

IMPLEMENTING BEHAVIOR-BASED SAFETY FOR MINING OPERATIONS

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EXECUTIVE SUMMARY

This two-year research project developed and delivered a behavioral safety training program for mining operations, and tested implementations of the basic procedures of behavior-based safety at several mining operations. In addition, a safety culture survey was refined and administered at mining sites to assess readiness to implement an interdependent observation and feedback process. Property damage was explored as an upstream proactive measure of safety performance and a tool for preventing workplace injuries. A major portion of the principles and procedures developed and tested for this research was documented in a chapter for an edited book (Geller *et al.*, in press). See Appendix K for a copy of this document.

In Study 1, behavioral observations and employee training sessions were conducted with four above-ground rock quarries. Mine A (n=18) and Mine B (n=15) are located in southwestern Virginia. Mines C (n=30) and D (n=22) are both located in northern Virginia. Participants were 99% male and 95% Caucasian. Though the sites differed in the number of employees, each was similar with respect to equipment used, size of quarry, and activity level. Materials from these mines were used mainly for road construction and building formation.

Observations were attempted each weekday for one school year (August, 1999 to May, 2000). Site visits were hampered by the limited availability of the foreman to escort the researchers around the quarry, and poor weather conditions. The observation sessions lasted 30-120 minutes.

The data from three above-ground rock quarries indicated a safe work environment, although this may not be the case. Our research concludes that BBS (behavior-based safety) is effective at increasing safe work practices. Training alone was not sufficient, but similar to past BBS feedback research, behavioral feedback led to a significant improvements in safety performance. Based on 3,898 observations over an eight-month period, overall percent safe scores across four sites increased from 79.3% to 86.5% safe following the introduction of BBS feedback.

In Study 2, a behavior-based safety (BBS) incentive program was implemented at Site A (n=18), located in southwestern Virginia. Participants were 99% male and 95% Caucasian. During the weekly safety meeting, the safety coordinator announced there would be a raffle held every two weeks. A completed CBC (critical behavior checklist) entered the employee in the raffle. The winner of the raffle was randomly selected from the completed CBCs. The winning entry received a small tool kit. In addition, every employee who completed two CBCs per day received a coupon redeemable for a large pizza at a local restaurant.

The data illustrate incentive systems can be extremely effective at increasing employee participation. However, the quality of the completed CBC did not improve; the majority of the CBCs reported only at-risk behaviors. Small rewards such as a tool kit or food coupon were responsible for a 600% increase in the number of CBC collected and a 500% increase in the number of different employees completing CBCs compared to baseline measures of employee participation, yet more is needed to motivate the employees to complete the CBCs correctly.

In Study 3, a Safety Culture Survey (SCS) was administered to employees at Kennecott Mining Company, an above-ground coal mine in Wyoming (Cordero Rojo Plant), to assess the feasibility of using a BBS intervention. Results across all employees, including salary,

maintenance, preparation, and production indicted these individuals had a positive view toward safety-related issues. These included: a) favorable opinions regarding how strongly they believed they and others in the organization support safety, b) favorable views of safety management systems already in place at the site, c) favorable actively caring behaviors related to the safety of coworkers, and c) favorable views of themselves, their work teams, and the organization as a whole. Further, these results indicated BBS interventions, such as training and a peer observation and feedback process, could be implemented at this site. These results were useful in the design of the training materials shown in Appendix C.

In Study 4, the SCS was administered to all intervention sites ($n = 126$). Overall results indicated a variety of positive discrepancies compared to a normative sample of industrial settings. For example, the miners generally had a more positive view of management support for safety at their plants. These same individuals also viewed their coworkers as having more support for safety compared to the norm. Yet, compared to the norm, miners viewed their personal responsibility for safety as much worse. While the miners indicated more personal control and belonging compared to the norm, they were less optimistic and had lower self-efficacy than the norm.

It should be noted that employees at an underground coal mine brought down the overall average on the majority of items. Not only did underground coal miners respond less favorable than their counter parts at the processing plant and above ground rock quarries, these individuals also responded considerably below the norm on a variety of safety indicators. Thus, we concluded that the underground coal miners we sampled were not ready for a BBS process.

In Study 5, an e-mail survey was sent to mining sites around the world in order to learn how various mining operation assess property damage. Unfortunately, we received few responses to this survey (only 5), even though we promised a complete report of our results for their participation. After compiling the e-mail responses, entertaining group discussions with safety coordinators at our research site, conducting a literature search, and questioning several safety professionals from outside the mining arena, we formulated an action plan to assess property damage in mining operations. Details are given in this technical report.

