MOTIVATIONAL, BEHAVIORAL AND PSYCHOLOGICAL IMPLICATIONS
OF ELECTRONIC MONITORING OF WORKER PERFORMANCE

Prepared for the Office of Technology Assessment
United States Congress

Michael J. Smith, Ph.D.
Pascale Carayon, M.A.
Kathleen Mieszko, M.S.

Department of Industrial Engineering
University of Wisconsin - Madison
1513 University Avenue
Madison, Wisconsin 53706

This document was prepared by an outside contractor as an input to an ongoing OTA assessment. It does not necessarily reflect the analytical findings of OTA, the Advisory Panel, or the Technology Assessment Board.


July 1986
U.S. Congress
Office of Technology Assessment

Contractor Documents: Volume 2

Contents:

Michael J. Smith, Pascale Carayon, and Kathleen Miezio,
"Motivational, Behavioral and Psychological Implications of
Electronic Monitoring of Worker Performance," July 1986...............1

Gary T. Marx and Sanford Sherizen, "Social Aspects of Changes
in Worker Monitoring and Computer/Communications Privacy
and Security Practices," June 1986.................................120

Emanuel Donchin, "Psychophysiological Monitoring: Possibilities
and Prospects," November 1986.................................311

These documents were prepared by outside contractors as inputs
to an OTA assessment. They do not necessarily reflect the
analytical findings of OTA, the Advisory Panel, or the
Technology Assessment Board.
PREFACE

Workplace electronic monitoring of employee performance is becoming more widespread, and with this increased application a number of important issues have come forth. Some deal with personal privacy considerations, while others center on the potential influences on worker stress and health. Sides have been drawn with unions and employee advocacy groups arguing against the use of electronic performance monitoring and going as far as recommending legislation to prohibit such use, and employers and their associations maintaining that electronic monitoring is vital to doing business and is a management right under federal labor legislation. This last contention by management has spurred congressional interest in changing labor laws, such as the National Labor Relations Act, to redefine labor and management responsibilities and rights. Advocates claim that such drastic action is required to provide the necessary legislation foundation for new organizational structures that will be needed in the next decade to deal with the wide ranging technological changes that will transform the workplace, forcing new roles for labor and management, and "fuzzing" the lines of responsibility between the two groups. At the heart of this issue is electronic monitoring which provides opportunities to share information at various levels of an organization or to limit such sharing, and which reduces the requirements for direct human supervision thereby influencing the organizational structure dramatically. Because of its control role in technological change and personal privacy issues, electronic monitoring will be one of the first arenas in which efforts to change federal legislation on privacy and labor laws will take place. Such attempts must take into consideration the significance of electronic monitoring for improving working conditions and job design which may be eroded
by technological advances and at the same time needed production improvements which can maintain the competitive advantage of U.S. products. Often these considerations are seen at odds, but they are not mutually exclusive or contradictory concepts and can be integrated to provide benefits to both labor and management. Such integration can be achieved by establishing monitoring systems that provide for more employee participation and control over work processes and which are coupled with employee motivation programs that reward participation, performance and commitment. Such systems can provide meaningful and satisfying feedback to employees, better means for employee evaluation, and production process information necessary to effectively manage production resources.

It is important to note that current electronic monitoring systems do not incorporate necessary features that will improve job design to benefit employees, and therefore the experience gained from these systems has little benefit in defining future directions and needs. Currently, there is no research evidence that demonstrates that electronic monitoring increases individual worker production, total workplace productivity, enhances the ability to manage and control workers, or improves the evaluation of worker performance. On-the-contrary, current electronic monitoring systems are so limited in their capabilities that they have fueled the objections of worker advocacy groups to electronic monitoring of worker performance. These systems rely primarily on second-by-second counts of the quantity of worker output without any consideration of the quality of the product, differences in providing specific products that change performance requirements and exceptional circumstances that throw-off timetables. Reliance on the number of units per hour puts inordinate emphasis on speed and can increase work pressure which is stressful, diminish job satisfaction, and decrease worker
pride. Such systems are doomed to failure in the long run as they build
"sweat-shops" full of unhappy employees who frequently move from employer to
employer.

Those few electronic monitoring systems that do examine quality as well
as quantity typically do the measurements in such an objectionable, "sneaky"
way that the approach acts as a demotivator to workers rather than as a source
of helpful information. Unannounced eavesdropping on telephone solicitations
or monitoring the number of corrections made in a typed document are examples
of current systems. A major concern in devising new electronic monitoring
systems is ensuring that the information gathered represents the full gamut of
employee performance including quantity, quality, service and initiative.
Current systems do not gather all of this information and technological and
worker evaluation advances are needed to be able to address all of them. But
even if they can be measured, such as with the quality examples above, if the
information is not applied in an appropriate way, then it will be harmful to
workers and the production process. It is often said that today's electronic
monitoring systems are not "evil", but the way in which they can be abused is
"evil." Future systems that monitor more explicit information have the
potential to be "more evil" than current systems if they are abused.

Because good experiences in using electronic monitoring are lacking, it
is not possible to define explicitly how the future systems should be
designed. Principles of job design and performance evaluation can be used to
guide their development, but it will be through experiences in their use that
refinements and redirection will occur. Such efforts should be undertaken on
an experimental basis so that principles can be developed for building future
systems. Congress, industry, and labor need to work together to test the
efficacy of new concepts in electronic monitoring. Such efforts will serve as
an important element in building America's future industries and providing satisfying and healthful jobs.

This report will look at various elements of electronic monitoring that are significant for employee behavior, performance, motivation, satisfaction, stress, and health. Its purpose is to highlight various aspects of each element that can contribute to good or to bad electronic monitoring from a behavioral psychological perspective. The paper does not provide definitive answers for the design of electronic monitoring systems because of the lack of experimental data needed for such formulations. However, it does give guidance on how to approach the design of such systems and what to watch out for. While it specifies significant policy considerations that can be addressed by Congress, it is clear that mutual cooperation between labor and management in trying out new approaches to electronic monitoring will be paramount if such systems are to be used successfully. This may require some changes in the nature and structure of work, but such changes will occur anyway with the introduction of new technology. The opportunity exists to tie technology and job design together in a proactive way and electronic monitoring can be an important element in this endeavor.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td>2</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>6</td>
</tr>
<tr>
<td>Introduction</td>
<td>7</td>
</tr>
<tr>
<td>Feedback</td>
<td>14</td>
</tr>
<tr>
<td>Goal Setting</td>
<td>22</td>
</tr>
<tr>
<td>Incentives</td>
<td>27</td>
</tr>
<tr>
<td>Performance Appraisal</td>
<td>32</td>
</tr>
<tr>
<td>Monitoring and Stress</td>
<td>37</td>
</tr>
<tr>
<td>Survey of Workers</td>
<td>46</td>
</tr>
<tr>
<td>Summary of Findings</td>
<td>53</td>
</tr>
<tr>
<td>Conclusions</td>
<td>56</td>
</tr>
<tr>
<td>Policy Considerations</td>
<td>60</td>
</tr>
</tbody>
</table>

## APPENDICIES

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>References</td>
<td>66</td>
</tr>
<tr>
<td>Interview Tables</td>
<td>71</td>
</tr>
<tr>
<td>Interview Form</td>
<td>76</td>
</tr>
<tr>
<td>Interview Results</td>
<td>89</td>
</tr>
<tr>
<td>Description of Workplaces</td>
<td>103</td>
</tr>
<tr>
<td>Bibliography</td>
<td>108</td>
</tr>
</tbody>
</table>
INTRODUCTION

This report examines the psychological, behavioral and performance influences of electronic monitoring of employees at work. Such monitoring is becoming more widespread (OTA, 1985) and is of concern because of its implications for worker privacy, stress, health and behavior, and for industry's ability to effectively control work and production activities. Concern has centered on office employees, for instance telephone operators and airline reservations clerks, who have their productivity monitored continuously by a computer and are exposed to eavesdropping to ensure that their style of interaction with customers is satisfactory. However, monitoring is not limited to such office work, industrial applications in blue collar assembly work are becoming more prevalent. Assembly workers have been assigned their own bar code (signature) that can be read by an optical scanner similar to those used at the grocery check-out. With this technology, factory managers can track individual output continuously, as well as, responsibility for defective parts in returned products. Current computer technology provides the capability to monitor work continuously if it can be quantified. Since the industrial revolution, economists (Smith, 1776), engineers (Babbage, 1832; Taylor, 1911; Gilbreth, 1914; Gant, 1919) and psychologists (Cattel, [see Poffenberger, 1947]; James, 1890; Munsterberg, 1913; Scott, 1911) have endeavored to develop better and better techniques to improve production through job analysis and quantification, the use of technology and economic rewards. They have developed sophisticated approaches for applying the latest technology to measure worker motions, behaviors and
They have also constructed checklists and survey forms to examine worker motives, satisfaction and distress. These tools have been applied to the development of electronic monitoring systems, but, as this paper will demonstrate more needs to be done.

To understand the significance of monitoring of worker performance it is useful to briefly review highlights of representative theories of workplace design.

The development of modern work design commenced with the economic theory of Adam Smith and the engineering applications of Charles Babbage at the time of the organization of the factory systems, about 1800. Babbage (1832) clearly anticipated that machines were more than devices and that combining them to achieve specific tasks could increase productivity. This trend toward work specialization was extended by Scientific Management of Frederick Taylor (1911) and Time and Motion Study of the Gilbreths (1914). The Scientific Management School aimed to discover the best method of work by analyzing and measuring work according to scientific methods and principles (Taylor, 1911). The extreme specialization of work under Taylor's principles gave managers the opportunity for more control over the work process. Through highly hierarchical work organizations, continuing feedback on the production process was given to management which was helpful in decision making about elements of production. According to Taylor this management philosophy was essential for efficient production and maximum profit. Frank and Lilian Gilbreth later refined Taylor's ideas. Their objective was to study work methods in terms of their simple component parts in the light of human abilities and limitations. They took Taylor's concept of the separation of "planning" and "doing" to its extreme logical conclusion which was very specialized and fragmented task. Thus, they developed new methods of work
observation known as Time and Motion Study (Gilbreth, 1914).

Taylor's theory was further modified by Henry Gantt (1919) who improved the bonus system to make it more acceptable to workers. However, the basic assumption of this incentive system still maintained that people were motivated primarily by money. In order to determine bonuses workers' performance was recorded by using a "Gantt Chart". The Gantt Chart (proposed in 1917) represents the oldest, simplest, and most widely used modern method for scheduling and planning various activities.

Taylor, Gilbreths and Gantt are at the origins of operations management which today includes such areas as inventory control, project scheduling, quality assurance, and work measurement techniques.

In a different vein organizational psychology practitioners (Munsterberg, 1913; Cattell, [see Poffenberg, 1947]; Scott, 1911) developed theoretical bases for evaluating and monitoring worker performance from management's perspective. This approach examined individual worker differences, skills and aptitudes in work to best match the worker to the tasks to be accomplished. However, while industrial engineers assumed that workers were motivated only by money, organizational psychologists provided more complex motivation theories including social considerations, individual needs and motives and workplace design considerations. In his book The Human Side of Enterprise Douglas McGregor (1960) contrasts the conventional, directive theory X philosophy of management -- followed by traditional industrial engineering theories -- with the humanistic Theory Y position reflected by most organizational psychology theories. Central to Theory Y is the notion that management should recognize the employee's social and intellectual needs as well as financial considerations, and try to arrange jobs such that satisfy higher-level self fulfillment. This was postulated to lead to stronger
commitment and contributions to the company. In that sense management should provide a structure for worker control and direction of their own work activities.

Like McGregor, Rensis Likert (1961) showed the importance of human resources management. However, unlike McGregor, Likert highlighted organizational design perspectives. According to him, the good interaction between managers and employees often was lost because of excessive management. Thus he proposed to cut out middle-management. This would require more information flow between top management and workers, in essence more feedback.

Taylor's Scientific Management created fragmented jobs. The Human Relations movement, McGregor and others attempted to counteract negative side effects of this approach, and their theories evolved into the job enlargement movement. Job enlargement focused primarily on putting more variety into the job by having more tasks of a similar nature. In the 1960's, the job design movement focus move to job enrichment which increased job content in terms of decision making, responsibility and control of tasks. The driving force behind the job enrichment movement was Frederick Herzberg (1966). According to him, there are three main components: (1) potential to develop skills and abilities, (2) the job must have built-in rewarding characteristics and (3) workers must be rewarded for performance. He proposed that people are motivated by internal factors and not external factors such as money (Motivation-Hygiene Theory; Herzberg, 1966). Job characteristics which address "motivators" and enrich a job were: direct feedback, client relationships, new learning, self-scheduling, unique expertise, control over resources, direct communication and personal accountability (Herzberg, 1974). Hackman and Oldham (1976) also presented evidence that there were a
number of separable job attributes that interacted to improve worker
performance, motivation, and satisfaction and to decrease absenteeism and
turnover. These job characteristics were: skill variety, task identity, task
significance, autonomy, and feedback (Hackman et al., 1975). Unlike Herzberg,
Hackman and Oldham assume that this theory does not work for everybody since
the psychological needs of people differ. Thus for persons with low
achievement potential the theory did not work. Hackman and Oldham provided
specific psychometric tools to diagnose jobs and to display workers for whom
the theory would work best. This approach provided an opportunity to measure
current level of performance, motivation, satisfaction, and job
characteristics.

The trend in both engineering psychology and business is toward theories
that characterize specific work elements such as technology, tasks and work
organization and particular worker attributes that can be best fit together to
provide the system for production. These are elaborations of Babbage, Taylor
and McGregor and assume the importance of accurate information about worker
performance to effectively guide the production process.

