department had the highest mean value on the Commitment Scale. Other statistically significant differences between departments on the Commitment Scale are given in Appendix A.

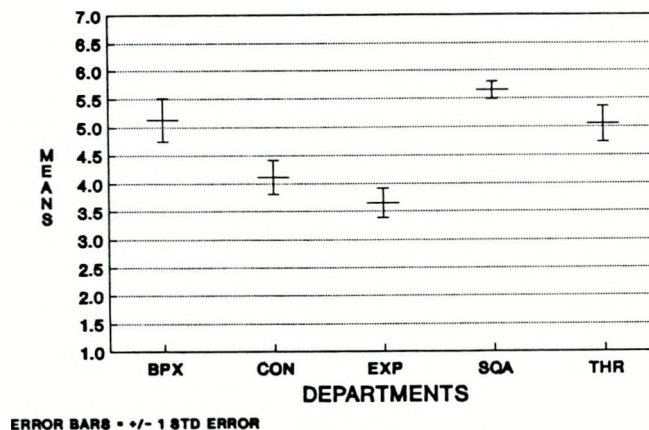


Figure 4.19. Significant differences between departments on commitment scale

Appendix F contains figures which compare each department to the overall mean value of the PPPL sample for each of the scales depicted in Figure 4.18.

4.3.4 Results for Staff Classifications

No statistically significant differences were found between any of the staff classifications on the Commitment Scale.

4.3.5 Results for Supervisory Levels

Regardless of the way in which supervisory levels were combined for analysis, no statistically significant differences were found between any of the levels on the Commitment Scale.

4.4 Cohesion Scale

4.4.1 Scale Description

The Cohesion Scale is very similar to the Commitment Scale except that it is defined as the relative strength of an individual's identification and involvement in a particular work group (Seashore, 1954; Price & Muller, 1972). The range on this scale is from a low score of 1 (weak cohesiveness) to a high score of 7 (strong cohesiveness).

4.4.2 Overall PPPL Results

The overall mean score for the PPPL sample on the Cohesion Scale was 5.32 (Figure 4.18), higher than the mean score for the Commitment Scale. Employees of PPPL who responded to the survey identified to a greater extent with their own work groups than with the organization as a whole. This may account for the many differences obtained between departments, but not between staff classifications or supervisory levels.

4.4.3 Results for Departments

As depicted in Figure 4.20, the Safety/Quality Assurance Department had a statistically significantly higher mean score on the Cohesion Scale than the Administration, Burning Plasma Experiment, Controller's Office, and Experimental Projects Departments. The Controller's Office had the lowest mean score on work group cohesiveness of all the departments. Other statistically significant differences are presented in Appendix A.

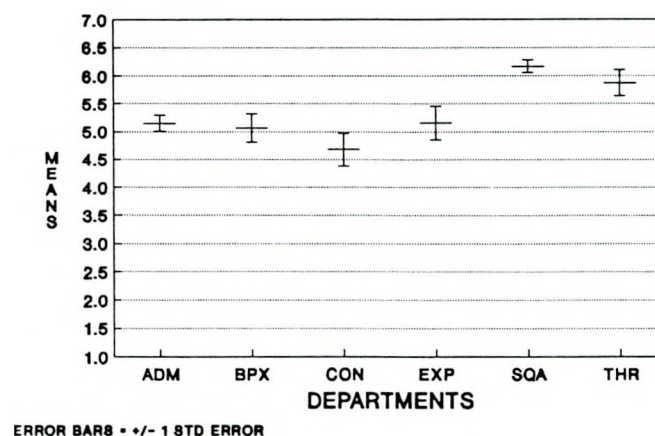


Figure 4.20. Significant differences between departments on cohesion scale

4.4.4 Results for Staff Classifications

No statistically significant differences between any staff classifications were obtained on the Cohesion Scale.

4.4.5 Results for Supervisory Levels

No statistically significant differences between any of the supervisory levels were obtained on the Cohesion Scale.

4.5 Coordination Scale

4.5.1 Scale Description

The Coordination Scale assesses the employee's perception of the degree to which the subunits of an organization cooperate according to the requirements of each other and of the total organization (Georgopoulos & Mann, 1962). The range on this scale is from a low score of 1 (low coordination) to a high score of 7 (high coordination).

4.5.2 Overall PPPL Results

The overall mean score on this scale for the PPPL sample was 4.04 (see Figure 4.18). This indicates that PPPL personnel perceive a moderate amount of coordination to exist between the work units and activities in their organization.

4.5.3 Results for Departments

As shown in Figure 4.21, the Experimental Projects Department had a statistically significantly lower mean value on this scale than the Burning Plasma Experiment, Theory, and Other Departments. The Theory Department perceives the greatest amount of work coordination to exist in the organization. Other statistically significant differences are presented in Appendix A.

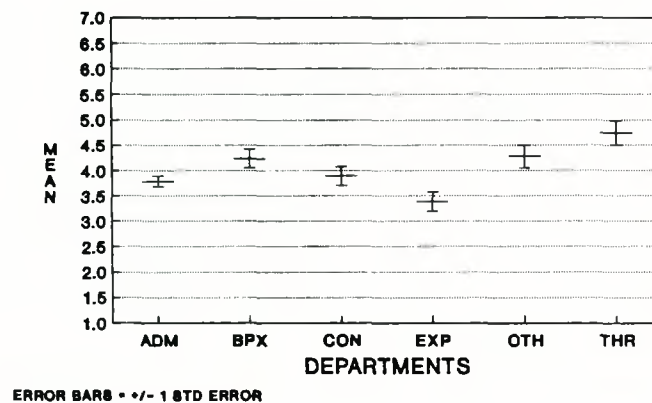


Figure 4.21. Significant differences between departments on coordination scale

4.5.4 Results for Staff Classifications

No statistically significant differences between staff classifications were obtained on the Coordination Scale.

4.5.5 Results for Supervisory Levels

No statistically significant differences between supervisory levels were obtained on the Coordination Scale, regardless of the way in which the analyses were performed.

4.6 Job Satisfaction

4.6.1 Description of Scale

The Job Satisfaction Scale (Kunin, 1955) refers to employees' overall satisfaction with their jobs. While it is not able to point to specific aspects of the working environment which people are satisfied or dissatisfied with, it can help to determine if employee satisfaction is something which needs further consideration by management. The scale ranges from a low score of 1 (very dissatisfied) to a high score of 7 (very satisfied).

4.6.2 Overall PPPL Results

Overall, PPPL employees tended to be satisfied with their jobs. The mean value for the PPPL sample on this scale was 5.08 (see Figure 4.18).

4.6.3 Results for Departments

No statistically significant differences were obtained between departments on the job satisfaction scale, despite the fact that some group means differed by more than one point (see Appendix A). The fact that no differences were obtained indicates that there was a lot of variation within the groups, as well as between them.

4.6.4 Results for Staff Classifications

No statistically significant differences between staff classifications were obtained on the Job Satisfaction Scale.

4.6.5 Results for Supervisory Levels

No statistically significant differences between any of the supervisory levels were obtained on the Job Satisfaction Scale.

4.7 Hazard Scale

4.7.1 Scale Description

The Hazard Scale is used to identify people's perception of the hazardous nature of their work (K.H. Roberts, 1990, personal communication). The scale ranges from a low score of 1 (not hazardous) to a high score of 7 (very hazardous).

4.7.2 Overall PPPL Results

The overall PPPL mean score on this scale was 3.74 (see Figure 4.18). This indicates that while employees tend to perceive some amount of hazard in their work, the amount is not, in general, very high.

4.7.3 Results for Departments

The statistically significant differences between departments are depicted in Figure 4.22. Every department is statistically significantly different from at least one other department on the Hazard Scale. The Burning Plasma Experiment, Theory, and Controller's Office Departments all scored significantly lower on the Hazard Scale than did the Experimental Projects, Tokamak Fusion Test Reactor, Engineering, Administration, and Safety/Quality Assurance Departments. The Experimental Projects Department had the highest mean value on the Hazard Scale, while the Theory Department had the lowest. Other statistically significant differences between departments are given in Appendix A.

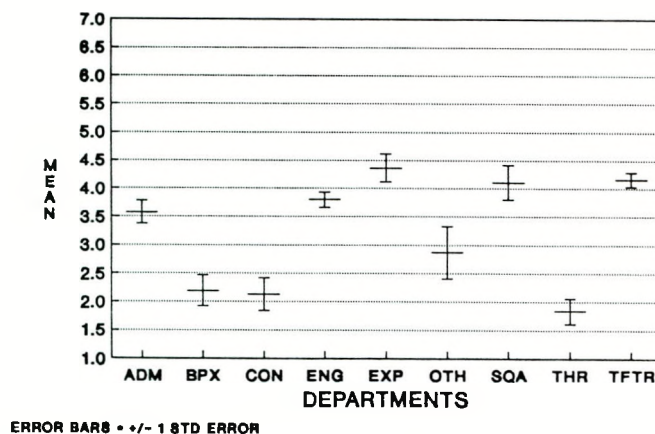


Figure 4.22. Significant differences between departments on hazard scale

4.7.4 Results for Staff Classifications

As shown in Figure 4.23, statistically significant differences on the Hazard Scale were obtained between every staff classification. The Laboratory and Shop Staff scored the highest on this scale, and were statistically significantly higher than every other staff classification. The Office and Clerical Staff scored the lowest on this scale, and were significantly different from the Engineering and Scientific Staff, Senior Laboratory and Shop Staff and Laboratory and Shop Staff. Other statistically significant differences are reported in Appendix B.