LIST OF APPENDICES

- Appendix A : Critical Behavior Checklists for Research Assistants
- Appendix B : Operational Definitions for Intervention Sites
- Appendix C : Safety Training Manual
- Appendix D : Safety Culture Survey
- Appendix E : Focus Group Questions
- Appendix F : Results for Focus Group Questions
- Appendix G : Employee Critical Behavior Checklists
- Appendix H : Safety Culture Survey Results for Study 4
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- Appendix J : Scholarship 1: Addressing the Human Aspects of Mining Safety:
From Behaviors to Attitudes to Culture Change
- Appendix K : Scholarship 2: Applications of Behavioral
Science to Improve Mine Safety

OVERVIEW

The research combined the technology of applied behavior analysis with theories of motivation, learning, and social influence to develop a conceptual framework and evaluation system for implementing a cost-effective, long-term, employee-driven process for directing and motivating the occurrence of injury-prevention behaviors in the mining industry. The target population was miners at two southwest Virginia locations, and two northern Virginia locations. Site's A, B, C, and D are limestone quarries employing approximately 20 miners each. We also worked with one underground coal mine and one coal processing plant in southeastern West Virginia.

From a systematic analysis of intervention processes implemented and evaluated at these facilities, as well as a comprehensive safety survey, we have answered critical questions regarding optimal ways to administer and institutionalize behavior-based safety (BBS) to keep miners injury free. Broadly, we have derived cost-effective and socially valid procedures and guidelines for monitoring work practices throughout a mining culture and reducing the probability of personal injury by increasing miners' safe behaviors and reducing miners' at-risk behaviors. This research has also explored ways to increase employee involvement in an effective BBS process.

Within the mining industry, tremendous progress has been made, particularly in ergonomic intervention, to improve on-the-job safety (Langton, 1995). The psychological and behavioral aspects of mining safety require increased attention to keep miners safe. Specifically, we developed an intervention process to reduce at-risk behavior in underground and above-ground mines, including the development of: a) evaluation procedures to measure process progress and outcome benefits; b) metrics and techniques to assess ongoing behavior and attitude change; c) improved ways to assess people's readiness to actively care (i.e., to go beyond the call of duty for the safety of others) from an interdependent perspective; and d) a property damage metric to predict injury rates and indicate intervention effectiveness.

In addition, training and education materials have been developed for effectively teaching BBS to all employees in a mining environment. Techniques to implement and maintain a behavior-based observation and feedback process throughout a work culture have been explored and evaluated. Furthermore, we have developed interventions to motivate miners to continuously improve safety and health throughout their work culture.

Regarding person-based factors, we have assessed attitudes, perceptions, and values of miners with regard to occupational safety and health in order to pinpoint human dynamic issues relevant to keeping miners safe. Also, we have assessed the willingness of miners to look out for the safety and health of their coworkers with a Safety Culture Survey, employee interviews, and focus-group meetings.

In the second year we implemented the BBS intervention process developed in the first year and conducted a comprehensive evaluation of safety performance with the assessment tools developed during the first year. As a result, our research efforts have developed: a) a set of guidelines for designing a practical long-term intervention process to reduce mining injuries, and b) principles and methods for maximizing the cost effectiveness, social validity, and institutionalization of injury prevention countermeasures within the mining industry.

BACKGROUND AND SIGNIFICANCE

Injury is the principle cause of lost-person years of productive life in the U.S. and accounts for more years of lost potential than cancer and cardiovascular disease combined (Waller, 1987). Injuries kill more than 142,000 Americans and require an estimated 62.5 million dollars in medical attention each year (U.S. Bureau of Labor Statistics, 1997). Every year, more than 80,000 Americans are permanently disabled by work-related injuries. In fact, injuries are the leading cause of death of individual's aged 44 and less in the U.S. (Baker, Conroy, & Johnston, 1992). Clearly, injuries occurring on the job due to unsafe (or at-risk) work behaviors remain a significant nationwide problem (Baker et al., 1992).

Social and Economic Ramifications

In addition to the traumatic personal consequences experienced by employees and their friends and families due to unexpected industrial injuries and deaths, there are also critical social and economic consequences to consider. Although the severe pain and suffering caused by these misfortunes cannot be quantified, the social and economic costs can be estimated. These costs include lost wages, medical expenses, insurance claims, production delays, lost-time of coworkers, equipment damage, fire losses, and indirect costs (National Safety Council, 1988).