These theories have demonstrated that managers need to know (1) the
performance level of employees and machines, (2) the status of the production
process, and (3) the disposition of materials, machinery and human resources
for effective, efficient production and maximum profit. The theories have
also shown that workers need to know about their own performance as well as
management's motives and rewards for the most effective performance. Current
theory of production emphasizes flexibility in the production process, just-
in-time application of resources, and the use of technology to produce a more
stable, predictable production system. This theory requires that human
performance be monitored in a similar way that machinery status is checked so
that managers can exert maximum control over the entire work system including the human resources. It is being applied in all types of workplaces from steel mills to banks to the Post Office. It has been proposed that this approach to production is necessary for the United States to achieve a competitive advantage in world markets.

Alternative theories of production deal with creating the proper work environment and job design for high employee motivation that will ensure high level, quality performance. These theories emphasize the importance of worker efforts in the emerging high technology production processes, and particularly in the ever growing service industries. They argue that technology alone will not give us an international competitive advantage, but that a hard working, highly motivated, dedicated workforce is also a key ingredient for such an advantage. They point to the Japanese production system as an example where the workforce and technology go hand-in-hand to provide efficiency. These theories, like the technology oriented ones also stress the importance of monitoring employee performance for effective control of the production process. They differ in the application of the information collected; the technology based theories emphasizing its use in management control, while the job design theories emphasize its usefulness to employees in their efforts to control the work process.

These two approaches to the collection and use of performance information at work define important areas of consideration that need to be examined in determining the influences of workplace electronic monitoring and worker productivity, behavior, stress and health. For it is through appropriate application of performance monitoring that both increased production and higher quality of working life can be achieved. In this regard the following issues are important outcomes of monitoring that impact worker behavior.
These areas include (1) performance feedback, (2) goal-setting, (3) incentive systems, and (4) performance appraisal. This report will first examine each of these areas to define their significance in influencing worker behavior and attitudes. Next an overview of occupational stress considerations related to electronic monitoring will be presented followed by interviews of workers affected by electronic monitoring. Finally, a set of policy recommendations will be developed concerning the application of electronic monitoring at the workplace.

This report will not examine the characteristics or capabilities of various monitoring technologies. Such an examination has been undertaken by others in different reports (Westin et al., 1985). It is sufficient to say that employees in jobs that can be quantified using job analysis techniques can be monitored on a second by second basis with current technology in unobtrusive ways such that they do not even know if or when they are being monitored. Some systems are more apparent such as in the bar coding of products, while others are not as apparent such as telephone eavesdropping or keyboard monitoring.

The information used in this report was obtained by undertaking a thorough review of the literature in the social sciences, education and engineering topics for the general areas of interest (feedback, goal setting, incentives, performance evaluation, monitoring). Computerized literature searches were conducted using Psych Abstracts, ERIC, INSPECT and COMPINDEX for the time periods 1960 to present. In addition, several popular business and engineering journals were scanned by graduate students from 1984 to present volumes to identify current material that might not be in these literature data bases. Besides the literature review, data was collected from convenient samples of employees who are electronically monitored using a semi-structured
interview format. A portion of the interviews were conducted face to face while the remainder were conducted over the telephone. Interviews took approximately 35 to 40 minutes to complete. (Appendix 1 illustrates the semi-structured interview format and content).

FEEDBACK

The role of feedback in performance has been studied at many diverse levels from sensory feedback and skilled motor response to knowledge of results and attitudinal reactions (Thorndike, 1905; Smith & Smith, 1966; Ammons, 1956; Bilodeau & Bilodeau, 1961). What is clear at all of these various levels of human response is that people want to know about their performance and in fact will endeavor to seek out such knowledge when it is absent. As Nadler (1977) stated "People are constantly searching for information to help them make decisions and correct errors, to give them direction, and to confirm their beliefs." In fact when feedback about working issues is absent, employees will actively seek it. Thus, individuals experiencing a high degree of contextual uncertainty, role ambiguity, high job involvement or low tenure on the job have reportedly been more active in seeking feedback within their environment (Ashford & Cummings, 1985).

Feedback is important at the most basic levels of response to guide the employee to the most appropriate actions. The more immediate the feedback and the better that it defines the results of the employee's action, the greater the control that the employee can exert over the skilled action being undertaken (Smith & Smith, 1966). Thus, when the data entry clerk inputs information by striking the keyboard there are various levels of direct, continuous feedback that occur, such as the force feedback from the keyboard
and the displaying of the characters struck on the video screen. When such
direct feedback is absent, like the absence of the pictorial display on a key-
to-tape input device, then employees are more uncertain about their
performance, are unable to detect and correct errors, and generally perform
worse then when the feedback is present.

A second level of feedback is called knowledge of results and it
generally is not continuous but is received after completion of performance,
such as assembling a part or completing the input on an insurance form. At
this time the employee can sense something about the quality of the product
completed. But this is only an internal knowledge of results. Another level
of knowledge of results occurs when the product is evaluated against some
external comparison standard and the results are fed back to the employee.
"You have produced 10% over the production goal today," or "Your output had 2%
errors." This feedback provides general direction to the worker about future
output.

There are a number of basic principles that concern the application of
output to provide the best possible employee performance and attitude. These
principles have been established for the various levels of feedback and for
individual versus group feedback. An examination of these principles
demonstrates many similarities across the various feedback levels and also
helps to define the most effective ways to apply feedback to enhance employee
performance, satisfaction and reduce stress.

In dealing with motor skills Ammons (1956) and Bilodeau & Bilodeau (1961)
have defined considerations for enhanced performance and learning. In
general, knowledge of performance provides information that can be used to
modify behavior, for motivation to maintain or change performance and as
intrinsic and extrinsic rewards that influence behavior. Essentially feedback
or knowledge of results serves to reinforce habits, serves as cues to evoke established patterns of response (habits), or provides the motivation for performance and/or learning. For all practical purposes, sensory feedback of actions must be immediate for proper performance, while knowledge of results can be delayed to the most appropriate time (as when a work cycle is completed).

Seven basic tenants for applying knowledge of results to provide the best levels of performance and learning are:

1. The more specific the knowledge of results the more rapid the improvement and the higher the level of performance.
2. The longer the delay in giving the knowledge of results the less effective it is in affecting performance.
3. When knowledge of results is decreased, performance will drop.
4. Knowledge of results influences motivation, typically by increasing motivation to perform, but sometimes causing the opposite effect.
5. For all practical purposes the employee always has some knowledge about his/her performance and knowledge of results either reinforces that belief or demonstrates where the belief is wrong.
6. Knowledge of results provides cues for proper behavior.
7. Supervisory instructions can alter the employees response to the feedback received.

When we move to higher order feedback about job conditions and performance, a different set of considerations emerges, but with similarities to the skills level knowledge of results findings. To understand the role of higher order feedback in employee motivation and its relationship to worker
performance, behavior, and stress reactions it is useful to examine a model proposed by Ilgen and colleagues (1979). Figure 1 illustrates the various elements of the model. There are important considerations in examining the feedback process and employee monitoring that are highlighted by the model. For instance, the employee's perception of the source of the feedback will influence the acceptance of the feedback, the behavioral and performance responses, and whether the feedback is stressful or not. For a highly regarded and credible source, the feedback will have more significant effects. In a similar vein, the message of the feedback will also have an influence. Thus, the perception of the accuracy of the feedback, the fairness and the medium (received from the supervisor or displayed on the video screen) all influence the acceptance of the feedback and its influences on responses(s). There are also characteristics of the receiver that will have an impact such as job tenure, frame of mind, current mood, and health status.

A range of theorists have proposed why higher order feedback about performance and working conditions is important for workers, and aspects of such feedback that determine its effectiveness (Nadler, 1977; Ilgen et al, 1979; Ashford & Cummings, 1983). Nadler (1977) suggests that individuals act and organizations function primarily on the basis of the information they receive; that people are constantly searching for information to help them make decisions and correct errors, to give them direction and to confirm their beliefs. Organizations are set-up to gather and process environmental data or internal data and getting the information from one person or group to another that can act on the information. Thus, information (feedback) has an important influence on the behavior of individuals and organizations and is a powerful tool for change. Information produces the impetus for change by providing for evaluation (comparison, direction setting) and rewards
FIGURE 1

MODEL OF THE EFFECTS OF FEEDBACK ON RECIPIENTS

Taken from Ilgen et al (1979)
Feedback is an effective modifier of behavior if it is seen as a valued commodity by the recipient. It takes on value to the individual when it is effective (relevant, understandable, accurate, useful) and when it is necessary. It becomes necessary when the employee is in an ambiguous situation or uncertain of how to respond. New situations without familiar cues, situations that are overloaded with cues, contradictory situations where direction is needed or uncertain situations due to information inadequacy all need feedback to help direct response. Employees also seek feedback if they are not sure of the appropriateness of their own behavior or if their behavior is being evaluated such that rewards/punishments could ensue. In essence feedback is used to resolve feelings of ambiguity or uncertainty.

At the same time feedback of performance can create feelings of anxiety, frustration and lowered self esteem. Since feedback fulfills an error correction function as well as a performance appraisal function, it can indicate to employees that they are not doing their job as good as they would like to, or even as good as the company would like them to. This can create stress, even when it reduces the stress associated with uncertainty and ambiguity. Therefore, feedback is a two edged sword in addressing job design considerations for stress.

Research into the effectiveness of feedback in influencing human performance has primarily been laboratory based and designed to test theory rather than absolute levels of improvement produced by use of feedback. In addition, many different forms of feedback under widely varying conditions have been tested with very little consistency in the approach taken. Thus, it is difficult to provide absolute statements about the extent of improvement in performance that can be achieved through the use of performance feedback to
workers. As will be discussed later many considerations such as the timing of the feedback, the accuracy in portraying performance, the various types of information such as quantity, quality, errors and corrections all have important influences on how people will respond. Most research studies on feedback only report statistical differences between feedback and no-feedback conditions and do not report absolute levels of subject performance. For those few studies for which absolute information is available, it appears that feedback can produce improvements of 3% to 15% under varying performance requirements with different tasks (Warm et al, 1972; Manzer, 1935; Church & Camp, 1965; Hundal, 1969; McCormack et al, 1962 & 1963; Matsui et al, 1983).

Based on the literature there are specific tenants that can be derived concerning higher order feedback about performance.

1. The feedback must be relevant and have value to the employee.
2. The feedback must be understandable and explicit (specific).
3. The feedback must be trusted (accurate, verifiable, from a good source)
4. The feedback should be positive for best results.
5. Feedback from one's self is more accepted than feedback from another source. Feedback from a machine is more accepted than that from another person.
6. Employees will actively seek feedback when they feel the need due to uncertainty, ambiguity or evaluative situations.

In summarizing the issue of feedback it is clear that there are some similarities between the basic perceptual/motor human performance feedback and the higher order feedback used to make judgments, set goals and motivate behavior. Feedback is a basic element of a self regulating system that is
used to influence the output (performance, behavior, production, reward). Feedback has intrinsic qualities that motivate personal performance but that can also bring about feelings of stress. For the best possible performance, feedback should be frequent, positive, and valued by the recipient. It should provide cues and direction toward the desired goals. Feedback is the element that allows the steersman to successfully navigate the boat over the rapids. Thus, it is quite clear that monitoring of workers can be an important aspect of proper steerage, for without monitoring there would be only limited feedback to the employee. Monitoring provides for structured, consistent feedback that is equivalent for all employees. Without monitoring it is likely that only the most astute employees would be able to estimate their own performance. But monitoring must be established within the framework of providing the most appropriate and effective feedback to the employee; feedback that allows for direction, error correction and learning; feedback that is positive, motivational and rewarding; feedback that is useful, functional, valued, and allows for enhanced performance; feedback that helps to establish the necessary goals to work effectively. Such feedback has to be fed back to the employee but not necessarily to supervision for good performance. In fact, to protect employees from supervisory intimidation and to ensure positive use of individual feedback, it may be appropriate to aggregate individual monitoring results together to be fed back to management.

In this later regard, feedback serves a significant role in the setting of employee goals. Such action is a major element in monitoring since two primary purposes of monitoring are to establish standards of performance and to motivate employees to meet these standards. Therefore, a discussion of feedback and monitoring is not complete without an examination of feedback and goal setting.
GOAL SETTING

Just as feedback about performance can clearly be established as a critical element in promoting superior employee productivity, so too is goal setting. Proponents of goal setting have linked it to performance feedback as the one-two punch that can knock-out poor employee performance (Locke, 1968; Latham & Yukl, 1975). They argue that knowledge alone is not a sufficient condition for effective performance, but that goals are necessary to establish evaluation criteria and motivation to perform at high levels. In terms of employee performance monitoring, goal setting can be linked in three ways. First, monitoring provides the information base on which to develop and set performance standards (goals). Secondly, monitoring provides information about how successfully employees are meeting the standards. Finally, goal setting provides the targets of performance that motivate employees to achieve.

Goals are the object or aim of activity. They are what an individual is trying to accomplish, e.g. the quota, standard, work norm, task, objective or deadline. The basic assumption of goal setting theory is that goals serve as regulators of human action. However, one-to-one correspondence between goals and action cannot be assumed since people make errors, may lack the skills and/or abilities to attain the goals, have various conflicts in obtaining goals (increased incentive pay versus reduced health), or may lack organizational support (adequate resources, organizational policies).

The goal may be implicit and largely unspecified quantitatively or qualitatively, or it may be quite explicit and detailed through the use of targets, standards and quotas. Specific goals have been found to result in
better performance than no goals or general goals such as "do your best" (Locke et al, 1981; Latham & Yukl, 1975). Monitoring can provide information about performance output and quality on which specific goals can be set and which gives employees details about how they are reaching the goals. Although a specific goal is expected to improve performance over the level produced by no goal or a general goal, the impact of goal specificity on employee satisfaction and attitudes is mixed (Steers & Porter, 1974). On the one hand, a specific goal may help an employee to reduce the situation's uncertainty and ambiguity. On the other hand, a very specific goal that allows for less freedom and makes the situation less flexible may be stressful.