4.7.5 Results for Supervisory Levels

Statistically significant differences between supervisory levels are presented in Figure 4.24. Administrative Supervisors had statistically significantly lower scores on the Hazard Scale than did either the Non-Supervisors or the Scientific/ Engineering Supervisors. The Scientific/Engineering Supervisors had the highest mean score on the Hazard Scale of the three groups. When the two supervisory levels were combined into one group called Supervisors, and compared to the Non-Supervisors, no statistically significant differences were obtained.

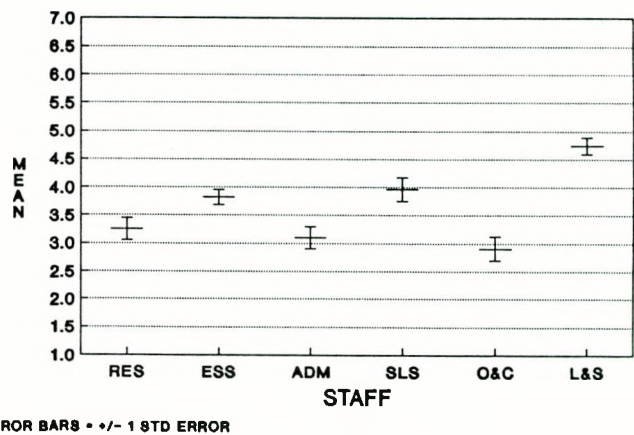


Figure 4.23. Significant differences between staff on hazard scale

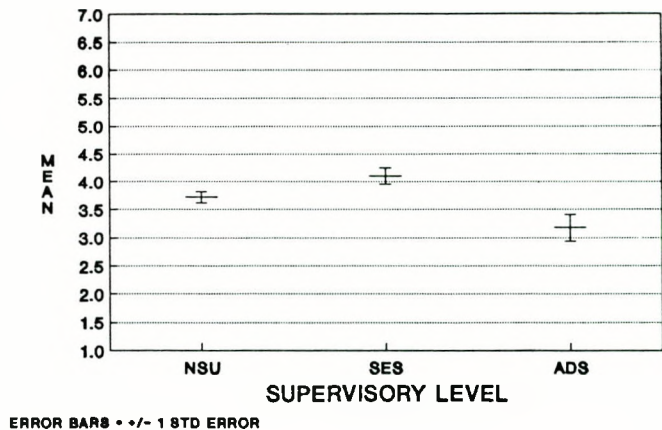


Figure 4.24. Significant differences between supervisory levels on hazard

4.8 Safety Scale

4.8.1 Scale Description

The Safety Scale, developed by researchers at the University of California at Berkeley (K. H. Roberts, 1989, personal communication), is used to assess an individual's perception of the importance of safety to success in an organization. Safety is defined as operating in a manner to ensure that the probability of making a mistake is low, because the consequence of making a mistake is high. Organizations typically viewed as operating in this manner are nuclear reactors, naval aircraft carriers and air traffic control centers. The safety scale consists of 40 items which range from a low score of 1 (does not help at all) to a high score of 7 (helps a great deal).

4.8.2 Overall PPPL Results

The overall mean score for the PPPL sample on the Safety Scale was 5.36 (see Figure 4.18). Thus, it appears that the employees of PPPL do understand those behaviors which are important to safety.

4.8.3 Results for Departments

No statistically significant differences between departments at PPPL were obtained on the Safety Scale.

4.8.4 Results for Staff Classifications

No statistically significant differences between staff classifications on the Safety Scale were obtained at PPPL.

4.8.5 Results for Supervisory Levels

Regardless of the way in which supervisory levels were analyzed, no significant differences were obtained on the Safety Scale.

4.9 Environmental, Safety, and Health Questions

4.9.1 Question Descriptions

For the administration of the Organizational Culture Survey (OCS) at PPPL, four questions pertaining to environmental, safety, and health issues were added to the survey. These questions had previously been administered at the Lawrence Berkeley Laboratory (LBL) and were modified based on comments received prior to their administration at PPPL. Each question ranges from a low score of 1 (not at all or little) to a high score of 7 (very likely or a lot).

The first question deals with the likelihood of serious offsite environmental damages/consequences due to improper or substandard performance by a work group. The second question deals with the likelihood of serious onsite environmental damages/ consequences due to improper or substandard performance by a work group. The third question asks employees to assess the amount of emphasis they believe management places on environmental issues. Finally, the fourth question asks employees for their perception of how well informed they are of possible risks in their work environment.

4.9.2 Overall PPPL Results

For the first environmental question, a mean value of 2.41 (Figure 4.25) was obtained for the PPPL sample. PPPL employees do not believe that if improper or substandard work was conducted by their working group that a potential for serious offsite environmental consequences exists.

The mean value for the PPPL sample on the second question was 2.87 (Figure 4.25). This mean is slightly higher than the mean obtained on the first environmental question, indicating that while PPPL employees do not believe there to be a large potential for offsite environmental consequences due to improper or substandard performance in their working groups, they perceive the potential for onsite damage to the environment to be greater.

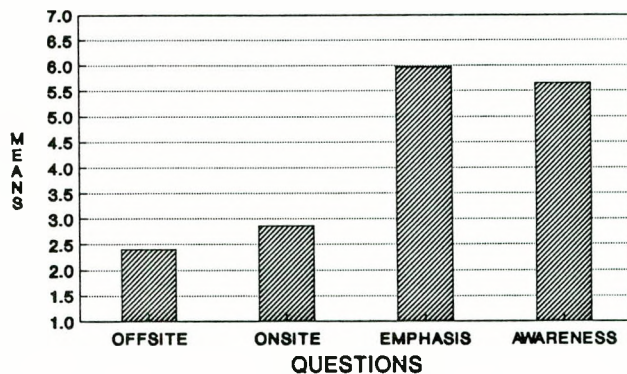


Figure 4.25. Overall means on environmental questions for PPPL

The mean value obtained for the third question was 5.98 (Figure 4.25). PPPL employees believe management places a large amount of emphasis on environmental issues.

The mean value obtained for the fourth question was 5.66, slightly lower than the previous question (Figure 4.25). PPPL employees believe themselves to be well informed concerning the risks in their work environment.

4.9.3 Results for Departments

Statistically significant differences were obtained between departments on two of the four environmental, safety, and health questions. As depicted in Figure 4.26, every department, except Other was significantly different from at least one other department on the issue of potential offsite environmental consequences as a function of improper or substandard performance of their work group. The Safety/Quality Assurance Department had the highest mean value on this question, and were significantly different from the Experimental Projects, Tokamak Test Fusion Reactor, Burning Plasma Experiment, Engineering, Theory, and Controller's Office Departments. The Controller's Office Department had the lowest mean value on this question, and was also significantly different from the Administration Department (as well as the Safety/Quality Assurance Department). Other statistically significant differences between departments on this question are presented in Appendix A.

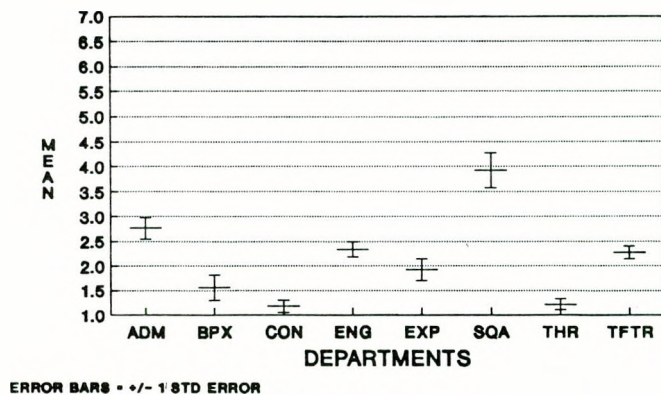


Figure 4.26. Significant differences between departments on offsite environmental question

Statistically significant differences were also obtained on the perception of employees concerning the amount of onsite environmental damages/consequences which could occur as a function of substandard performance by the work group (Figure 4.27). The Safety/Quality Assurance Department had the highest mean value on this question, and was significantly different from the Burning Plasma Experiment, Theory, Controller's Office, and Other Departments. The department with the lowest mean value on this question was the Theory Department. They were significantly different from two other departments besides the Safety/Quality Assurance Department: the Tokamak Fusion Test Reactor and the Administration Departments. Other statistically significant differences between departments on this question are presented in Appendix A. No statistically significant differences between departments were obtained on the other two questions. Appendix G contains figures which compare each department to the overall mean value of the PPPL sample on each of the four environmental, safety, and health questions.