The precise nature of the relationship between goals and behavior is influenced by the effects of feedback, incentives and rewards, participation in setting the goals, commitment to the goals and individual personality. All in all, goal refers to attaining a specific standard of proficiency on a task, usually within a specified time frame and given specific conditions and constraints.

The purpose of goal setting is to provide direction toward a standard of performance. Goal setting achieves this by directing the attention and action of the employee toward the desired organizational outcomes. Thus, goal setting can be used to focus in on specific elements of performance that need to be enhanced which provides specific direction, but also can provide general direction on the level of desired production. A number of research studies indicate that goal setting is more effective in the presence of feedback or knowledge of results about performance (Locke, 1967; Kim & Hamner, 1976; Erez, 1977; for a review see Locke et al, 1981). Such feedback can provide information on how successfully the employee is meeting goals and serves as the impetus to change behavior to improve productivity. The feedback also
provides an indicator of the reasonableness of the goal. If the employee is working at near top capacity and skill, and still is not within reach of the goal, then the employee has the basis for reexamining the goal.

This last point is important because Locke (1967) and Hamner & Harnett (1975) among many others indicate that it is more effective for management to set hard goals than easy ones (for a review of literature on goal difficulty, see Locke et al, 1981). Employees perform at higher levels under hard goals, but such high performance is achieved only if the employees have the skills and abilities as well as the physical resources to achieve the hard goals. When given hard goals, employees modify the work pace to increase output. Such an increase in work pace has the potential to be stressful if individual capacities are over extended. Salvendy (1981) points out that when standards of performance are externally established (by the company) that under conditions of high workload and fast work pace, these systems are similar to machine-paced work which has been shown to be quite stressful and detrimental to employee physical and mental health. In this regard some studies of goal setting demonstrate that employees set higher goals and work more productively when they participate in goal setting or when they set their own goals rather than using management established goals.

The relationship between goal setting and improved work performance is much clearer than is the case for feedback. While many of the studies are similarly laboratory exercises, there are also field experiences that allow for a more accurate determination of potential productivity influences. Latham and Yukl (1975) report that 10 of 11 studies in organizations using goal setting support its effectiveness in improving worker performance. Locke et al (1981) in reviewing various studies of goal setting demonstrate a 90 percent success rate in using goal setting to improve worker performance.
However, an important consideration is that goal setting is often used along with other work motivators such as feedback, incentives and worker participation. Thus, the most significant influences appear to be associated with the effective blending of goal setting with those of other factors. With this in mind it can be shown that goal setting has produced improvements in subject performance from 6 percent to 43 percent (Umstot et al, 1976; White et al, 1977; Locke, 1968; Latham & Yukl, 1975).

A number of factors influence the effectiveness of goal setting on employee performance. The personal abilities and skills of the employee will determine his/her ability to meet the standards that are established. Being able to meet the standards acts as a motivator to continue to perform well, while inability to meet the standards may motivate better performance but may also demotivate the worker and reduce effort and performance and cause stress. Personal motivation also affects the influence of goals on performance. If the employee is demotivated by other job factors such as repetitive work, then the influence of standards of performance will be less. Personality also plays a role in that persons who are not highly motivated to begin with may not respond well to imposed standards of performance. Finally, it appears that job tenure influences the effects of goals such that the more established employees respond better than newer employees.

The importance of employee participation in goal setting is clear. Early studies (Coch & French, 1948; French et al, 1966) in industrial settings have demonstrated higher goals and superior performance when employees have a role in setting their standards of output. More recent research on management by objectives (MBO) extends this important consideration (Drucker, 1954; McGregor, 1957; Odiorne, 1965). MBO is an approach to planning and
performance appraisal that establishes employee goals and relates employee performance to organizational goals. It provides for manager/subordinate interaction and communication and through establishing goals, feedback and objective evaluation, stimulates employee motivation. Research on MBO indicates that after employees set standards that cannot be achieved, once they have worked they receive feedback that tells them they cannot meet the goal, the feedback can serve as the basis of redirecting their efforts and revising the standards. This is an active process that has shown to be extremely successful in blue collar, sales and managerial jobs for increasing productivity. It works because the employees are in control of their own performance as long as the standards they set are within the corporate goals. This assures highly motivated workers with positive feelings towards the company and their supervisors. Often goals are set too high and need to be revised. In the participative environment this is achieved with relative ease due to the interactive nature of the process. When goals (standards) are imposed by the company without worker input, inability to achieve the goals can produce stress. This often leads to conflicts between workers and management.

In summary, goal setting and standards development is a natural outcome of employee monitoring. Monitoring can provide employees with feedback that gives them an objective basis to evaluate their own performance, as well as, any standards that are set. Employees perform better when goal setting is used. Increased effectiveness is obtained from goal setting when: (1) employees participate in establishing their own goals, (2) hard goals are set, but are within the individual's capabilities and are accepted by the individuals, (3) goals are specific, and (4) goal setting provides for increased supervisory/employee interaction.
While goal setting can be effectively used to increase worker performance; it does not necessarily increase worker satisfaction (Umstot et al, 1976). In fact, care has to be taken that goal setting does not create increased stress for workers due to increased job pressure. An example of this is the use of goal setting with semi-autonomous work groups in a Volvo production plant that brought about increased workload that was unhealthy and stressful for some of the workers, even though production increased (Ostberg, 1982).

An important aspect of goal setting is the establishment of standards of performance that can be used to evaluate employees and reward them. The use of incentive systems to reward performance above standard levels is an established industrial method for increasing worker production. The advent of electronic monitoring can potentiate an increased use of this approach due to the availability of individual performance information. The next section will examine the effects of incentive systems on employee performance and behavior.

INCENTIVES

Since the initial efforts of Frederick Taylor (1911) to motivate employees with incentives, their use in American industry has steadily grown. An underlying consideration in the application of incentives for work performance is that employee efforts can be measured and quantified. Thus, a central aspect of incentive applications is the analysis of jobs to determine standard methods of performing work and to establish output standards. A second element is the establishment of a process that can track employee performance -- that is performance monitoring. The comparison of employee output to established standards (performance evaluation) then serves as the basis for the payment of incentives. These incentives serve as feedback to
the employee about his/her performance and provide the motivation for employee
goal setting. Thus, incentive systems contain all of the control aspects of
employee monitoring examined in this paper, feedback, goal-setting,
performance evaluation and performance monitoring.

In the distant past, employee performance was evaluated by looking at the
number of finished products, the number of machine cycles or the number of
letters typed. These outputs represented a complete task cycle and often were
examined on a week-by-week or day-by-day basis. Emphasis was placed on
quantity of output rather than quality. While this is still true today, as
technology has improved, the ability to track worker performance on a
continuous, second-by-second basis has become a possibility. Such a
capability develops greater management control of the work system so that
bottlenecks or breakdowns can be identified or shifts in production emphasis
can be implemented at a moments notice. In addition, new technology provides
the capability to stamp an identifier or signature on finished parts or
products that can be traced for quality control and remedial action. Hence,
with electronic monitoring, quality as well as quantity can be evaluated in
the incentive/rewards process. This introduces a whole new approach to the
reward system and to how employees respond to the system.

An understanding of how incentive systems influence employee behavior and
production can shed some light on the possible impact of electronic monitoring
of employee performance. Frederick Taylor's (1911) belief was that paying
workers for each element of work completed (piece-rate payments) would enhance
output by providing the financial opportunity for the worker to better himself
in life. This belief in using contingent rewards to enhance behavior has
support in the behavioral science literature in operant behavior theory,
learning theory and expectancy theory. In brief, these theories state that
people will engage in behaviors that they expect will be beneficial to them and which provide them rewards for performing well. This approach is based on the belief that external reinforcement can increase desired behaviors. These theories are in contrast to those that stress internal rewards which are sources of motivation and satisfaction to the person.

That incentive plans are entrenched in American industry as a way of dealing with worker production is reflected in a survey of U.S. and Canadian industries (Rice, 1977). This survey of 1500 companies showed that 44 percent reported using wage incentives. For the factory respondents the percentage was 51%. In this same survey 89% of the respondents reported using some form of work measurement to develop work standards. Various types of incentive plans were used with standard hourly add-ons the most popular, followed by piece-work, and sharing plans. Forty-six percent of the performance standards were established by time study of specific jobs, while 23% were by standard data systems and 12% by predetermined time standards. Three fourths of the companies reported changing production standards when work methods or materials changed, 2/3 when employee performance was low due to a tight standard, and 1/2 when performance was high due to a loose standard. Only 1/4 of the companies indicated that unions could initiate revisions of standards and 3% said employees could initiate such revisions. As for reported benefits of the incentive systems, 95% believed that it improved direct labor productivity, while only 43% believe it improved non-direct labor productivity; 61% believed it improved direct labor morale, 28% non-direct labor morale; 59% supervisory effectiveness of direct labor, 27% non-direct labor supervisory effectiveness; and 25% improved direct labor quality, 3% improved non-direct labor quality.

This survey demonstrates significant differences in industry attitudes
towards the effectiveness of incentive pay systems between factory and non-
factory employees. The widespread use of work measurement methods,
performance standards and incentives in factories indicates a firm commitment
to the principles of scientific management as espoused by Frederick Taylor.
The addition of electronic/computerized methods to enhance the application of
work measurement (McDermott, 1984) will add to their application in non-
factory environments, since these methods provide simple and structured
approaches for work measurement and employee evaluation.

Some important considerations in the use of incentive pay need to be
examined in light of this possibility.

Rothe (1960) has indicated that performance increases observed in the
installation of incentive pay systems may be due as much to the improved work
design because of work evaluation and measurement methods than the incentives
themselves. In fact, Rothe (1978) has demonstrated that workers paid under
individual incentives as well as those under group incentives show highly
variable production output when they are observed over a long time period such
as weeks or months. This suggest that rewards for production are not the only
influences on employee production behavior in incentive pay work systems.
Dar-El & Young (1977) suggest that workers on incentive pay systems often
predetermine their earnings and decide beforehand how much they are going to
produce. This is especially true when new work standards are set due to new
job tasks. As workers learn to do the tasks and they improve their abilities
as well as learn tricks in doing tasks their output should increase.
Typically what increases is their idle time rather than production level.
Some theorists feel this may be due to work group pressure to keep the
standard at the current level or to worker fears that management will raise
the standard if they perform too high. Whatever, the answer, the external
incentive only has an effect up to a certain level of performance and then the effect is lessened.

Cammann & Lawler (1977) and Opsahl & Dunnette (1966) have suggested a number of considerations for the proper application of incentive systems for enhanced employee performance to occur. First, the rewards have to be of value to the recipient. Second, the rewards have to be clearly tied to performance. The employee has to recognize that good performance of a specific task will bring a specific reward. Third, the standards of reward have to be fair, and the employee has to believe he/she can achieve the reward. Fourth, the incentives must be positive. Fifth, the employee needs feedback about the rewards received and their performance. Sixth, the employee works harder if he/she participates in setting the standards of performance. Seventh, individual incentives appear to be more effective than group incentives in most instances. Actually the effectiveness of individual versus group incentives in terms of performance depends on the requirements of the tasks facing the group such as the level of coordination. Eighth, repetitive, boring, disliked work tasks are less susceptible to influences by incentives.

It is essential that performance standards be "perceived" as equitable (fair for everyone) and that employees feel trust for management. Salvendy (1976) revamped what the workers perceived as an unfair production standard that affected their incentive wage. His time and motion evaluation relaxed some of the requirements, which brought about substantial improvement in production above the previously believed to be unfair standard. It also brought about a decrease in union grievances, absenteeism and turnover and higher profits. Even though this study was successful, it has to be understood that incentive pay schemes are not typically established to
increase satisfaction. In fact, often the opposite is true (Schwab, 1974).

In summary, incentive pay systems require that worker performance monitoring be undertaken to establish standards of performance and to determine pay-offs for performance. Monitoring can be a benefit to workers in these systems as it provides an objective data base for making accurate judgments about proper standards and equitable rewards. Incentive pay schemes do not enhance worker satisfaction and may contribute to "Taylorization" of jobs. Electronic monitoring and performance contingent reward schemes may also promote the simplification of jobs for easier measurement of performance. Thus, the use of such schemes can lead to worker stress.

PERFORMANCE APPRAISAL

Evaluating the performance of employees is a central aspect of organizational strategies for determining their compensation. Performance appraisal is a widespread approach that looks at employee performance over an extended period of time (quarterly, semi-annually, annually) and assesses a variety of employee achievements and behaviors that are felt to be of importance to the continued productivity of the organization. This process is tied closely to goal setting since success at achieving global goals is a primary aspect evaluated in a performance appraisal. Likewise, the appraisal process is tied to feedback since a main purpose is to inform the individual of how their performance and behavior are viewed by the organization, and to establish whether performance and behavior need to be changed.

Monitoring of employee performance is a more continuous process within more restricted time frames than performance appraisal. Currently, the relationship between the two processes is fuzzy because of the substantial difference in their time lines. However, one important reason for monitoring
is to be able to evaluate employee performance to be able to change behavior as necessary which is also an important aspect of performance appraisal. Since this use of monitoring is quite new, it makes sense to look at performance appraisal, which has a long history of application, to see what the factors are that influence employee behavior, attitudes and satisfaction with the performance evaluation process.

The following quote from Landy & Farr (1980) succinctly defines the uses and current state of performance rating. "The measurement of performance in industrial settings has occupied the attention of psychologists for 50 years. Performance description and prediction plays an important role in all personnel decisions. Criteria are necessary for validation studies and training evaluation; indices of effectiveness or relative worth are necessary for administrative decision making with respect to current employees; performance-related information is necessary for feedback and employee counseling; there is even some indication that the process of performance evaluation may function as a reward and be capable of inducing feelings of satisfaction in some employees (Landy et al, 1978).

Unfortunately, realizing the importance of performance measurement and actually measuring performance accurately are two different matters. In some ideal sense, complete performance measurement would include the combination of objective, personnel, and judgmental indices (Landy & Trumbo, in press). Unfortunately, it is difficult to obtain objective indices of performance for many job titles. In addition, personnel information is applicable to a small portion of the employee population in any organization (e.g., 5% of the employees may have 100% of the accidents, less than 8% of the employees may have more than one unexcused absence per year, tardiness records are not well kept, etc...). Consequently, most individuals concerned with performance
measurement depend on judgmental indices of one type or another. In spite of the widespread use of judgmental indices of performance, there has been a constant dissatisfaction with these measures on the part of both researcher and practitioner."

That managers and employees are unhappy with the performance appraisal process is a universal situation, one of profound concern to organizations. Because of the very important purposes of performance appraisal, it is vital for organizational effectiveness that this process be acceptable to managers and employees. Examining the problems with this process may provide clues to the implications of electronic monitoring in employee performance and the pitfalls to be avoided in using monitoring in employee performance rating or appraisal systems.

One of the main weaknesses of performance appraisal is the subjective nature of various aspects of the process such as what gets rated, how the ratings are obtained, who does the ratings, how the ratings are presented to the employee and when the ratings are given. All of these elements have aspects that can be influenced by biases or conditions that are not relevant to performance, such as being rated by a supervisor who has never done the job being rated, or conducting the ratings annually which may have no relationship to the timing or schedule of the job accomplishments. Many attempts have been undertaken to reduce the subjective nature of the evaluation process including: (1) developing standardized performance rating scales, (2) establishing goals of performance to be met during the evaluation time frame, (3) training evaluators so that they do a better job of appraisal and feedback, and (4) using objective indicators of performance.

Even with these improvements, satisfaction with performance appraisal is low. A major problem area is that employees have a hard time understanding
how they can be evaluated for an entire year using a one or two page checklist, even though it might contain objective indicators of productivity. In their eyes this approach fails to take account of individual daily contributions, special efforts, instances of staying late to help out or pitching in when special deadlines had to be met. Thus, the time frame is not tied to specific task performance characteristics and provides only a global assessment which misses important specifics. The abbreviated nature of the review, the time frame and the use of standardized scales provides an "impersonal" impression. This, combined with the potential biases of the supervisor that are reflected in the subjective nature of the evaluation, often leads to employees viewing performance appraisal as a meaningless and distasteful process to be endured once a year.

This leads to an important question. If the performance appraisal process is seen in the above way by employees, how does it influence attitude, behavior and performance? Employees are concerned about the fairness of performance appraisals. Research has shown that employees feel that the appraisals are fairer when (1) the frequency of evaluation is higher, (2) goals are identified to eliminate weaknesses, (3) supervisors doing the evaluations have personal knowledge of the employee's performance and (4) the supervisor has personal knowledge of the subordinate's job duties. One approach that has been tried to enhance employee feelings of fairness is to have self-ratings. However, research indicates that this approach typically produces higher ratings than supervisor or peer ratings and provides less discrimination capability among employees. Research has also shown that employees overestimate their own accomplishments based on what they are told on their performance appraisal by their supervisor. Thus, it seems that employees often tend to think they have done a better job than their
supervisors think they have.

Among the numerous performance evaluation methods, comparative judgement procedures, such as ranking or forced-distribution that make direct comparisons among employees are used by only 7% of U.S. firms and are usually less acceptable to employees than absolute judgement or behavioral description procedures (Zawacki & Taylor, 1976). Monitoring provides management with the opportunity to more easily compare employees' performance; printed out, quantitative data on performance are more readily comparable. But the nature of the information provided by monitoring may increase competition among employees and be an additional source of stress, especially for the "poor" performers who are directly identified as such by the monitoring. These individuals may be ostracized by their supervisor for not keeping up with the rest of the employees.

While employees feel evaluations are fairer when they contain specific goals to eliminate weakness, it has been shown that supervisor attempts to assist subordinates by pointing out improvements are seen as threatening to self esteem and can result in defensive behaviors. In fact, the greater the perceived threat the less favorable the employee's attitude toward the appraisal and the less improvement in job performance after the appraisal. Research indicates that the effects of job criticism are moderated by job tenure, with the newer employees being more dissatisfied with criticism and tending to downplay the significance and accuracy of the appraisal.

Literature on test anxiety (Wine, 1971; Liebling & Shaver, 1973) indicates that it is often debilitating and reduces performance under highly evaluative conditions, but may actually be facilitative under low evaluation conditions.

In summary, performance appraisal has characteristics that are similar to
conditions that may occur with electronic monitoring of employee performance. As with incentive pay, performance appraisal requires the development of specific goals or standards that have to be met for rewards to be obtained. In addition, performance appraisal requires feedback on success and failure. It includes subjective elements that are open to biases and interpretation. Generally, employees do not like performance appraisal because it produces feelings of anxiety, due to its highly evaluative nature and potential impact on compensation, and also influences self-esteem and satisfaction. These effects are moderated by job tenure, with newer workers being most adversely affected. When dissatisfaction or anxiety occur, the hoped for improvements in employee performance are not obtained. This suggests that monitoring that is based on long times between feedback, is global and not specific, and is evaluative has the potential to produce stress particularly in workers with low job tenure.

**MONITORING AND STRESS**

"Big Brother" is watching you. You cannot escape his scrutiny. This message is one that resounds throughout the union halls of America. There is a general "paranoia" that electronic monitoring is the backbone of an impersonalized workplace in which every "sneeze" or every "breath" of a worker will be recorded and analyzed; and more importantly will be used in some way to punish workers, or to change their behavior. These fears have not been generated in a vacuum. Employer practices in using electronic monitoring have shown some of the fears to be well founded. Horror stories of monitoring misuse have been reported in the Washington Post (Perl, 1984), Dunn's Business Month (Hershman & Rozen, 1984), and ABC-TV Nightly News (Jennings, 1984).
Such stories include descriptions of the overwhelming effects of monitoring on worker psychological functioning, effects such as fear, anxiety, hatred and loss of self image. In addition, influences on health due to stress are reported. Westin (1984) indicates that management must realize that monitoring can cause increased production standards which employees feel are unfair. This can lead to morale and commitment problems, create physical and psychological stress and increases in undesired behavior such as absenteeism, turnover and lowered productivity.

While these effects all seem reasonable and have firm theoretical backing, currently there is insufficient research literature to support the contention that electronic monitoring leads to stress and diminished health. The results of our interviews with monitored workers provide preliminary evidence for such a linkage, but this will be discussed later. In addition, the excesses of some employers in applying monitoring which result in these horror stories most likely are not the norm for industry. While this cannot be established without more comprehensive surveys of employment practices regarding electronic monitoring, Westin (1984) provides the best available data on such practices from 110 companies. His data indicates more moderate application of electronic monitoring in personnel and administrative functions than are reported in the abuse stories. However, Westin's data base is too limited to be able to reflect general trends.

One approach to examining stress issues is to look at monitoring concerns from a "worst case" perspective. This allows for the establishment of the most damaging applications which then provides the basis for the limits of acceptable practice as well as direction for establishing policy considerations. Actually, employees are not informed as to the precise nature of the behavioral information which may be collected from a computer system.
and how this information may be used. For example, a telephone monitoring capability was included with a new telephone system for customer service operators. The monitoring system which distributed calls, timed the calls and allowed for unintrusive eavesdropping was instituted under the guise of workflow scheduling in order to determine the peak periods when extra operators are needed. But instead of using the monitoring system for that purpose only, management established standards (seconds per transaction) and used this information for discipline. Abusive use of electronic monitoring systems by misinformed management can lead to workers' stress.

A major concern in electronic monitoring is the influences that it can have on worker self-image and on feelings of self-worth. In one sense, monitoring should enhance feelings of worth if the results of worker efforts are positive and the workers gets feedback to that effect. Likewise, management interest in the worker as a valuable resources can be demonstrated by the attention provided by monitoring. However, both effects may be seen differently by workers if poor performance can lead to some form of punishment or reprimand. This fear of evaluation can produce anxiety and heightened sensitivity to adverse feedback that may damage self-esteem and self-image. Both the type of technology and the context of the monitoring determine its influences on stress, not the monitoring process itself.

Tied to fear of reprimand is the pressure to perform above average that monitoring can induce. Some managers may feel that this is a desirable effect since it implies high production. But occupational stress research indicates that such work pressure is not conducive to good performance and brings about adverse health consequences (Cooper & Marshall, 1976; Smith, 1986).

In fact, there are a range of stressful working conditions that may be the outcome of electronic monitoring of employer performance. These include
heightened work pressure, routinized work activities, paced work, potential
for increased work standards and workload, variable work standards, lack of
control over the tasks, lack of decision latitude, reduced peer social
support, reduced supervisory support and fear of job loss.

The following is a summary of the implications of stress for workers and
various job conditions that have been implicated as sources of worker stress
all of which could be influenced by electronic monitoring of work performance.
Before going into these job conditions it is important to understand how and
why stress causes health problems and reduced performance.

Selye’s (1956) viewpoint on stress, although controversial, appears to be
the one most frequently cited in the literature. According to Selye, the
presence of stress can be inferred in an individual from a very generalized
physiological response pattern (e.g., increases in adrenaline secretion, the
dumping of sugar into the bloodstream; and other related physiological
processes) whose elicitation can be provoked by a wide variety of
environmental agents and situations, such as drugs, fear, and job ambiguity.
This conceptualization of stress provides a basis for the development of
various illnesses, most notable psychosomatic diseases. Selye refers to these
maladies as “diseases of adaptation,” since they are not a direct function of
the agent or situation that elicited the response pattern, but a consequence
of the body’s adaptive reaction to a wide range of environmental stimuli.
While normally there is nothing wrong per se with escalations occurring in
this response pattern, chronic elicitation has been shown to produce serious
degenerative effects in specific bodily processes. Typically, these responses
are essential to the organism’s ability to control the internal and external
environment. Often, elicitation of these responses occurs where the
environmental stimuli should not cause such an intensive mobilization of the
body's defensive apparatus and thus the reactions are inappropriate and maladaptive. In such instances, these responses will most likely increase the wear and tear on the body, especially if this elicitation process becomes chronic.

In Selye's conceptualization, the most essential feature concerns the intensity of the demand for readjustment or adaptation brought about by the stressor, regardless of whether it is pleasant or unpleasant. Selye's view deals primarily with the effects of the stressor on the physiological system, with the physiological response assumed to be independent of the individual's emotional state.

More recently, Levi (1972) has defined the relationship between workplace stimuli, emotional reactions and physiological responses. Levi has proposed a model by which job factors can create stress (distress) and lead to chronic disorders. In this model, environmental conditions impose demands on the individual who may perceive these demands as either stressful or not stressful. This perception is conditioned by many factors such as prior experience, knowledge, current emotional status, health status and genetically predisposing features. If the environmental condition is perceived to be stressful, then acute biologic and emotional responses occur. If these continue to occur with some consistency over a prolonged period of time they can lead to disease. Various intervening factors determine the potential for disease to develop. These include individual behavior patterns and coping style, genetic predisposition to disease, and emotional support from others, to name a few.

The theory of Selye can be linked with the job stress model of Levi, and based on this linkage it can be hypothesized that particular working conditions can influence emotional and biologic reactions, as well as the
behavior of workers. If these conditions are perceived as unpleasant for a prolonged time, the resultant stress reactions can influence the development of disease. Thus, psychological factors, in terms of perceptions and emotions, influence the disease process. In addition, worker behavior plays a significant role in exacerbating or mitigating these emotional and biologic reactions, and adding to or reducing the potential for disease and/or accidents.

Generally, stress in the work environment stems from a mismatch in a combination of the following three sources: (1) the individual (e.g., personality attributes), (2) the environment (social and physical environments at work and at leisure), and (3) the task (e.g., mental load, pacing). This is an oversimplification of a complex process of interaction of these sources and for the sake of this document only task factors will be examined.

Two organizational factors have been shown to be of special significance for increased job stress and decreased worker health. These are: (1) job involvement or participation; and (2) organizational support, as reflected by supervisory style, support from managers and career development. Lack of participation in work activities has been demonstrated to result in an increase in negative psychological mood (Margolis et al., 1974; Caplan et al., 1975; Smith et al., 1981). In terms of organizational support, it has been shown that close supervision and a supervisory style characterized by constant negative performance feedback are related to high levels of stress and poorer worker health (Caplan et al., 1975; Smith et al., 1981). The implication of these findings is that excessive, impersonal electronic monitoring of employee performance that produces close supervision and constant negative performance feedback can promote worker stress.
It has also been demonstrated that workers' feelings of lack of involvement are related to stress and potentially to health complaints. (WHO, 1984; Rutenfranz et al., 1977; Karasek, 1981; Caplan et al., 1975; Gardell, 1976; Margolis et al., 1974; Haynes & Feinleib, 1980; Colligan et al., 1977). Electronic monitoring has the propensity to reduce worker feelings of job involvement and may in this way increase worker distress. The chances to participate and be involved in the job process may be diminished in work systems that are driven by employee performance monitoring.

Career development is another major organizational stressor that has been studied. Concern over chances for promotion has been shown to be a significant stressor for office workers while being passed over for promotion has been related to increases in both job stress and ill-health (Smith et al., 1981; Arthur & Gunderson, 1965). This paper has indicated that monitoring can have both beneficial and negative effects in this regard. If monitoring provides for more objective employee evaluations and employee promotions are tied into the evaluation process, then monitoring may have a positive impact on workers. However, if the monitoring is perceived as unfair and not representative of performance, then this could produce a stressful influence.

Security is the other side of career development. The threat of job loss is a very potent stressor. It has been tied to serious health disorders such as ulcers, colitis, severe emotional stress and patchy baldness as well as to increased muscular and emotional complaints. Monitoring has been used for employee dismissal due to unsatisfactory performance and such use can be very stressful.