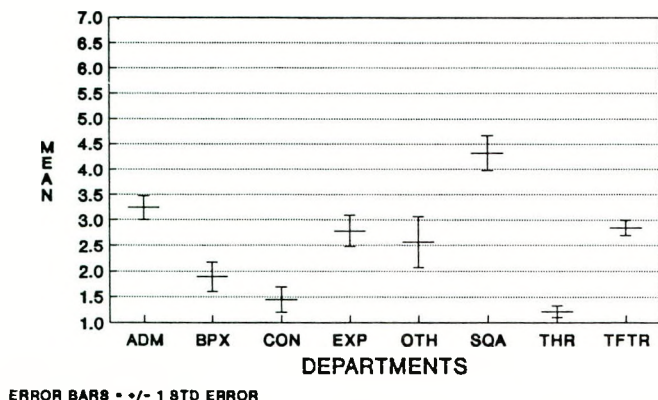


Figure 4.27. Significant differences between departments on onsite environmental question

4.9.4 Results for Staff Classifications

No statistically significant differences between staff classifications were obtained on any of the four environmental, safety, and health questions.

4.9.5 Results for Supervisory Levels

No significant differences between supervisory levels, regardless of the way in which they were analyzed, were found for any of the environmental, safety, and health questions.

5. CONCLUSIONS

The Organizational Cultural Assessment (OCA) conducted at the Princeton Plasma Physics Laboratory (PPPL) was only the second conducted at a Department of Energy (DOE) National Laboratory and the third at a DOE facility. Comparisons among these organizations would be premature and comparisons to other types of organizations at which the Organizational Culture Survey (OCS) has been administered are not justified. However, within the PPPL sample, several results are worth noting and may provide useful insights for the organization as well as for DOE.

The overall organizational profile which emerges from the results of the PPPL sample is somewhat uncertain. Contrasts in cultural styles, as measured by the scales on the Organizational Culture Inventory (OCI), are not obvious and a particular style is not dominant. The two strongest styles which emerge from the overall means on the OCI are the constructive and passive/defensive styles. The non-dominant culture may be reflective of an organization in transition or change.

In spite of this cultural uncertainty, PPPL employees who participated in the OCA appear to be committed to the organization and generally describe PPPL values and their own values to be similar. PPPL personnel do identify with their own work groups, however, to a greater extent than they do with the entire organization. This is also demonstrated by the fact that the majority of the differences obtained at PPPL on the OCA were between departments, not between staff classifications or supervisory levels. Functional identification, by project and department, appears to be a strong influence on the culture at PPPL.

Among departments at PPPL, there is a consistent pattern in the organizational profiles of some units. The Experimental Projects Department had consistently lower mean values on the more constructive cultural scales and higher mean values on the more passive/defensive scales than most other departments. In direct contrast, the Safety/Quality Assurance and Theory Departments, scored consistently higher on the more constructive dimensions of organizational culture and lower on the more passive/defensive ones than most other departments. The notable exception to this pattern, is that the Safety/Quality Assurance Department scored similarly to the Experimental Projects Department on the Hazard Scale, with both departments having mean values significantly higher than most other departments.

Most of the departmental differences across the organization were consistent and indicative of functional roles and professional occupations. The consistently different pattern of the Experimental Projects Department compared to departments with similar demographic compositions such as the Burning Plasma Experiment and Tokamak Fusion Test Reactor Departments is noteworthy. These differences may be explained by factors outside the assessment capabilities of the OCA.

Results on the Communication Scales indicated that the PPPL sample did not perceive significant problems in communication within their organization. There is a high desire for interaction with others at all organizational levels in PPPL. There is also the perception that the information received from others in the organization is accurate. In general, PPPL employees trust their superiors and are satisfied with the overall communication in the organization.

Although there were few statistically significant differences obtained between staff classifications, those that were, were along functional and professional roles. As already mentioned, the small number of differences obtained may be a result of the strong functional identification by department at PPPL. Structurally, PPPL identifies itself as a matrix organization, and consequently the individuals within such

an organization may develop strong relationships within their work units, regardless of classification or organizational level.

The differences obtained between supervisory levels at PPPL are similar to those frequently reported in the literature. However, these differences must be interpreted cautiously since there was some confusion with the expected and reported frequencies of supervisors in the sample. The PPPL sample is significantly over-represented in terms of individuals identifying themselves as supervisors. Besides the statistical implications of this discrepancy, there could be organizational consequences if all these individuals are actually functioning in supervisory capacities.

In summary, the PPPL population, as represented by the OCS sample, is a committed and cohesive workforce that is in a state of cultural uncertainty or transition. The competing cultural styles may be reflecting the different forces currently acting upon this population. The differences obtained in the Experimental Projects Department may be indicative of the effects that such transition and change can ultimately have upon an organization and should be carefully analyzed.

6. REFERENCES

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APPENDIX A

SIGNIFICANT DIFFERENCES BETWEEN DEPARTMENTS ON OCA

Code	Departments	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
1	ADM	3.17	3.36	2.74	2.91	3.09	2.23	2.32	2.53	2.32	2.72	3.36	3.07
			1			5							
2	BPX	2.99	3.33	2.72	2.78	3.11	2.32	2.38	2.51	2.31	2.76	3.33	3.07
			1			5							
3	CON	3.23	3.30	3.06	3.29	3.29	2.74	2.57	2.88	2.43	3.10	3.37	3.19
		1	1	8,5	8,5	5	8,5						
4	ENG	3.07	3.26	2.69	2.96	3.10	2.42	2.42	2.46	2.32	2.79	3.32	3.06
					5	5	5						
5	EXP	2.58	2.66	2.97	3.41	3.38	2.60	2.42	3.01	2.74	3.15	2.90	2.73
		8,9,5,6	8,9,7,3,5,6	8,5	8,5	8,5	8,5					8,9,5,2	5,8,9
6	OTH	3.38	3.62	2.88	2.98	3.08	2.28	2.72	2.64	2.58	3.11	3.71	3.35
		1	1	5	5	5						1	1
7	SQA	3.55	3.70	2.29	2.52	2.77	1.86	2.52	2.35	1.99	2.82	3.72	3.47
		1	1	6,1	1,6	1	6,1					1	1
8	THR	3.30	3.32	2.22	2.30	2.24	1.76	2.39	2.16	2.61	2.69	3.68	3.53
		1	1	6,1,9	1,6,9,4,2	1,6,3,4,7,9,2	6,1,4					1	1
9	TFTR	3.08	3.23	2.65	2.95	3.01	2.20	2.41	2.53	2.43	2.96	3.48	3.13
					5	5							1

First line of each box = mean for department on that scale.

Second and third line of each box = those departments (coded by number) that the department is significantly different from.

Code	Departments	COT	COH	HAZ	SAF	COD	JOB	CMT	CMA	CMI	CMS
1	ADM	4.48	5.15	3.58	5.32	3.79	5.14	4.68	4.62	5.61	4.78
			8	3,5,6		5					
2	BPX	5.13	5.07	2.19	5.27	4.23	5.26	4.85	4.57	5.30	5.37
		1,6	8	1,2,4,7,8		1					
3	CON	4.12	4.68	2.13	5.27	3.89	4.95	4.50	4.21	4.88	4.77
		8	5,8	1,2,4,7,8		5					
4	ENG	4.65	5.42	3.80	5.41	4.10	5.08	4.70	4.88	5.38	4.83
				3,5,6							
5	EXP	3.65	5.16	4.36	5.20	3.38	4.41	4.23	5.17	5.49	4.04
		5,3,8	8	3,6,5,9		3,5,9					
6	OTH	4.53	5.23	2.87	5.43	4.28	5.08	4.90	5.00	5.83	4.92
				1		1					
7	SQA	5.65	6.16	4.11	5.73	4.10	5.62	5.35	4.73	5.94	5.17
		1,6	1,3,6,7	3,5,6							
8	THR	5.05	5.87	1.84	4.71	4.74	5.43	4.75	5.24	5.55	4.86
		1	6	1,2,4,7,8		1,6,7					
9	TFTR	4.64	5.28	4.16	5.43	4.14	5.04	4.92	4.99	5.54	4.74
				3,5,6							

First line of each box = mean for department on that scale.

Second and third line of each box = those departments (coded by number) that the department is significantly different from.

Code	Divisions	OFF	ONS	MGE	EMA
1	ADM	2.77	3.24	5.86	5.61
		5,6	5,6		
2	BPX	1.56	1.89	5.67	5.72
		8	8		
3	CON	1.18	1.44	5.50	5.22
		8,7	7,8		
4	ENG	2.35	2.76	6.05	5.66
		8			
5	EXP	1.93	2.79	5.86	5.36
		8	5		
6	OTH	2.52	2.57	5.68	5.09
			8		
7	SQA	3.93	4.32	5.75	5.21
		1,2,3,4,5,6	3,5,6,9		
8	THR	1.21	1.21	6.00	6.14
		8,7	2,7,8		
9	TFTR	2.28	2.85	6.13	5.82
		8	5		

First line of each box = mean for department on that scale.