Stress-related work-task factors that have been researched include task variety, task clarity (confusion), challenge, complexity, utilization of skills and abilities, and activity level. All of these factors have been
related to increased stress and negative psychological states such as boredom, confusion and frustration and have also been related to increased risk of health disorders. In particular, monitoring may reduce task complexity, variety, challenge and skills use due to the need for management to simplify work tasks and break them down into measurable units that can be easily monitored. This increased the potential for job stress. Work role includes a number of job factors such as responsibility for others, job conflict, role ambiguity, accountability, authority, discretionary control, participation and job status. A number of studies have demonstrated that role ambiguity, job conflict and responsibility for persons are related to job stress and psychological problems (Caplan et al, 1975). The lack of discretionary control over work activities has also been shown to be related to increased risk of coronary heart disease. Lack of participation in work decisions is yet another source of increased worker stress. Monitoring can greatly reduce the amount of discretionary control and participation that work has unless specific actions are taken by management to include these elements in the use of the monitoring process.

Mental workload factors, such as quantitative underload/overload, and workspace, can cause stress. In this case, a balance is required to avoid negative health consequences. Underload is just as bad for your health as overload in that it can affect psychological well-being. Quantitative overload has been shown to be a significant stressor for various occupations including scientists, machine operators, and data-entry clerks. The impact of work overload varies from psychological disturbances to increased disease risk. Monitoring is often accompanied by the establishment of work standards to assess employee performance. These standards are often not based on scientific grounds, but on computer system capabilities (Smith et al, 1981).
If the standards are excessive they will produce stress. On the other hand, if a scientific basis is used to set the standards, this influence of monitoring could be stress reducing if prior workload requirements were excessive.

Workpace is a very important workload factor (Smith et al, 1981; Cakir et al, 1978). The speed or rate of work has been implicated as a significant issue in factory-worker ill-health. Recent technology, such as computers, that can operate at high speeds on a continuous basis has increased the pacing impact on office workers. Recent research suggests that pacing produced by computerization may have an even greater stress effect than factory pacing (Smith et al, 1981). Monitoring, and the establishment of excessive work standards has the potential to increase work pace and thus to produce stress.

Time pressure, such as having to meet deadlines, is a stressor that may interact with both work hours and workspace (Friedman et al, 1958). Studies have shown increases in stress level as difficult deadlines draw near. Monitoring may produce such deadline pressure on a constant basis that may be more damaging than simple deadline pressure.

Although there is insufficient research literature to support the contention that electronic monitoring increased stress and diminished health, the above review of literature shows that electronic monitoring has the potential to be stressful. Indeed electronic monitoring may create adverse working conditions such as paced work, lack of involvement, reduced task variety and task clarity, reduced peer social support, reduced supervisory support, fear of job loss, routinized work activities, and lack of control over tasks. The results of our interview with monitored workers provide preliminary evidence for such a linkage between stress and electronic monitoring.
SURVEY OF MONITORED WORKERS

To supplement the literature review, a survey was carried-out to assess employee perceptions of electronic monitoring and to establish potential behavioral, motivational and stress considerations. This survey cannot be considered as a representative evaluation of the workforce that is electronically monitored due to the nature of employees sampled and the small number of participants. There were 41 employees (40 females and 1 male), all members of unions (CWA, TNG, UFCW, AFSCME), from 5 employers (telephone company, hospital, insurance company, 2 newspapers) who participated (see Appendix 3 for the description of the workplaces). All were interviewed using a semi-structured interview format (see Appendix 1 for interview form). Fifteen of the interviews were conducted face-to-face and the remaining 26 were conducted via telephone. In addition to these interviews, supervisors, union stewards and national union representatives were interviewed concerning their impressions about electronic monitoring. Their responses will be used to illustrate important considerations but will not be in the analysis that follows.

The results of the survey can be broken into 6 major areas (see Appendix 2 and Tables 1 to 4 for interview results). These are satisfaction with work and technology, job demands, work content, work measurement and employee evaluation, performance monitoring and its influences and perceived stress.

This heterogeneous group of workers was quite happy with their jobs overall with 70 percent indicating they were satisfied with their job and 78 percent stating that their job was important to them. Over half said that their job made them feel good about themselves. Every employee felt that the
technology they used was good and made their jobs easier, and helped them work faster and more efficiently. A classified advisor at a newspaper talks about computers as follows: "The computer is much more effective than typewriters: a larger volume of ads can be taken, retrieval of ads is easier, it is easier to correct things. It is much more sophisticated and makes the job easier." However, 78 percent reported that their equipment had broken down at some time. In fact, the number one reported problem with the technology was breakdowns or malfunctions. The breakdowns were most problematic for people who had to interact with customers. Misfunctions included transmission problems and losing input forcing the operator to redo the work. Overall, these workers were satisfied with their jobs and technology and would fight to keep the technology since they felt they can do their jobs better with it. Supervisors uniformly felt that the technology enhanced the work process and employee output. Union leaders were fearful that technology would replace workers without an equivalent increase in jobs of equal quality in the technology production industries. In addition, there was the fear of the loss of union membership that would not be recaptured in the new jobs.

In terms of job demands, these were jobs that all had fixed standards of production. Ninety percent of the workers indicated that they did not have any input into the determination of their own work rate. Over half of the workers indicated that they disliked their rate of work, but 47 percent indicated that they thought the rate was fair: "It is a fair rate of work but there is no allowance for variability of volume." Fifty-six percent would like to change their rate of work. Fifty nine percent of the workers felt constantly pressured to work hard, and only 31 percent said that they could get ahead in their work so that they could rest. Forty-one percent indicated
that there was always a backlog of work to do. Interestingly, only 29 percent disliked their workload and 27 percent felt the workload was unfair. In summary, these jobs have a fast work pace and high perceived workload that employees would like to change, but which they feel are fair. A long-distance phone operator expresses her feelings about job demands: "I dislike this rate of work. It turned the job into factory work. It causes competition. Standards go up ..." Local union officials concurred that the work rates were fair. National union officials expressed concern that work standards are often set without regard to scientific principles of job analysis and design. They felt that monitoring of performance to enforce unfair work standards was a common practice and vowed to stop it.

The content of these jobs was not varied with only 5 percent indicating a lot of variety, 63 percent some variety, and 32 percent no variety or no response; but 68 percent liked their task variety. In terms of task clarity, 63 percent indicated that their work tasks were clearly defined. Thirty one percent indicated there were times when they did not know exactly what they had to do at work. When asked about their control over the decision making on their job about one third of those responding said they had some control, while fifty-nine percent of those responding said they had opportunities to participate in decisions on control. In summary, these workers felt that they had reasonable levels of task variety and clarity and some opportunity to participate in decision making, but they felt that management did not listen to their inputs, as a medical transcriptionist reports: "You can say your opinion, but often it doesn't matter. They know already what they want to do."
In the work evaluation and measurement area, seventy percent of the workers indicated that standard forms were used for annual performance evaluation. Eighty three percent were evaluated by their supervisors. When asked the purpose of these evaluations, the largest response was that they served no purpose (46%), followed by for promotion (29%), and for merit pay (10%). Forty nine percent of the workers felt that their performance evaluations were fair and 51 percent were satisfied with their evaluations. Seventy-one percent of the workers reported no opportunity for career development. In summary, this appears to be a typical group of workers in their perception of performance evaluation with a significant proportion feeling the evaluations were not useful or fair. Several reasons for performance evaluation unfairness have been given by workers: "It is not fair because emphasis is on speed.", "It is too subjective.", "The supervisor hardly knows the employees."

A series of questions were asked about how the workers felt about electronic monitoring of their work performance. The first set dealt with the mechanics of monitoring such as how it was done, when and what was monitored. The second set dealt with the type and influences of feedback received based on the monitoring process and the last set dealt with the effects of monitoring on the work process.

In all cases the employees were monitored by a computer system. For 37 percent of the workers there was also telephone eavesdropping to check on the quality of performance and 63 percent of the workers indicated that non-electronic monitoring of quality was performed by their supervisor. Ninety percent of the workers felt that their performance was monitored daily (actually 100 percent were continuously monitored). The electronic monitoring
is basically for the quantity of output (94%). There are also some quality checks which are not done electronically but in most cases by the supervisor in an incidental, unplanned manner.

Workers indicated that they received feedback about the quantity of their work (94 percent) primarily with 56 percent indicating they also get supervisor feedback on quality sometimes. The feedback comes primarily from daily sheets on performance (41 percent) or from the supervisor (38 percent). Eighty-four percent of the employees indicated that their supervisor makes comments to them about their quantity and quality of production. Sixty-nine percent have their performance compared to that of other employees.

When asked about the accuracy of the monitoring system, 82 percent felt the information was accurate, but 60 percent felt that the monitoring information did not give management a good picture of their performance. Some employees' comments were that the system only provided numbers, that it did not take into account personal knowledge, skills or the quality of customer interaction: "Monitoring doesn't take into account the demands of the whole job.", "Only quantity is measured. The effort and time for a task are not seen. The knowledge of the job is not measured." Finally, they felt it was not very substantial as a base to evaluate people. Union officials at both the local and national levels were highly critical of monitoring systems that dealt solely with the quantity produced. They stressed the absence of good measures of worker effort, quality or motivation in current monitoring systems and generally felt that this absence made such systems ineffective and poor representations of worker performance. Supervisors felt that the monitoring of individual worker quantity of output individual worker quantity of output gave them important information that could be used to motivate individual
workers to increase their level of performance. They thought that it provided insight into who the best workers were. They also found the information on the productivity of the office as a whole very useful to deal with top management when more work has to be done and when more people are needed to keep up with the workload.

Fifty-five percent of the monitored workers felt the feedback they received was helpful, mainly because feedback gives them milestones in reaching the standard: "I can see whether I need to work more." Sixty-four percent felt the monitoring system and feedback did not help them correct their performance or errors. Only 21 percent could determine when they could receive feedback. When asked where they would like to get their feedback from 45 percent from their supervisor, 34 percent from the machine and 17 percent from both.

The influence of the monitoring system on the job design, worker behavior and worker motivation were examined. All respondents indicated that they had no control over the monitoring system in any way. Eighty-eight percent said that the monitoring system did not help them gain control over their work, while 68 percent indicated that they did not have any control over their work decisions. Fifty-nine percent reported some participation in job decision making. A major influence of monitoring was on supervision with 84 percent reporting that monitoring changed the style of supervision. In most cases the impact on supervision style was negative: "Not only the supervisors can listen to you, but also they know exactly what you are doing without having to see you." Seventy-two percent indicated that they liked their supervisor. Among those who reported a change in supervisor style, 60% indicated that supervisors relied more on numbers, on the information given by the monitoring
system; 34% found the relationship between employees and supervisor more strained; 28% thought that supervision was closer, while 22% thought that supervision was remote and/or distant; finally 19% indicated that the monitoring system put pressure on supervisors. Seventy-two percent indicated their supervisors had praised their performance, while 40 percent received supervisor complaints at sometime. Ninety percent felt good from the supervisory praise and 82 percent felt bad by the criticism. Monitoring had only limited influence on worker's skipping breaks (33 percent) or working late (13 percent). However, monitoring did influence taking to fellow workers (80 percent) and socializing at work (75 percent). Thus some workers may lack social support, as a medical transcriptionist says: "On a bad day I can't talk to anyone about it or I won't make the standard."

The monitoring system does not motivate the majority of workers to work harder (57 percent) or better (72 percent). When asked if the monitoring system made them feel good about performing well, 64 percent said no.

The final area of examination dealt with the stress reported by the workers. Eighty-nine percent of the workers reported feeling stressed by the monitoring system. In this regard, 88 percent felt anxious, 88 percent felt tense, and 89 percent felt angry. In terms of work pressure 59 percent reported such pressure as a problem, while 83 percent felt "watched" by the monitoring system. Telephone operators ("When they are listening to me, I'm very upset because you can't stop it.") and word processors ("I feel watched all the time. It's like a classroom, a child.") were among the respondents that resented being watched.

Overall, the electronic monitoring of workers was perceived as a source
of stress even though the worker understood the need for monitoring and the vast majority felt that the feedback received was accurate. The workers in this survey were generally satisfied with their jobs in terms of workload, work standards and job content. They liked their supervisors. They felt that their jobs were an important aspect of their life. They liked the technology that they worked with and would not give it up without a fight. However, most felt that the monitoring systems as presently established did not motivate them nor help them to improve their performance. Many indicated that they would prefer more feedback and more frequent feedback. They felt that improved feedback would help them perform better. A major impact of monitoring was on the style of supervision which changed with the introduction of monitoring. Finally the workers felt that monitoring cannot be helpful unless it includes more than quantity of output information.

SUMMARY OF FINDINGS

The literature evaluation and the survey study taken together provide some general conclusions about the potential influences of electronic monitoring and how monitoring can be best designed to provide the most beneficial effects.

Monitoring has the capability to change job design substantially. All theories of human performance at work stress the significance of having up-to-date, accurate information about individual performance so that aspects of workplace redesign or personal motivation can be applied to increase productivity. While the theories may differ on the use of the information, they agree on the need for such information. Thus it is apparent that electronic monitoring can play a significant role in providing this information which can be applied in accordance with whichever theory has been
selected. However, it is also clear that monitoring must provide more significant information than just the quantity of individual output, it must also provide insight into the quality of output and the individual contributions of workers not adequately reflected in sample measures of quantity and quality.

Monitoring has direct effects on employee perceptions of stress and has the potential to influence worker motivation and behavior. If monitoring is used in an evaluative way by management then it can create distress, influence individual motives and goals adversely and could have both positive and negative effects on performance. If monitoring is used to provide accurate, meaningful feedback in a timely way and is non-evaluative, it provides the basis for enhanced goal setting and motivation and provides the cues necessary to improve performance. Such monitoring also can provide the basis for establishing equitable and reasonable work standards that influence performance motivation under incentive conditions, as well as worker perceptions of fairness and job satisfaction under non-incentive conditions. A major fear of organized labor is that continuous monitoring systems will be used to establish unfair production standards which will overtax worker capabilities. To counteract such outcomes it is likely that employees will limit their performance as they have under incentive systems so that work standards will not increase. This will defeat the positive benefits of monitoring for performance motivation and enhancement, and therefore the most effective uses of monitoring will be for non-evaluative purposes.

Monitoring can provide the necessary feedback climate that the research literature extols as necessary for the best possible employee performance. But monitoring also changes the nature of jobs and most importantly the way workers interact on the job. Socialization and talking are reduced in most
automated worksettings; and monitoring adds the concern about being watched on a frequent basis. Thus, the workers are afraid to socialize. In our survey, all of the workers expressed the desire to work hard and to produce quality products. This is reflected by the fact that the vast majority indicated that they produced more than the established work standard at their worksites even though they did not receive extra payment for this. They all also commented on the importance of work as a place to socialize and to interact with others. It seems reasonable that such socialization can be accommodated in automated work systems and that monitoring can be established in such a way as to not diminish social interaction.

Monitoring also influences the way in which workers are supervised. Smith et al (1981) indicated that computer automation with monitoring produced more coercive, stricter number-counting supervisory style which replaced a more helpful, less performance oriented supervisory approach. Our survey supports the belief that most employees feel that supervision changes with monitoring and that the changes are for the worse. Again, this suggests that monitoring should not be used as part of an individual evaluation approach but should be used to feed back information to individuals about their performance in a non-evaluative way so that they can make necessary corrections in their behavior.

Monitoring can influence motivation by the type of information feedback to individuals. Value judgement information such as that in annual performance evaluations generally is not perceived as important, accurate or worthwhile by workers. In fact workers misjudge what they are told about their performance. Performance feedback on a continuous basis can help in setting individual performance goals, can act as a direct performance motivator and can help direct behavior that is tied to financial incentives.
Thus, the information and cues presented act as primary sources for motivating worker behavior.

Whether monitoring can influence the health of workers is not clear. There is no research about health effects and only a limited amount of research on the stress effects of monitoring. Thus, there is no basis on which to demonstrate direct health effects due to monitoring. However, monitoring has been shown to be associated with worker stress (Smith et al., 1981) and to have the necessary influences on job design to be a potent stressor (Cooper and Marshall, 1976; Smith, 1986). Thus, if not used properly electronic monitoring has the potential to be a serious threat to worker health as mediated through increased job stress and reduced job satisfaction.

CONCLUSIONS

It is clear that electronic monitoring of employee performance is a necessary element in a competitive, productive work system. If the United States is to keep the international competition at bay, then effective utilization of employee resources is vital. In this light, employee resources must be recognized as a vital component of workplace modernization; and that without a highly motivated workforce, the modernization will not be as successful. Monitoring, and its related motivational processes such as feedback, goal setting and performance evaluation are keys to the success of electronic workplace enhancements. Monitoring can be an anchor in these efforts. In fact, most employees want to have feedback about their performance so that they can gauge their behavior, evaluate their goals, and as a source of internal and external motivation. Such feedback would be absent without effective monitoring.
On-the-other-hand, monitoring can establish the framework for a work environment that is coercive, threatening and frightening to employees. When monitoring is used to invest greater and greater control in management and provides the basis for higher and higher work standards that employees feel are unfair, then it has the potential to be very stressful, and to degrade worker motivation and performance.

Thus, while monitoring is at the heart of successful job design because of its uses in providing feedback, goal setting, performance evaluation, and employee rewarding/compensating, it also is at the heart of stressful working conditions. The problem lies not in the actual monitoring of performance, but in the system by which performance is monitored and the way in which the monitoring is applied to control and motivate worker behavior. Successful monitoring implies that worker performance can be quantified in a meaningful way. It is clear that simply reporting on the quantity of work output will not provide adequate performance feedback to workers for productivity gains, quality improvement or for motivating worker performance (including quality and individual contributions are needed to enhance the use of electronic monitoring). If performance cannot be adequately measured, it cannot be adequately monitored and proper feedback cannot be given to the worker. Such feedback is the base upon which successful monitoring programs for enhancing worker performance are built.

To be successful performance monitoring must be perceived as fair by the employees being monitored. Some necessary conditions for this would be that the measurements of performance being monitored: (1) have value to the worker and the activities being undertaken, (2) be from a good source, accurate and verifiable, (3) provide positive feedback, (4) provide necessary information in a timely way in light of uncertainty or ambiguity, (5) provide cues to
proper behavior, and (6) have reasonable standards preferably based on employee input. Such a monitoring system requires planning and a great deal of work in making it operational. Standard software packages provided by manufacturers of monitoring equipment do not have many of these elements and thus may contribute to stress. In fact, Westin (1984) indicates that many employers do not use the approaches inherent in the standard software as they perceive that it fails to meet many of the basic requirements for effective employee motivation.

Proper application of electronic monitoring enhances job design by building intrinsic motivation into work activities. This is typically accomplished by increasing worker control over the task through participation in goal setting and work standards establishment, and through feedback that assists the worker in gaining control over task activities and by obtaining satisfaction from successful performance. Such processes imply that task content will not be degraded by the monitoring. Sometimes, in attempting to provide meaningful, verifiable, accurate feedback, organizations take the easy way out by simplifying job tasks to make them more amenable to measurement and the establishment of work standards. This is a natural tendency that must be controlled since the reduction in job content will negate gains from enhanced feedback and participative goal setting. To enhance motivation and its influences on performance, as well as the positive benefits of feedback and goal setting, it is necessary to keep jobs complex and to develop more sophisticated hardware, software and work evaluation methods to provide the needed monitoring parameters. If jobs are simplified, the production gains are reduced, and in addition job characteristics become similar to those that have been shown to be very stressful with adverse health consequences (Smith, 1986).
A final comment regarding motivation concerns the use of incentives in the technology driven jobs of the future. It is to be expected that behavioral scientists and industrial engineers will want to use improved methods of work evaluation and monitoring to establish more effective incentive systems for influencing worker production. While these systems can provide a base level of output, as Rothe (1978) has demonstrated there is a great variability in performance over time under incentive pay schemes and this reflects social as well as individual motivational factors. More effective monitoring systems will enable managers to achieve more precise control over the standards of performance and over the variability in individual worker performance. Whether this will be good or bad for workers remains to be seen. However, this approach has some weaknesses from a stress perspective. Changing standards of performance through technology rather than through worker participation invests negative qualities in the technology from the worker's perspective and tends to promote fear, anxiety, anger and adverse behavioral responses. It invests control over the job in the technology, rather than in the workers and could cause increased stress. Those employers using incentive based performance approaches will need to look carefully at the issues of worker participation in work standards evaluation and in designing greater worker control over job tasks through enhanced feedback based on performance monitoring. Without such considerations, productivity may suffer and stress could become a more serious problem in the future.

Monitoring has a very positive role to play in worker performance appraisal. Serious deficiencies in current appraisal approaches because of the subjective nature of some of the factors being evaluated, the lack of specific information about performance on a well defined time line and the use of
global goals that may not relate to daily performance or motivation may be overcome via monitoring. Proper use of electronic monitoring can provide a data base for more objective performance appraisal over a well defined time line. It has discriminate validity, if properly designed can be fair, is unambiguous and can be compared to objective standards rather than global goals. Thus, monitoring may be the key to improving the performance appraisal process which currently has little support from supervisors or employees.

POLICY CONSIDERATIONS

1. Electronic performance monitoring is an outgrowth of advances in the use of computer technology in the workplace. The continued application of computer technology is a vital element in the United States' efforts to reestablish America as a competitive producer on world markets. While electronic monitoring is a small part of this new automation effort, it is a central element in the effective use of the technology and in maintaining a highly motivated and productive workforce. As such, the Congress should support the proper use of electronic performance monitoring as a part of any comprehensive economic policy dealing with the use of new technology in the workplace. The key to electronic monitoring and improvements in worker production are the applications of current knowledge about the best types of feedback to provide employees, the rise of monitoring to help establish appropriate work standards and employee goals, and the most beneficial uses of monitoring in evaluating worker performance and rewarding/punishing workers.

2. Electronic monitoring of worker performance is an accepted management practice and a "right" that management exercises in conducting business in an efficient manner. While recognizing the facts that electronic monitoring is a
management prerogative, it should also be recognized that management practices should and must conform to basic principles of ethics and moral considerations for individual dignity and rights to meaningful, enjoyable, satisfying and healthful work. In a May 14, 1986 discussion with Professor Bertil Gardell in Stockholm, Sweden about these concerns, he impressed on me the vital nature of the ethical and moral considerations of monitoring which he felt must take precedence over production considerations. This philosophy is typical of Swedish thinking about the important nature of work in our lives. For them work that is meaningful and satisfying is a right rather than a privilege and in their system it is management's legal as well as ethical and moral responsibility to ensure this right. Since electronic monitoring that is not properly designed has a high potential to produce worker stress, reduce the meaningfulness of work and create job dissatisfaction, Sweden will most likely place legal limits on how monitoring can be conducted and what can be monitored. The Congress of the United States may also want to set limits on electronic monitoring based on the ethical and moral considerations as it influences job design and worker dignity and health. Congress might consider limits in areas like organizational policies, personnel practices, disciplinary procedures, payment systems, access to information on performance, etc. Given our current knowledge, these issues should be examined more in-depth so that specific limits be set. These limits should be independent of productivity considerations.

3. Electronic performance monitoring represents an increasing trend reflective of increased computerization of work process. Like all new advances, it is still too early to know the exact direction(s) that it will take. Research on electronic monitoring is very sparse, and it would be premature to try to establish that one direction is more legitimate than
another. However, it is reasonable to assume, based on various theories of worker motivation and performance, that electronic monitoring is an important element in successful international competition through a more productive workforce. Because of the lack of research and due to the significant nature of electronic monitoring, it is suggested that Congress encourage research in industry and fund scholarly research in the following areas:

a. The development of work evaluation tools and methods that will increase the ability to electronically monitor complex work. This would include hardware for sensing worker activities, software for evaluating complex input and providing worker feedback and improved methods and procedures for evaluating complex jobs.

b. Demonstration projects that evaluate the effectiveness of various approaches in motivating worker productivity in electronic monitoring environments. The use of large federal agencies such as the Social Security Administration and the Internal Revenue Service as model project sites should be encouraged. Funding to these agencies for such projects would increase their likelihood.

c. Development of work analysis and measurement methods that consider both quality and quantity of work. Currently, a major weakness of electronic monitoring systems is that they emphasize quantity measures over qualitative indicators of performance. This occurs primarily because the technology for electronic monitoring is not advanced sufficiently to examine quality issues in accurate and cost effective ways. A critical research need is to examine the relative merits of quantitative versus qualitative feedback to workers in terms of output effectiveness and job design considerations. It is quite apparent that good job design that enhances work esteem, dignity and motivation requires measures of both quantity and quality. The quality
considerations imply that good methods of electronically evaluating worker production quality also have to be developed, which is also a critical research need.

d. Examination of the stress and health consequences of electronic monitoring, and determination of the most beneficial monitoring approaches.

4. Congress should look into the important concern of the use of monitoring for punitive measures. Research should be undertaken to determine the feasibility of developing legislation that would prohibit the use of electronic monitoring for employee discharge. The primary negative influence of continuous electronic monitoring is the work pressure and fear generated by concerns with failure to perform adequately and resultant punishment, the ultimate being dismissal. That is not to say that failure to perform adequately could not be used as grounds for dismissal; only that the continuous electronic performance monitoring should not be used as the basis for such dismissal. This would serve to remove a major fear and stress factor from electronic monitoring and increase its potential benefits as a positive motivational resource to enhance productivity. Before legislation is considered, a pilot examination of this concept could be undertaken in volunteer industries supported by research funds allocated by Congress. If this concept proves workable, it would provide a major impetus to union and worker acceptance of electronic monitoring.

5. An important roadblock in using electronic monitoring to develop new ways of designing better jobs for workers and improving the management of the work process is current federal labor legislation that limits the roles of managers and workers in interactivity with each other and in decision making. The most effective use of electronic monitoring for enhancing productivity and improving job design will be likely to occur as feedback
about individual performance is given to the individual who will be empowered to make decisions about how the work is conducted, as well as what is to be done, when and where it is done. Such a shifting of "power" from management directly to the worker can be problematic under current federal legislation. Congress needs to study how current federal legislation will limit the capabilities of electronic monitoring to improve job design, and whether these laws need to be modified in light of technological innovation and its influence on the workplace.

6. Congress should encourage employer associations to develop educational materials for their members on the positive and negative aspects of electronic monitoring of employees.

7. With the ever increasing application of technology in the workplace and the increased use of electronic monitoring, Congress should establish a resource within the federal government that could provide employers (with special emphasis on small employers), unions and employees with educational materials and consultative services in dealing with technology and monitoring considerations. For the United States to achieve the most favorable international competitive position, it is necessary for the federal government to play an active role in setting a national policy and in providing scientific and research direction to industry. Such a centralized approach is required because of the rate at which technology is being implemented at all levels (large and small) of the economy and because of the rate at which newer and newer technology is being developed and to provide the necessary focus in direction that can produce answers in a timely fashion. Such efforts cannot be left to the academics since they are mainly interested in theory and not practice. They cannot be left to industry because of vested interests. They logically fall on the federal government and are legitimate, even in these
times of fiscal constraint, because these are the types of efforts that will propel the economy to the necessary heights to resolve the current budgetary and fiscal problems. Federal agencies can be both scholar and applied practitioner and are thus best equipped to tackle the non-research issues.
REFERENCES


Friedman, M., Rosenman, R.H., & Carroll, V., "Changes in the serum cholesterol


McDermott, K.J., "Microcomputer and spreadsheet software make time studies less tedious more accurate", Industrial Engineering, July 1984, 16, 78 - 81.