Second and third line of each box = those departments (coded by number) that the department is significantly different from.

APPENDIX B

SIGNIFICANT DIFFERENCES BETWEEN STAFF ON OCA SCALES

B-1

Code	Staff	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
1	RES	3.07	3.07	2.48	2.72	2.83	2.16	2.49	2.48	2.74	3.04	3.59	3.26
			5										
2	ESS	3.06	3.16	2.66	2.93	3.07	2.35	2.43	2.59	2.37	3.00	3.38	3.09
			5										
3	ADM	3.19	3.27	2.71	2.91	3.10	2.26	2.40	2.68	2.37	2.90	3.44	3.10
			5										
4	SLS	3.10	3.33	2.74	3.01	3.07	2.23	2.36	2.46	2.25	2.71	3.37	3.06
5	O&C	3.23	3.67	2.81	2.94	3.12	2.19	2.43	2.43	2.20	2.81	3.45	3.20
			3,6,2,1										
6	L&S	3.04	3.27	2.75	3.17	3.12	2.37	2.43	2.46	2.38	2.71	3.28	3.05
			5										

First line of each box = mean for staff on that scale.

Second and third line of each box = those staffs (coded by number) that the staff is significantly different from.

Code	Staff	COH	COT	HAZ	SAF	COD	JOB	CMT	CMA	CMI	CMS
1	RES	5.36	4.61	3.25	5.17	4.20	4.96	4.85	5.38	5.79	4.76
				6					3,4,5,6		
2	ESS	5.26	4.58	3.82	5.36	4.02	4.90	4.70	5.07	5.64	4.72
				5,6					5,6		
3	ADM	5.29	4.65	3.10	5.54	3.82	5.06	4.89	4.75	5.54	4.88
				4,6					1		
4	SLS	5.53	4.74	3.97	5.43	3.99	5.19	4.85	4.74	5.54	4.73
				3,5,6					1		
5	O&C	5.27	4.65	2.91	5.40	4.19	5.57	5.13	4.61	5.25	5.13
				2,4,6					1,2		
6	L&S	5.28	4.50	4.74	5.38	3.89	5.05	4.58	4.48	5.15	4.63
				1,2,3,4,5					1,2		

First line of each box = mean for staff on that scale.

Second and third line of each box = those staffs (coded by number) that the staff is significantly different from.

Code	Staff	OFF	ONS	MGE	EMA
1	RES	1.80	2.10	5.97	5.73
2	ESS	2.38	2.84	6.02	5.59
3	ADM	2.44	2.84	5.72	5.45
4	SLS	1.99	2.75	6.32	5.88
5	O&C	2.36	2.74	5.88	5.75
6	L&S	1.99	3.36	5.99	5.69

First line of each box = mean for staff on that scale.

Second and third line of each box = those staffs (coded by number) that the staff is significantly different from.

APPENDIX C

SIGNIFICANT DIFFERENCES BETWEEN SUPERVISORY LEVELS ON OCA SCALES

C-1

Code	Supervisory Level	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
1	NSU	3.04	3.28	2.72	3.00	3.07	2.30	2.42	2.53	2.36	2.84	3.36	3.09
2	SES	3.25	3.26	2.57	2.79	2.94	2.20	2.43	2.45	2.37	2.95	3.52	3.19
3	ADS	3.28	3.39	2.70	2.92	3.11	2.23	2.41	2.63	2.39	2.87	3.47	3.15
1	SUP	3.26	3.30	2.62	2.84	3.00	2.21	2.42	2.51	2.38	2.92	3.50	3.17
		2											
2	NSU	3.04	3.28	2.72	3.00	3.07	2.30	2.42	2.53	2.36	2.84	3.36	3.09
		1											

First line of each box = mean for supervisory level at scale.

Second and third line of each box = those supervisory levels (coded by number) that the supervisory level is significantly different from.

Code	Supervisory Level	COT	COH	HAZ	SAF	COD	JOB	CMT	CMA	CMI	CMS
1	NSU	4.50	5.21	3.72	5.31	4.06	5.08	4.74	4.76	5.33	4.78
				3					2	2,3	
2	SES	4.90	5.59	4.11	5.48	4.09	5.14	4.93	5.23	5.92	4.86
				3					1,3	1	
3	ADS	4.88	5.50	3.18	5.56	3.90	5.14	4.89	4.68	5.77	4.93
				1,2					2	1	
1	SUP	4.88	5.56	3.79	5.54	4.01	5.14	4.91	5.03	5.89	4.88
									2	2	
2	NSU	4.51	5.23	3.70	5.32	4.05	5.08	4.75	4.78	5.35	4.78
									1	1	

First line of each box = mean for supervisory level at scale.

Second and third line of each box = those supervisory levels (coded by number) that the supervisory level is significantly different from.

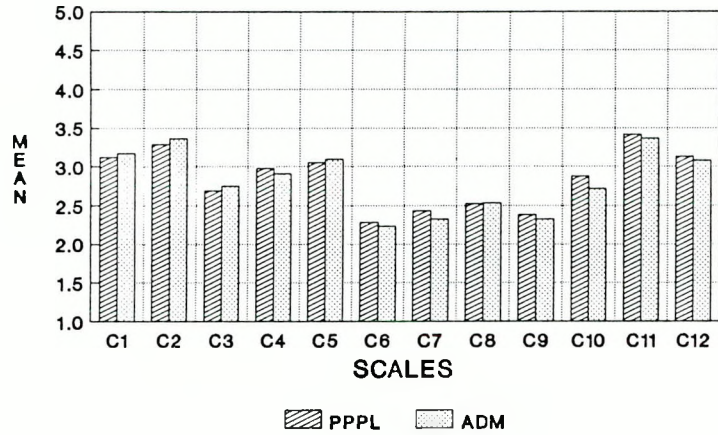
Code	Supervisory Level	OFF	ONS	MGT	EMA
1	NSU	2.39	2.84	6.02	5.71
2	SES	2.23	2.78	6.02	5.53
3	ADS	2.55	3.00	5.74	5.61
1	SUP	2.33	2.87	5.92	5.55
2	NSU	2.38	2.79	6.04	5.73

First line of each box = mean for supervisory level at scale.

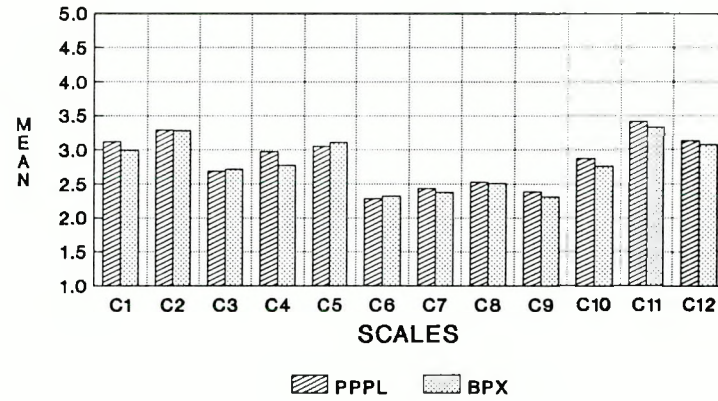
Second and third line of each box = those supervisory levels (coded by number) that the supervisory level is significantly different from.