Ostberg, O., Personal communication to M.J. Smith, 1982.


TABLES
RESULTS OF INTERVIEWS
<table>
<thead>
<tr>
<th>Satisfaction with work</th>
<th>Percent Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfied with job</td>
<td>Yes 71% No 22% NR* 7%</td>
</tr>
<tr>
<td>Job important</td>
<td>Yes 78% No 7% NR* 15%</td>
</tr>
<tr>
<td>Job makes feel good</td>
<td>Yes 54% No 17% NR* 29%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stress</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feel stressed because of the monitoring system</td>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>Feel anxious because of the monitoring system</td>
<td>88%</td>
<td>12%</td>
</tr>
<tr>
<td>Feel tense because of the monitoring system</td>
<td>88%</td>
<td>12%</td>
</tr>
<tr>
<td>Feel angry because of the monitoring system</td>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>Feel watched by the monitoring system</td>
<td>83%</td>
<td>17%</td>
</tr>
</tbody>
</table>

*NR = No Response
Table 2. Employee Perceptions of Job Demands

<table>
<thead>
<tr>
<th>Demand</th>
<th>Percent Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Rate of Work</td>
<td></td>
</tr>
<tr>
<td>Like rate</td>
<td>29%</td>
</tr>
<tr>
<td>Rate fair</td>
<td>47%</td>
</tr>
<tr>
<td>Like to change rate</td>
<td>56%</td>
</tr>
<tr>
<td>Have input to work rate</td>
<td>7%</td>
</tr>
<tr>
<td>Workload</td>
<td></td>
</tr>
<tr>
<td>Feel pressure to work hard</td>
<td>59%</td>
</tr>
<tr>
<td>Can get ahead to rest</td>
<td>31%</td>
</tr>
<tr>
<td>Always a backlog of work</td>
<td>41%</td>
</tr>
<tr>
<td>Like workload</td>
<td>27%</td>
</tr>
<tr>
<td>Workload fair</td>
<td>34%</td>
</tr>
</tbody>
</table>

*NR = No Response
**Table 3. Employee Perceptions of Job Content**

<table>
<thead>
<tr>
<th>Task Variety</th>
<th>Percent Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Like task variety</td>
<td>Yes: 68%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task Clarity</th>
<th>Percent Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tasks clearly defined</td>
<td>Yes: 63%</td>
</tr>
<tr>
<td>Times when don't know what to do</td>
<td>Yes: 31%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control</th>
<th>Percent Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have some control over the decisions on job</td>
<td>Yes: 32%</td>
</tr>
<tr>
<td>Have some opportunities to participate in decisions on job</td>
<td>Yes: 59%</td>
</tr>
</tbody>
</table>

*NR = No Response*
<table>
<thead>
<tr>
<th>Feedback</th>
<th>Percent Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>. Get feedback about the quantity of work</td>
<td>Yes: 94%</td>
</tr>
<tr>
<td>. Get feedback about the quality of work</td>
<td>No: 6%</td>
</tr>
<tr>
<td>. Feedback helpful</td>
<td>Yes: 56%</td>
</tr>
<tr>
<td>. Determine when receive feedback</td>
<td>No: 44%</td>
</tr>
<tr>
<td>. Supervisor makes comments about quantity or quality of work</td>
<td>Yes: 55%</td>
</tr>
<tr>
<td>. Performance rating compared to others'</td>
<td>No: 45%</td>
</tr>
<tr>
<td>Monitoring Characteristics</td>
<td>Yes: 84%</td>
</tr>
<tr>
<td>. Information given by monitoring system accurate</td>
<td>No: 16%</td>
</tr>
<tr>
<td>. Monitoring system gives management a good picture of performance</td>
<td>Yes: 82%</td>
</tr>
<tr>
<td>. Monitoring system helps to correct performance or errors</td>
<td>No: 18%</td>
</tr>
<tr>
<td>Influence of Monitoring</td>
<td>Yes: 40%</td>
</tr>
<tr>
<td>. Monitoring system helps to gain control over work</td>
<td>No: 60%</td>
</tr>
<tr>
<td>. Monitoring system influences supervision</td>
<td>Yes: 36%</td>
</tr>
<tr>
<td>. Monitoring system makes skip breaks</td>
<td>No: 64%</td>
</tr>
<tr>
<td>. Monitoring system makes work late</td>
<td>Yes: 12%</td>
</tr>
<tr>
<td>. Monitoring system impacts talking to fellow workers</td>
<td>No: 88%</td>
</tr>
<tr>
<td>. Monitoring system influences socializing at work</td>
<td>Yes: 84%</td>
</tr>
<tr>
<td>. Monitoring system influences socializing at work</td>
<td>No: 16%</td>
</tr>
<tr>
<td>. Monitoring system makes work late</td>
<td>Yes: 33%</td>
</tr>
<tr>
<td>. Monitoring system impacts talking to fellow workers</td>
<td>No: 67%</td>
</tr>
<tr>
<td>. Monitoring system makes work late</td>
<td>Yes: 13%</td>
</tr>
<tr>
<td>. Monitoring system influences socializing at work</td>
<td>No: 87%</td>
</tr>
<tr>
<td>. Monitoring system influences socializing at work</td>
<td>Yes: 80%</td>
</tr>
<tr>
<td>. Monitoring system influences socializing at work</td>
<td>No: 20%</td>
</tr>
<tr>
<td>. Monitoring system influences socializing at work</td>
<td>Yes: 75%</td>
</tr>
<tr>
<td>. Monitoring system influences socializing at work</td>
<td>No: 25%</td>
</tr>
</tbody>
</table>
APPENDIX 1: INTERVIEW FORM
Hello

Is this _______________?

I'm _______________ from the University of Wisconsin working with Professor Michael Smith on a study on workplace monitoring.

We want to thank you for volunteering to participate in this study. The study is commissioned by the U.S. Congress because of their interest in how the workplace can influence the quality of workers' lives.

I have a series of questions that I am going to ask you. If any are unclear please ask me to repeat the question or to clarify it.

Your answers will remain anonymous. We will not put your name on the answers so that no one will know how you answered.

Do you have any questions?
1-Sex: Age:

2-How long have you been working for your current employer?

3-What is your job title?

4-What do you like most about your job?

5-What do you least like about your job?

6-What do you like most about your employer?

7-What do you least like about your employer?

There are many conditions of work that are of interest to us. I would like you to tell me how you feel about the following work conditions.

WORK HOURS

8-When do you start to work?

9-When do you finish to work?

10-Do your starting and ending times change from day to day or week to week? If yes how?
11-How many hours per day do you work?

12-How many hours per week do you work?

13-Is your work schedule flexible?

14-Do you work overtime?

15-On the average how much overtime do you work per day? per week? per month?

16-Are there any times during the year when your overtime increases significantly?

17-Do you feel any pressure to be at work at specific times or can you be there when you want? If yes why?

TECHNOLOGY

*18-What technology do you use? (by technology we mean the kind of machinery, computer or electronic devices you use)
19. How effective is the technology in accomplishing your work?

   a. Does it provide aids for accomplishing work tasks?

   b. Does it break down?
      If yes how often?

   c. Are you aware of other technology that you feel can do the tasks better?
      If yes what technology?

20. Do you have any problem with the technology you use?
    If yes what is the problem?

   (after respondent has given the problems or answered no, then ask about the following problems)

   a. Do you encounter problems with the responsiveness of the technology?
      Does it lag behind your rate of work?
      What type of lag problems do you encounter?

   b. Does the technology ever misfunction? That is, does it make mistakes?
      What are these mistakes?
RATE/SPEED OF WORK

*21—How many units per hour do you have to do? (units are basic outputs or products, e.g. letters, forms, keystrokes, characters, telephone calls)

22—Are you free to decide how many units per hour you have to do? (who sets the workload)

23—Do you like or dislike the rate of work? Why?

24—Is it a fair rate?

25—Who determines your rate?

26—Do you have any input in the determination of the rate? If yes what is this input?

27—Would you like to change your rate of work? How?

WORKLOAD

28—Do you constantly feel pressure to work hard?

29—Can you ever get ahead so that you can rest?

30—Is there always a backlog of work to do?

31—Do you like or dislike your workload? Why?
32-Is your workload fair?

33-Does your workload vary?
   If yes how does it vary?

TASK VARIETY

34-What are the different types of work (tasks) you have to do?
   Listing

35-Do you like or dislike your task variety?
   Why?

TASK CLARITY

36-Who defines your task?

37-Are your work tasks clearly defined?

38-Are there times when you don't know exactly what you have to do?
   When?

QUALITY OF WORK

39-How is your quality of work measured?

40-Are there specific standards of quality?
TASK REQUIREMENTS

41—How many times do you have to redo a unit of work?

*42—How much does your unit of work contribute to a final product?

Now we want to ask you some questions on how you are evaluated at work. We are going to start with daily work evaluation and monitoring. We are not interested in your specific performance level but how you feel about how you are evaluated.

PERFORMANCE MONITORING

43—How is your work monitored?

44—How often is your performance measured?

44—Do you get feedback on your performance?
   How?
   When?

45—Does the feedback you receive address the quantity of your work?
   The quality?

46—Does your supervisor make any comment on the quantity or quality?

47—Is your performance rating compared with other workers?
48-Can you control the monitoring system in any way?  
How?  
If not why not?

49-Can you log on or log off whenever you want?

50-Is the information given by the monitoring system accurate?

51-Does the monitoring give management a good picture of your performance?  
If no why not?

52-Do you think the feedback you receive is helpful?

53-Is the timing of the feedback helpful?

54-Who determines when you get feedback?

55-Is this feedback useful for you to improve your performance?

56-Would you rather receive feedback from the machine or your supervisor?

57-Does the monitoring system help you to correct your performance? to correct your errors?

58-Does the monitoring system motivate you to work harder?

59-Does the monitoring system motivate you to work better?
60—Does the monitoring system act as a whip to make you work harder?

61—Do you feel watched by the monitoring system or do you feel it is neutral? Please explain.

62—Does the monitoring system make you feel good about performing well?

63—Do you feel stressed because of the monitoring system?
   anxious
   tensed
   angry

64—Would you like to change anything in the monitoring system? If yes what? How can this change be done?
65-Does the monitoring system make you behave differently than you normally would at work? How?

a-Does the monitoring system make you skip breaks?

b-Does it make you work late?

c-Does it impact your talking to fellow workers?

d-Does it influence socializing at work?

Now we are going to talk about your annual performance evaluation.

PERFORMANCE EVALUATION

66-How is your performance evaluation accomplished? Is a standard form used?

67-Who evaluates you?

68-How do you feel about your performance evaluation?

69-Is it fair?

70-Are you satisfied with your performance evaluation? If not why not?

71-For what purpose is your performance evaluation used?

For merit?

For pay increases?

For promotion?
72-How many opportunities for career development do you have?

SUPERVISION

73-Do you like your supervisor?
  Why?

74-Does your supervisor ever give praise on your performance?

75-Do you feel good when you get praised?

76-Does your supervisor ever complain about your performance?

77-Do you feel bad when you are criticized?

78-Does the monitoring system have an influence on how you are supervised?
  If yes how?

79-Has the style of supervision changed due to monitoring?
  If yes how?

CONTENT

80-Are you satisfied with your job?

81-Is your job important to you?
  Why?
82-Is your job more or less important than other parts of your life?

83-Does your job make you feel good about yourself?

84-Do you have any control over the decisions that affect your work?

85-How many opportunities to participate in these decisions do you have?

86-Does the monitoring system help you to gain control over your work? If yes how?

87-If you could change anything in your job what would you change?

88-What do you most like about the monitoring system?

89-What do you least like about the monitoring system?
APPENDIX 2: INTERVIEW RESULTS
Hello

Is this ______________?

I'm ______________ from the University of Wisconsin working with Professor Michael Smith on a study on workplace monitoring.

We want to thank you for volunteering to participate in this study. The study is commissioned by the U.S. Congress because of their interest in how the workplace can influence the quality of workers' lives.

I have a series of questions that I am going to ask you. If any are unclear please ask me to repeat the question or to clarify it.

Your answers will remain anonymous. We will not put your name on the answers so that no one will know how you answered.

Do you have any questions?

Legend:
Y = yes
N = no
NR = no response
1-Sex: F=40  
   M=1  
Age: mean = 34.5 years, SD=10.4

2-How long have you been working for your current employer?  
   5.9 +/- 4.3 years

3-What is your job title?

4-What do you like most about your job?

5-What do you least like about your job?

6-What do you like most about your employer?

7-What do you least like about your employer?

There are many conditions of work that are of interest to us. I would like you to tell me how you feel about the following work conditions.

WORK HOURS

8-When do you start to work?

9-When do you finish to work?

10-Do your starting and ending times change from day to day or week to week?  
   If yes how?
11-How many hours per day do you work?

12-How many hours per week do you work?

13-Is your work schedule flexible?  Y=21  N=15  NR=5

14-Do you work overtime?  Y=21  N=20

15-On the average how much overtime do you work per day?
   per week?
   per month?

16-Are there any times during the year when your overtime increases significantly?

17-Do you feel any pressure to be at work at specific times or can you be there when you want?

   Y=16  N=12  NR=13

   If yes why?

TECHNOLOGY

*18-What technology do you use? (by technology we mean the kind of machinery, computer or electronic devices you use)
*19- How effective is the technology in accomplishing your work?

a- Does it provide aids for accomplishing work tasks?

b- Does it break down? Y=32 N=2 NR=7
   If yes how often?

c- Are you aware of other technology that you feel can do the tasks better?
   If yes what technology?

*20- Do you have any problem with the technology you use?
   If yes what is the problem?

(after respondent has given the problems or answered no, then ask about the following problems)

a- Do you encounter problems with the responsiveness of the technology?

   Does it lag behind your rate of work?

   What type of lag problems do you encounter?

b- Does the technology ever misfunction? That is, does it make mistakes?
   What are these mistakes?)
RATE/SPEED OF WORK

21-How many units per hour do you have to do? (units are basic outputs or products, e.g. letters, forms, keystrokes, characters, telephone calls)

22-Are you free to decide how many units per hour you have to do? (who sets the workload)
   Y=6   N=33   NR=8

23-Do you like or dislike the rate of work? Why?
   LIKE=12   DISLIKE=21   NR=8

24-Is it a fair rate? Y=19   N=17   NR=5

25-Who determines your rate? superior=5   engineering=7
   management=22   computer=1   don't know=2   NR=4

26-Do you have any input in the determination of the rate? If yes what is this input?
   Y=3   N=37   NR=1

27-Would you like to change your rate of work? How?
   Y=23   N=8   NR=10

WORKLOAD

28-Do you constantly feel pressure to work hard?
   Y=24   N=4   NR=13

29-Can you ever get ahead so that you can rest?
   Y=13   N=16   NR=12

30-Is there always a backlog of work to do?
   Y=17   N=10   NR=14

31-Do you like or dislike your workload? Why?
   LIKE=11   DISLIKE=12   NR=18
32-Is your workload fair?
   Y=14  N=11  NR=16

33-Does your workload vary?
   If yes how does it vary?
   Y=19  N=11  NR=11

**TASK VARIETY**

34-What are the different types of work (tasks) you have to do?
   Listing
     A Lot=2
     Some=26
     None=10
     NR=3

35-Do you like or dislike your task variety?
   Why?
   LIKE=28  DISLIKE=7  NR=6

**TASK CLARITY**

36-Who defines your task?

37-Are your work tasks clearly defined?
   Y=26  N=8  NR=7

38-Are there times when you don't know exactly what you have to do?
   When?
   Y=13  N=21  NR=7

**QUALITY OF WORK**

39-How is your quality of work measured?
   Y=39  N=1  NR=1

40-Are there specific standards of quality?
   Y=36  N=4  NR=1
TASK REQUIREMENTS

41-How many times do you have to redo a unit of work?
    Y=15  N=15  NR=11

*42-How much does your unit of work contribute to a final product?

Now we want to ask you some questions on how you are evaluated at work. We are going to start with daily work evaluation and monitoring. We are not interested in your specific performance level but how you feel about how you are evaluated.

PERFORMANCE MONITORING

43-How is your work monitored?  
    Computer=41  
    Telephone=15  
    Supervisor=26

44-How often is your performance measured?  
    Daily=22  Weekly=3  
    Monthly=1  Daily + Weekly=4  Daily + Monthly=7  Continuously=3  NR=1

44-Do you get feedback on your performance?  
    Y=35  N=1  NR=5

          Myself=2  NR=9

    When?  Daily=7  Weekly=9  Monthly=7  Several times per day=3  
           Varies=4  Daily + Monthly=1  Yearly=1  NR=9

45-Does the feedback you receive address the quantity of your work?  
    The quality?  
    Y=31  N=2  NR=8

    Y=19  N=14  NR=8

46-Does your supervisor make any comment on the quantity or quality?  
    Y=31  N=6  NR=4

47-Is your performance rating compared with other workers?  
    Y=24  N=11  NR=7
48-Can you control the monitoring system in any way?  Y=0  N=36  NR=5
   How?
   If not why not?

49-Can you log on or log off whenever you want?  
   Y=27  N=5  NR=9

50-Is the information given by the monitoring system accurate?  
   Y=28  N=6  NR=7

51-Does the monitoring give management a good picture of your performance?  Y=14  N=21  NR=6
   If no why not?

52-Do you think the feedback you receive is helpful?  
   Y=16  N=13  NR=12

53-Is the timing of the feedback helpful?  
   Y=16  N=13  NR=12

54-Who determines when you get feedback?  
   Supervisor=18  Management=8  Myself=7  NR=8

55-Is this feedback useful for you to improve your performance?  
   Y=28  N=6  NR=7

56-Would you rather receive feedback from the machine or your supervisor?  
   Machine=11  Supervisor=13  Both=5  NR=12

57-Does the monitoring system help you to correct your performance? to correct your errors?  
   Y=13  N=23  NR=5

58-Does the monitoring system motivate you to work harder?  
   Y=16  N=21  NR=4

59-Does the monitoring system motivate you to work better?  
   Y=10  N=26  NR=5
60-Does the monitoring system act as a whip to make you work harder? 
Y=29  N=5  NR=7

61-Do you feel watched by the monitoring system or do you feel it is neutral? Watched=34  Neutral=4  NR=3
Please explain.

62-Does the monitoring system make you feel good about performing well? 
Y=12  N=18  NR=11

63-Do you feel stressed because of the monitoring system? 
Y=34  N=4  NR=3
anxious Y=29  N=4  NR=8
tensed Y=29  N=4  NR=8
angry Y=31  N=4  NR=6

64-Would you like to change anything in the monitoring system? 
If yes what? 
Y=29  N=8  NR=4

How can this change be done? 
Incentives=1
Get rid of it=11
Input of employees=4
Technology=1
Flexibility=5
Lower standards=4
65-Does the monitoring system make you behave differently than you normally would at work? Y=11 N=11 NR=19

How?

a-Does the monitoring system make you skip breaks?
   Y=11 N=21 NR=9

b-Does it make you work late?
   Y=4 N=27 NR=10

c-Does it impact your talking to fellow workers?
   Y=28 N=27 NR=10

d-Does it influence socializing at work?
   Y=24 N=8 NR=9

Now we are going to talk about your annual performance evaluation.

PERFORMANCE EVALUATION

66-How is your performance evaluation accomplished?
   Is a standard form used?
      Standard form=29 No form=3 NR=9

67-Who evaluates you?
      Supervisor=34 Management=4 Both=1 NR=5

68-How do you feel about your performance evaluation?

69-Is it fair?
   Y=20 N=13 NR=8

70-Are you satisfied with your performance evaluation? Y=21 N=9
   If not why not? NR=11

71-For what purpose is your performance evaluation used?
   For merit? Y=4
   Don't know=1
   To monitor production=1
   Personal knowledge=1
   No purpose=19
   For pay increases? Y=1
   For promotion? Y=11
72-How many opportunities for career development do you have?  
Some=9  None=29  NR=3

SUPERVISION

73-Do you like your supervisor?  Y=28  N=11  NR=6  
Why?

74-Does your supervisor ever give praise on your performance?  
Y=22  N=11  NR=6

75-Do you feel good when you get praised?  Y=19  N=2  NR=20

76-Does your supervisor ever complain about your performance?  
Y=12  N=18  NR=11

77-Do you feel bad when you are criticized?  
Y=14  N=3  NR=24

78-Does the monitoring system have an influence on how you are supervised?  Y=32  N=6  NR=3  
If yes how?

79-Has the style of supervision changed due to monitoring?  
If yes how?  Y=23  N=4  NR=14

CONTENT

80-Are you satisfied with your job?  
Y=29  N=9  NR=3

81-Is your job important to you?  Y=32  N=3  NR=6  
Why?
82-Is your job more or less important than other parts of your life?  
More=4  Less=24  Equally=6  NR=7

83-Does your job make you feel good about yourself?  
Y=22  N=7  NR=12

84-Do you have any control over the decisions that affect your work?  
Y=9  N=11  NR=14

85-How many opportunities to participate in these decisions do you have?  
Y=16  N=11  NR=14

86-Does the monitoring system help you to gain control over your work?  
Y=3  N=23  NR=15  
If yes how?

87-If you could change anything in your job what would you change?

88-What do you most like about the monitoring system?  
Easy to understand=1  Sharing of workload=2  
Knowledge of performance=16  Better performance=2  
Don't know=12

89-What do you least like about the monitoring system?  
Watching (Big Brother)=9  Unrealistic standards=6  
Negative effects (pressure, low self-esteem, job more tedious)=19  
Lower quality of work=6  Don't know=1
APPENDIX 3

DESCRIPTION OF THE WORKPLACES
Hospital

All medical transcriptionists and the supervisors were interviewed (on company time). The transcriptionists are fed copy by dictaphone and key copy into a computer. Most of the documents processed were short (2-3 pages long). The number of characters typed was measured by the computer. Workers were allowed to check their progress whenever they wished and had to meet a rigid standard. At the end of the work day each transcriptionist prints out her performance record (number of characters of each document + identification number of the document), writes down her actual working time (working time = number of presence hours less interruptions, such as answering phone), and files the printout in a directory. At the end of the month the supervisor computes workers' productivity (monthly and weekly) based on the information contained in the directory. Workers receive monthly feedback from the supervisor who sometimes makes comments such as: "Keep up" "Try to do better". Workers also have to meet a quality standard: less than 2% of their documents has to be returned for correction. The computer printout allows the supervisor to find who types the document returned. After a document is being returned, the supervisor has to decide whose fault it is: typing fault of the wordprocessor, bad dictaphone, modification of the physician, ...

There were no labor-management problems. The supervisors were quite happy with the present system; it facilitates sharing of the workload and helps to identify the best workers. Moreover the best workers were used by the supervisors as reference for the low performers.

The main effect of the electronic monitoring system was on skipping breaks. Workers were allowed to take two fifteen-minute breaks and one lunch break per day. But since the time for these breaks was not counted as interruptions, most of the workers did not take any break or took very short breaks. A unique feature of this wordprocessing department was a home-based component which was sanctioned by the union and management. Three workers took dictation at home, over phone lines. They were full-time workers and had to meet a rigid standard which was higher than the office standard. They were very happy with this working system and thought electronic monitoring was a necessary component of the system.

Insurance Company

The interviewed employees were doing fairly routine claims work. They had variable work standards depending on the type of claim. Problems arose with the increasing of standards which were determined by classic industrial engineering time and motion studies. Labor-management relations were very poor.

Newspaper

Classified ad takers and advisors for classified ads were interviewed. These workers deal with customers by phone and do all their work (ad retrieval, information retrieval, ad taking...) at terminals. The electronic monitoring of their performance include: eavesdropping, (in such a way that workers never know when they are being monitored), timing of length of calls, number calls per day, and lag between calls, recording of number of personal calls, and log on/log off system that records breaks or interruptions. Three
times a day, computers provide workers with feedback about their calls (numbers, length, ...). At the end of the work day, a report on each worker's performance is printed out and given to the supervisor.

Workers are required to perform at specific standard, depending on the type of ads. Workers were unanimously against phone listening because it was perceived as an infringement of their privacy. A major impact of the electronic monitoring system was on their talking to fellow workers. They were authorized to get feedback on their performance only three times: this was a source of conflict between workers and management because workers wanted to get feedback at their discretion. Indeed labor-management relations were very strained, particularly because of the rapid rotation of supervisors who generally did not know the work of the subordinates. The breakdowns and slowdowns of computers -- that was a crucial problem for those employees who deal with customers -- was another source of stress, since work standards were fixed and did not take into account technological problems. Finally there was much resentment of the entire monitoring system.

Telephone Company

Service operators and long-distance operators were interviewed. All the work was done at terminals. These workers have been monitored for a long time (eavesdropping). Computer technology allows for more monitoring: length of calls and number of calls are directly recorded by the computer. The operators resented the work standards: on the average, each call must take less than 22 seconds; that is operators must handled 600 calls a day. The major criticism against the standard was that it gives no time for good service. This was a crucial problem because most of the customers need help (elderly people,...). Although direct supervisors were well liked, workers feel pressured to work faster and faster. Besides operators receive feedback on their performance from the supervisor only when there is a problem, that is when the standard is not reached. Labor-management relations were very strained.
BIBLIOGRAPHY
BIBLIOGRAPHY


Brickman, P., "Rational and nonrational elements in reactions to disconfirmation of performance expectancies". Journal of Experimental Social Psychology, 1972, 8, 112-123.


Butler, R.P., & Jeffer, C.L., "Effects of incentive, feedback, and manner of presenting the feedback on leader behavior".


Clarke, D.R., "The effects of simulated feedback and motivation on persistence at a task", Organisational Behavior and Human Performance, 1972, 8, 340-346.


Funk, G.L., & Smith, D.E., "Estimating economic incentives for


Haynes, S.G., & Feinleib, M., "Women, work and coronary heart disease: prospective findings from the Framingham heart


Hutchinson, S. Jr., & Laier, C.V., "Influence of drive level on various feedback combinations", Psychological Reports, 1971, 29, 1191-1195.


Ilgen, D.R., & Hamstra, B.W., "Performance satisfaction as a function of the difference between expected and reported performance at five levels of reported performance", Organisational Behavior and Human Performance, 1972, 7, 359-370.


Lindner, G., & Hancock, W.K., "Computerized work measurement can help hospitals identify cost reduction possibilities", Industrial Engineering, March 1985, 17, 70-77.

Locke, E.A., "Effects of knowledge of results, feedback in relation to standards, and goals on reaction-time


Marx, M.H., "Increased probability of error repetition as a function of number of successive prior repetitions", Perceptual and Motor Skills, 1971, 32, 544-546.


279-281.
McDermott, K.J., "Microcomputer and spreadsheet software make time studies less tedious, more accurate", Industrial Engineering, July 1984, 16, 78-81.


Ostberg, O., Personal communication to M.J. Smith, 1982.


Pritchard, R.D., & Curts, M.L., "The influence of goal setting and


Rothe, H.P., "Does higher pay bring higher productivity?", Personnel, July/August 1960, 20-27.


Sellie, C., "Better use of better tools should make work measurement increasingly valuable in future", Industrial Engineering, July 1984, 16, 82-85.


Shanab, M.E., Peterson, D., Dargahi, S., & Derolan, F., "The effects of positive and negative verbal feedback on the intrinsic motivation of male and female subjects", The
Van Houten, R., Hill, S., & Parsons, M., "An analysis of a performance feedback system: the effects of timing and


Yuki, G.A., & Latham, G.P., "Consequences of reinforcement schedules and incentive magnitudes for employee performance: problems encountered in an industrial