APPENDIX D:
**COMPARISON OF PPPL DEPARTMENTS TO OVERALL
PPPL MEAN VALUES ON OCI SCALES**

ADMINISTRATION DEPARTMENT COMPARED TO PPPL OVERALL ON THE OCI

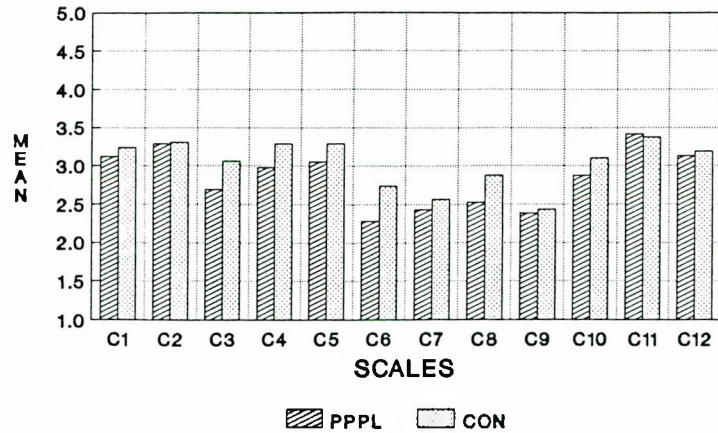


BURNING PLASMA EXPERIMENT DEPARTMENT COMPARED TO PPPL OVERALL ON OCI

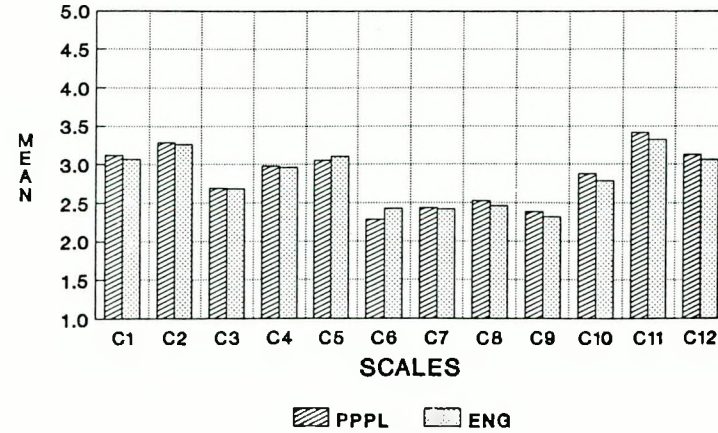


D-1

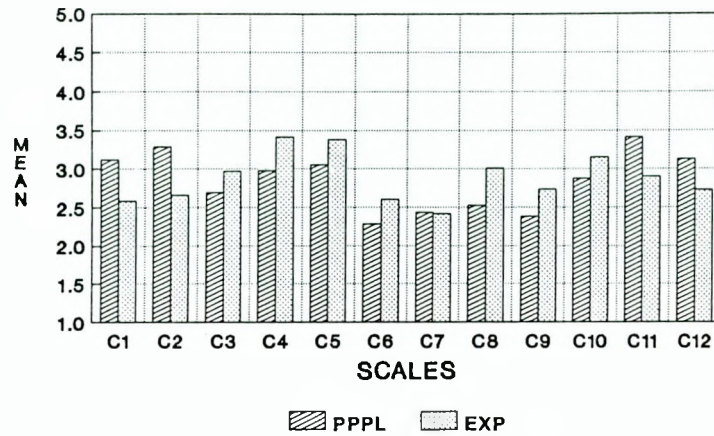
CONTROLLER'S OFFICE COMPARED TO PPPL OVERALL ON THE OCI



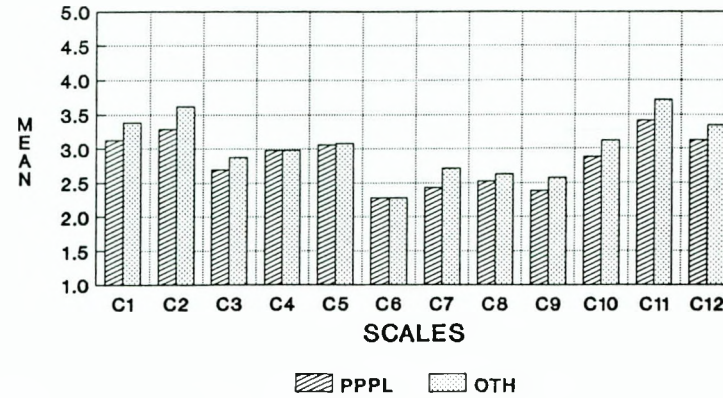
ENGINEERING DEPARTMENT COMPARED TO PPPL OVERALL ON THE OCI



EXPERIMENTAL PROJECTS COMPARED TO PPPL OVERALL ON THE OCI

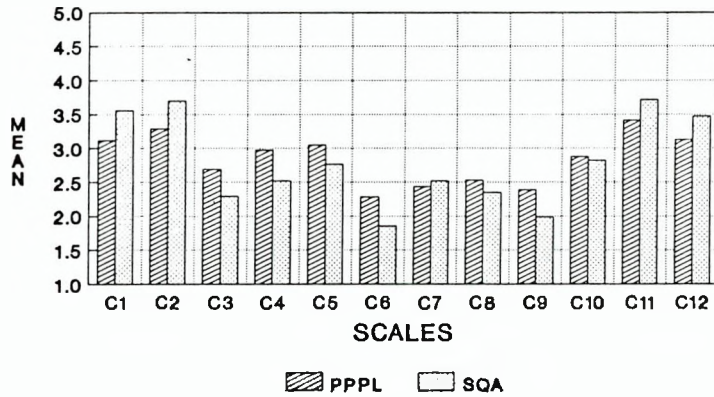


OTHER DEPARTMENTS COMPARED TO PPPL OVERALL ON THE OCI

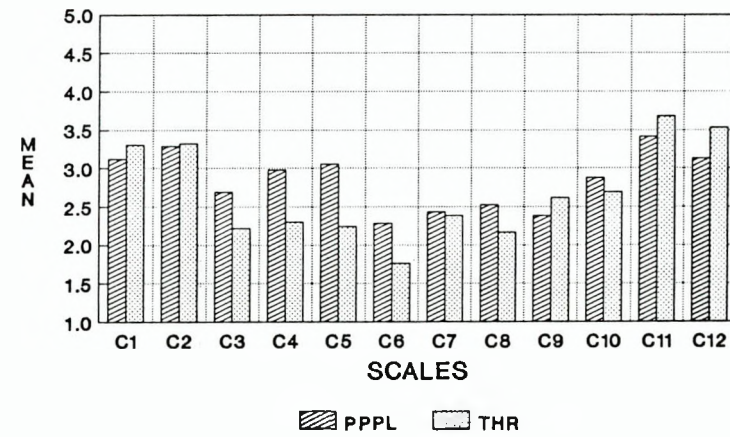


NOTE: Other consists of Scheduling, Technology Transfer, Departmental Offices, Director's Office.

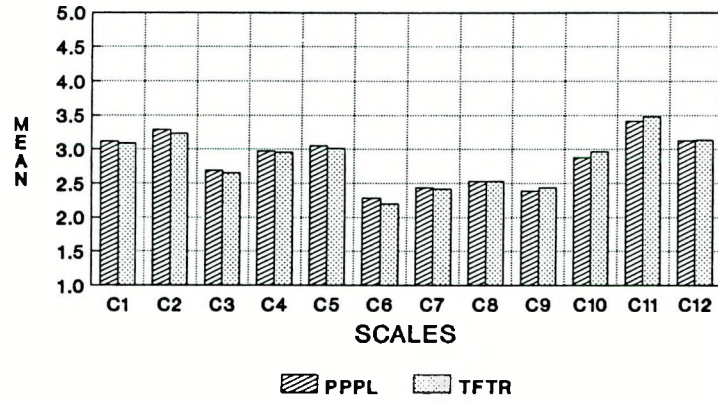
SAFETY/QUALITY ASSURANCE DEPARTMENT COMPARED TO PPPL OVERALL ON THE OCI



THEORY DEPARTMENT COMPARED TO PPPL OVERALL ON THE OCI



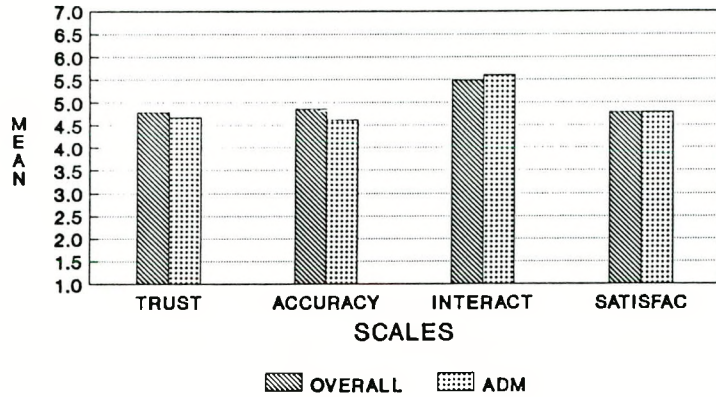
TOKAMAK FUSION TEST REACTOR
COMPARED TO PPPL OVERALL
ON THE OCI



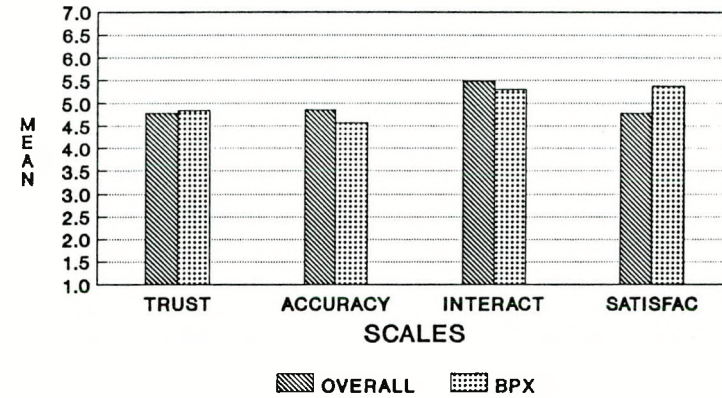
APPENDIX E:

**COMPARISON OF PPPL DEPARTMENTS TO OVERALL
PPPL MEAN VALUES ON COMMUNICATION SCALES**

ADMINISTRATION DEPARTMENT COMPARED TO PPPL OVERALL ON THE COMMUNICATION SCALES

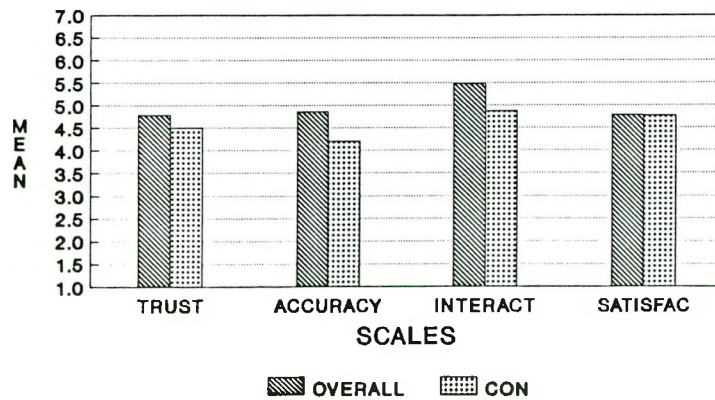


BURNING PLASMA EXPERIMENT COMPARED TO PPPL OVERALL ON THE COMMUNICATION SCALES

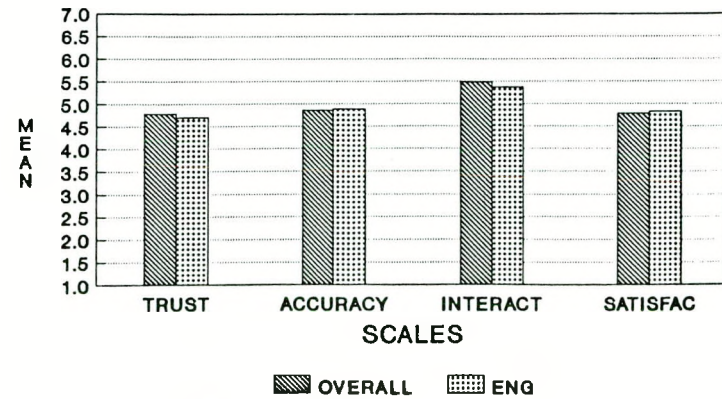


E-1

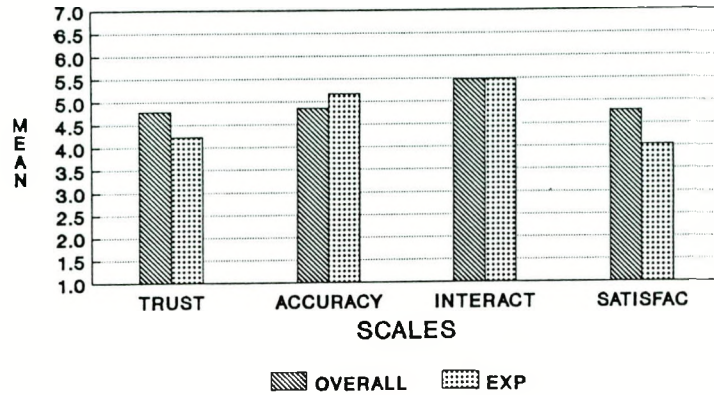
CONTROLLER'S OFFICE COMPARED TO PPPL OVERALL ON THE COMMUNICATION SCALES



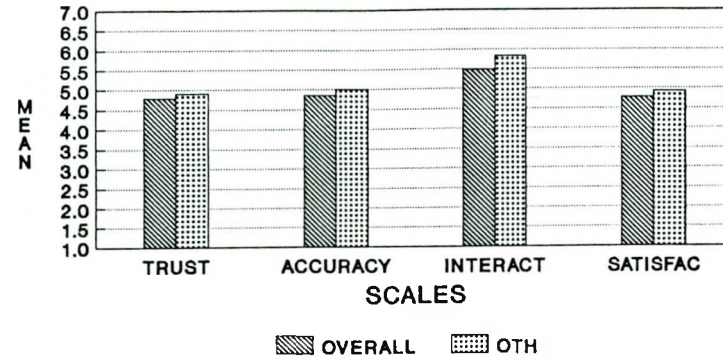
ENGINEERING DEPARTMENT COMPARED TO PPPL OVERALL ON THE COMMUNICATION SCALES



EXPERIMENTAL PROJECTS COMPARED TO PPPL OVERALL ON THE COMMUNICATION SCALES

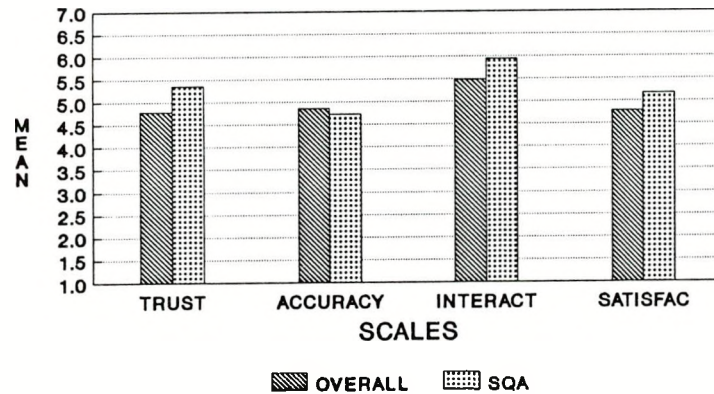


OTHER DEPARTMENT COMPARED TO PPPL OVERALL ON THE COMMUNICATION SCALES

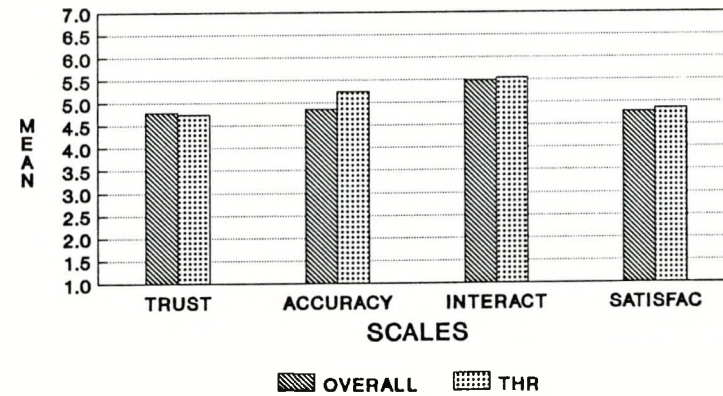


OTHER DEPARTMENT INCLUDES: SCHEDULING; TECHNOLOGY TRANSFER; DEPARTMENTAL OFFICES; DIRECTOR'S OFFICE

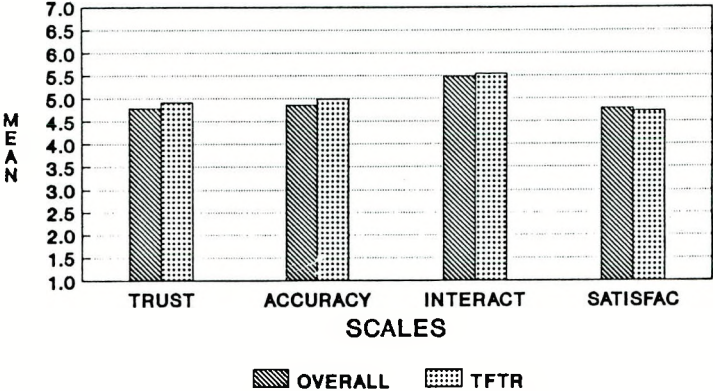
SAFETY/QUALITY ASSURANCE DEPARTMENT COMPARED TO PPPL OVERALL ON THE COMMUNICATION SCALES



THEORY DEPARTMENT COMPARED TO PPPL OVERALL ON THE COMMUNICATION SCALES



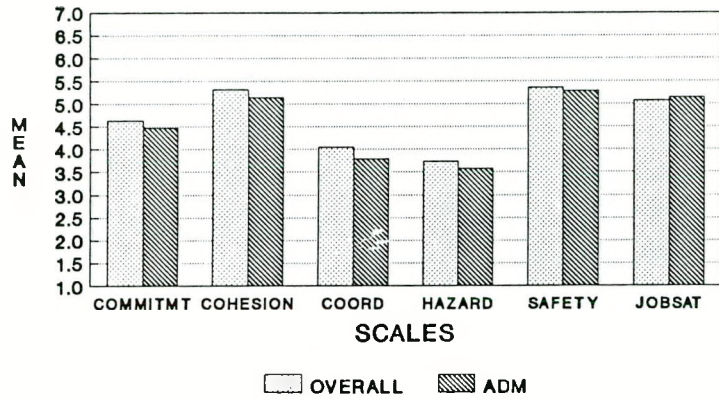
TOKAMAK FUSION TEST REACTOR
COMPARED TO PPPL OVERALL ON THE
COMMUNICATION SCALES



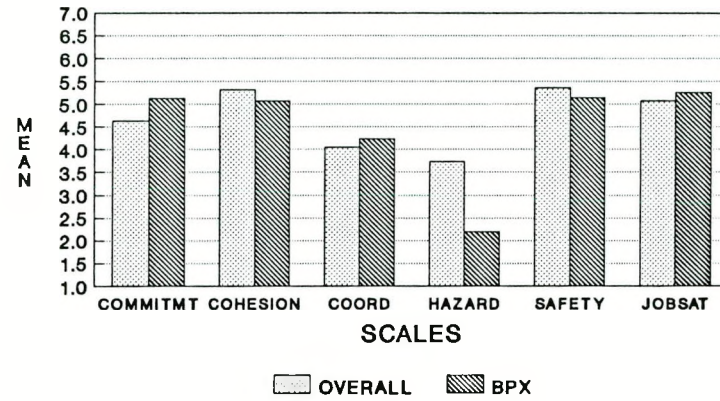
APPENDIX F:

**COMPARISON OF PPPL DEPARTMENTS TO OVERALL
PPPL MEAN VALUES ON ADDITIONAL SCALES**

ADMINISTRATION DEPARTMENT COMPARED TO PPPL OVERALL ON THE ADDITIONAL SCALES

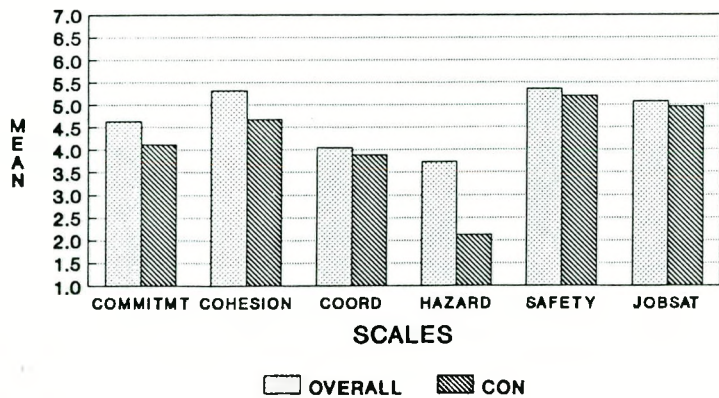


BURNING PLASMA EXPERIMENT COMPARED TO PPPL OVERALL ON THE ADDITIONAL SCALES

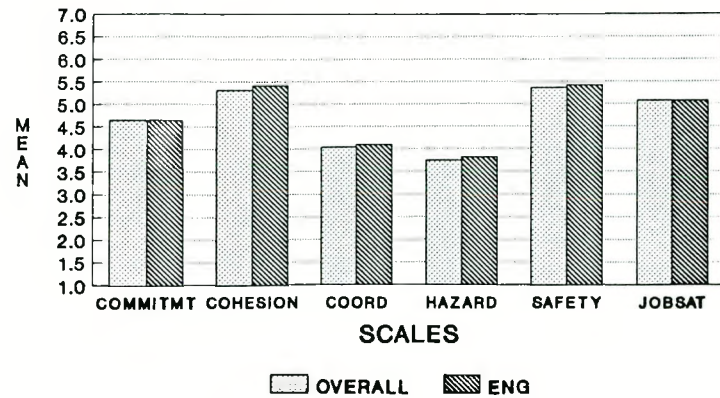


F-1

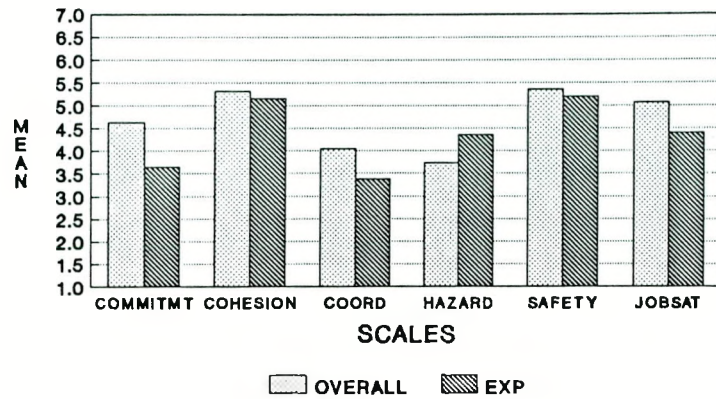
CONTROLLER'S OFFICE COMPARED TO PPPL OVERALL ON THE ADDITIONAL SCALES



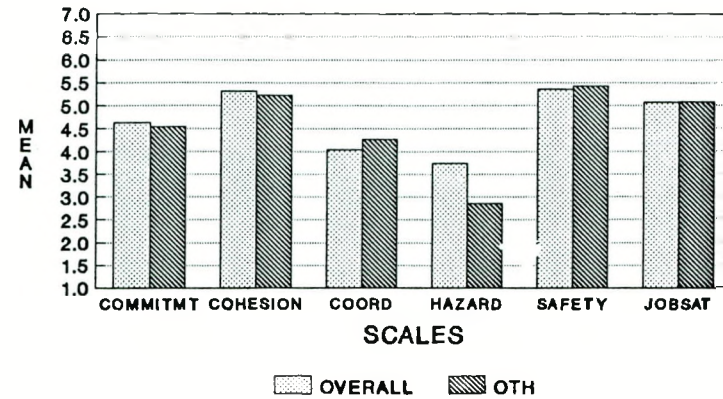
ENGINEERING DEPARTMENT COMPARED TO PPPL OVERALL ON THE ADDITIONAL SCALES



EXPERIMENTAL PROJECTS COMPARED TO PPPL OVERALL ON THE ADDITIONAL SCALES



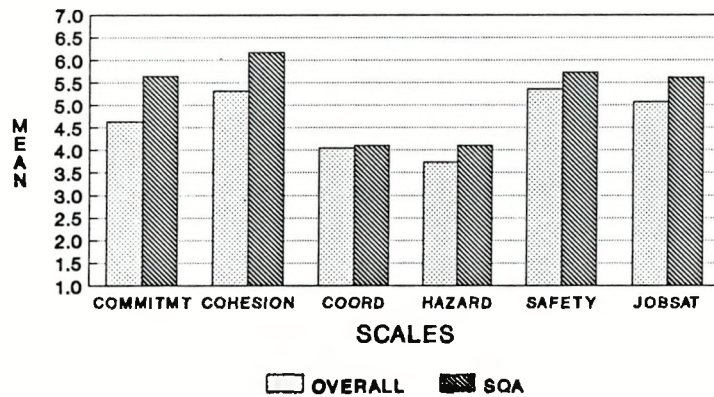
OTHER DEPARTMENT COMPARED TO PPPL OVERALL ON THE ADDITIONAL SCALES



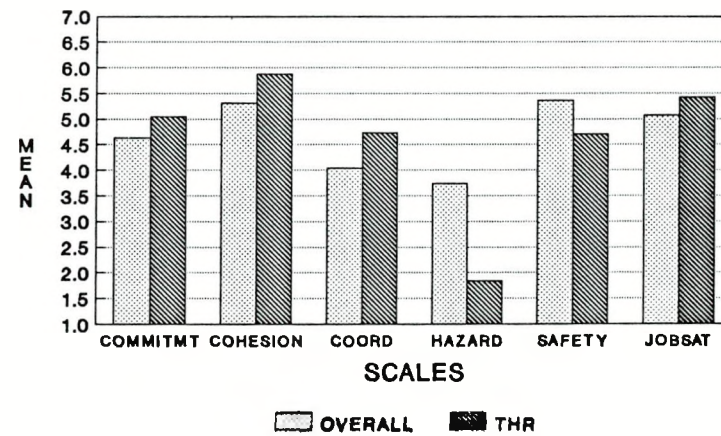
Other department consists of Scheduling; Technology Transfer; Departmental Offices; Director's Office

F-2

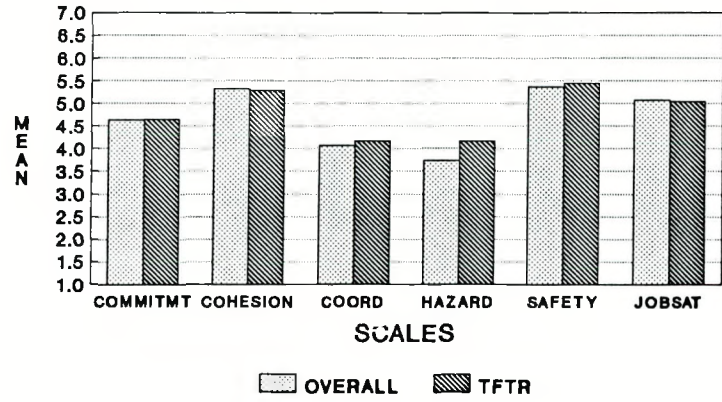
SAFETY/QUALITY ASSURANCE DEPARTMENT COMPARED TO PPPL OVERALL ON THE ADDITIONAL SCALES



THEORY DEPARTMENT COMPARED TO PPPL OVERALL ON THE ADDITIONAL SCALES



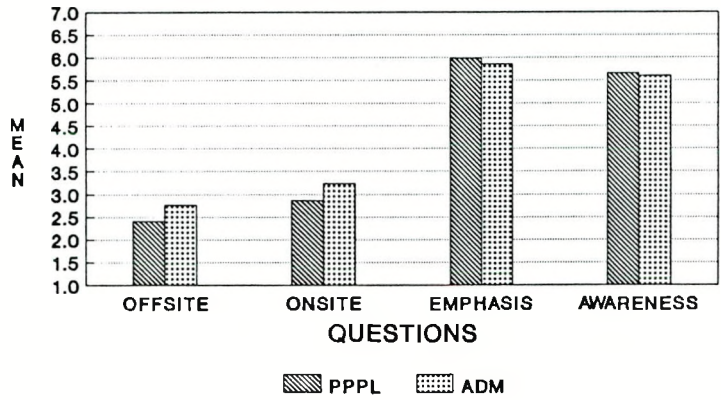
TOKAMAK FUSION TEST REACTOR
COMPARED TO PPPL OVERALL
ON THE ADDITIONAL SCALES



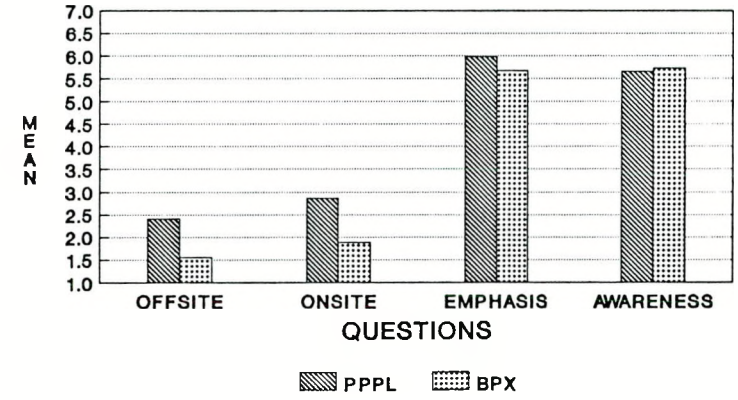
APPENDIX G:

**COMPARISON OF PPPL DEPARTMENTS TO OVERALL
PPPL MEAN VALUES ON ENVIRONMENTAL QUESTIONS**

ADMINISTRATION DEPARTMENT COMPARED TO PPPL OVERALL ON THE ENVIRONMENTAL QUESTIONS

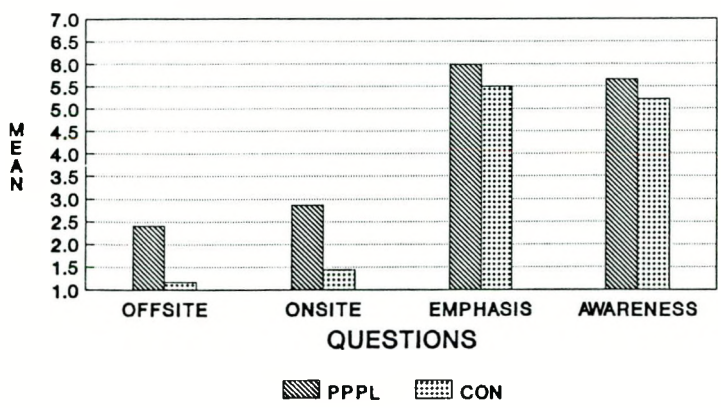


BURNING PLASMA EXPERIMENT COMPARED TO PPPL OVERALL ON THE ENVIRONMENTAL QUESTIONS

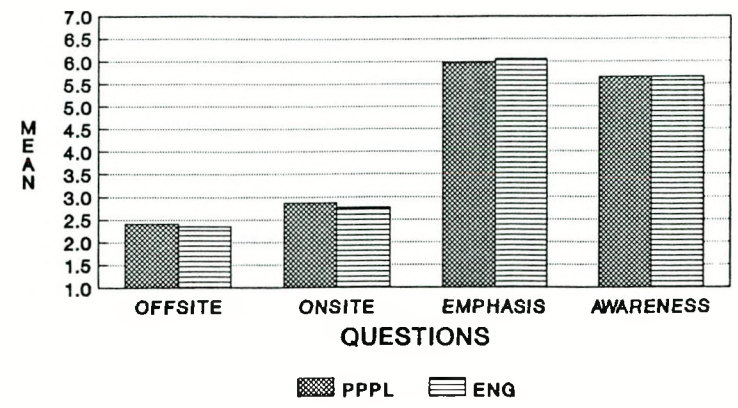


G-1

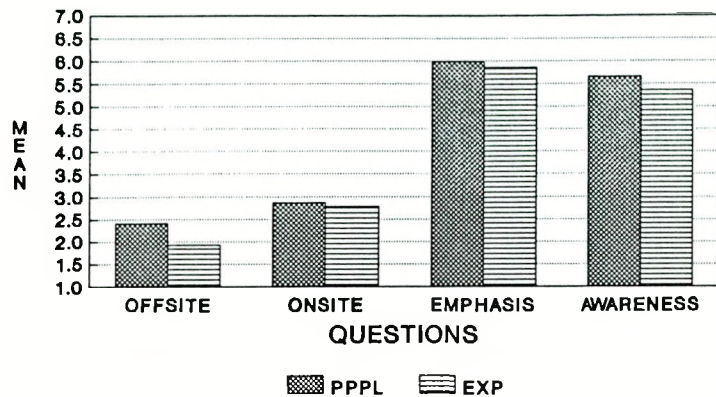
CONTROLLER'S OFFICE COMPARED TO PPPL OVERALL ON THE ENVIRONMENTAL QUESTIONS



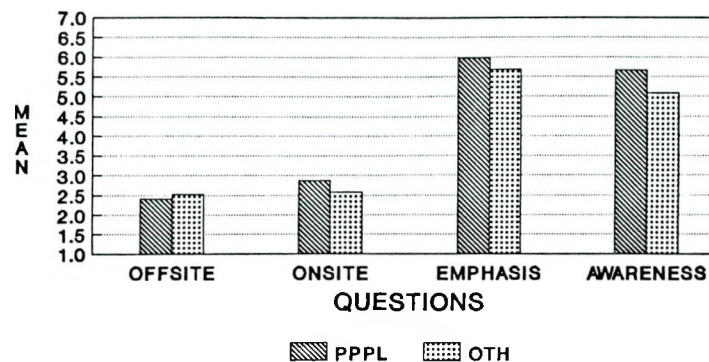
ENGINEERING DEPARTMENT COMPARED TO PPPL OVERALL ON THE ENVIRONMENTAL QUESTIONS



EXPERIMENTAL PROJECTS COMPARED TO PPPL OVERALL ON THE ENVIRONMENTAL QUESTIONS

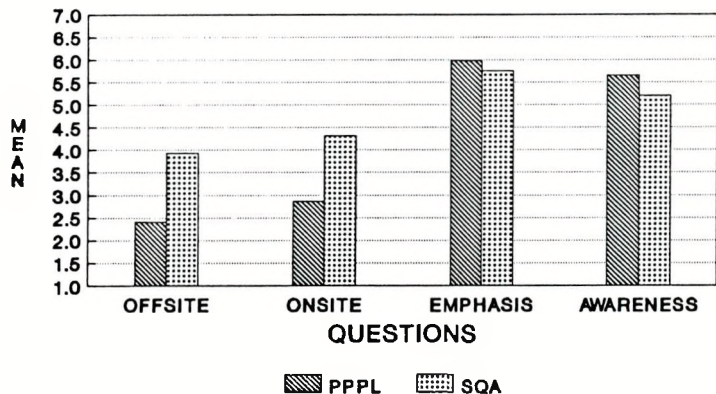


OTHER DEPARTMENT COMPARED TO PPPL OVERALL ON THE ENVIRONMENTAL QUESTIONS

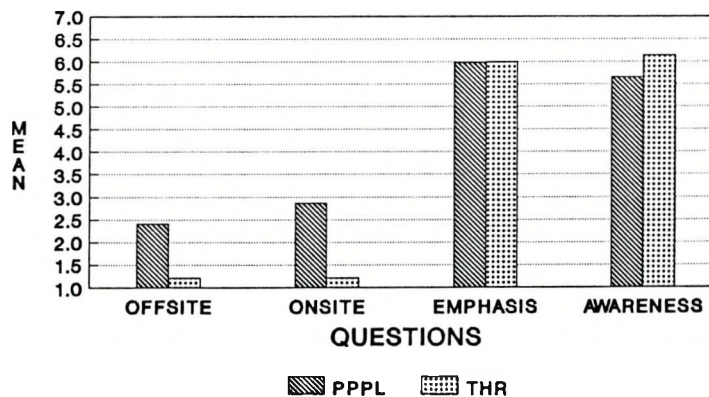


Other Department Includes: Scheduling; Technology Transfer; Departmental Offices; Director's Office

SAFETY/QUALITY ASSURANCE COMPARED TO PPPL OVERALL ON THE ENVIRONMENTAL QUESTIONS



THEORY DEPARTMENT COMPARED TO PPPL OVERALL ON THE ENVIRONMENTAL QUESTIONS



TOKAMAK FUSION TEST REACTOR
COMPARED TO PPPL OVERALL ON THE
ENVIRONMENTAL QUESTIONS