The overall cost of work-related injuries incurred back in 1989 has been estimated at \$48 billion (Baker et al., 1992). This figure is an increase from the 1987 estimate of 42.4 billion dollars and is dramatically larger than the 1985 estimate of \$34.6 billion (National Safety Council, 1988). Although all of these estimates are enormous, the numbers also indicate the cost of industrial injuries is increasing at an alarming rate. And, it is likely these estimates underestimate the true impact of industrial injuries because of problems with current surveillance techniques and the fact that many injuries are not reported (Baker et al., 1992; The National Committee for Injury Prevention and Control, 1989; U.S. Bureau of Labor Statistics, 1997).

Significance to Mining

In the mining industry alone, 548 workers were killed in both metal/non-metal and coal surface and underground mines from 1989-1993 (Langton, 1995). In 1995, more than 6% of all work-related fatalities occurred in mining facilities (U.S. Bureau of Labor Statistics, 1997). Also, there were more than 37,000 injury reports by miners in 1995 (U.S. Bureau of Labor Statistics, 1997). The number of unreported or hidden injuries during this time is hard to quantify, although it is likely these numbers grossly underestimate the actual number of miners hurt on the job (Miller, 1997).

Much has been accomplished to make ergonomic improvements in mining. For example, video camera back-up monitors and sophisticated Doppler radar alarms have been used to reduce injuries involving haulage trucks (Boldt & Backer, 1995). Although such technologies are improving with laboratory and field experiments, mining experts have pointed out that the technological improvements must be supplemented with a focus on the human aspects of safety, including the application of employee surveys and incentive programs (Peters, 1995). With this in mind, "the U.S. Bureau of Mines identified fundamental psychological principles that could be employed to enhance the ability of miners to recognize and respond to threats in their dangerous work environment" (Kowalski, Fotta, & Barrett, 1995, p. 95). This defines the direct relevance of BBS to mining.

The leading-edge technology in applying psychological principles to keeping workers safe is BBS. As Boling (1995) points out, "Today the progressive, productive and safe companies around the world have one common denominator, an innovative safety program that is behavior-based" (p. 2). The components of behavior-based technology go beyond the behavioral observation methods and statistical techniques for charting safety performance improvement. They include ways to enhance interpersonal communication, individual responsibility, teamwork, morale, involvement, peer support, follow-up intervention, and other factors needed for continuous safety improvement (Geller, 1996, 1998b, 2001).

Behavior-Based Safety and Injury Reduction

In 1979, the Surgeon General identified people and their behavior as the major contributor to poor health, injuries, and death (Califano, 1979). This theme of improved health and reduced injuries through behavior change has been emphasized in government reports (Harris, 1980, 1981), journal articles (Roberts, 1987; Sleet, Hollenbach, & Hovell, 1987), conference proceedings (Geller, 1988; Tolsma, 1987), and throughout entire journal issues (Geller, 1991; Lawson, Sleet, & Amoni, 1984; Roberts & Brooks, 1987). "What people *do* influences the quality of life, and people *doing* is the realm of psychology, the science of behavior" (Roberts, Fanurick, & Layfield, 1987, p. 105). In other words, unhealthy or injury-prone lifestyles result from excessive unhealthy and unsafe behaviors, and from deficits in healthy and safe behaviors (Gelfand & Hartman, 1984).

Research on injury prevention that addresses the identification and modification of behaviors contributing to injury is greatly needed (Institute of Medicine, 1988). This research was based on the successes of previous behavioral science research (e.g., Elder, Geller, Hovell, & Mayer, 1994; Geller, 1984; Geller, 1988; Geller, Rudd, Kalsher, Streff, & Lehman, 1987; Winett, King, & Altman, 1989). Surprisingly, very few BBS studies have been found which specifically target the mining industry. Clearly, there is a need for research in this area.

Injury Control Strategies

As reviewed by Guastello (1993) and Geller (2001), research has shown that the following techniques can significantly reduce the number and severity of occupational injuries: a) developing ergonomic and engineering strategies that decrease the probability of an employee engaging in at-risk behaviors; b) understanding the characteristics of workers most at risk for unintentional injury; c) educating and training employees regarding equipment, environmental hazards, and at-risk work practices; d) motivating safe work behaviors through behavior-based auditing and feedback; and e) analyzing and correcting property damage (Bird & Germain, 1966, 1997). This research addressed each of these intervention domains.

Ergonomic and engineering strategies. Research in industrial safety has consistently indicated that injuries occur as a result of the interaction between human behavior and the work environment (Reber, Wallin, & Chhokar, 1990). As a result, the discipline of ergonomics has been gaining prominence in the U.S. as a way to reduce occupational hazards in mining and other industries. Ergonomics focus on the interaction of the employee with machines, tools, work methods, and the work environment (The National Committee for Injury Prevention and Control, 1989).

The principle of ergonomic design is that the machine should fit the worker, rather than forcing the worker to fit the machine (Office of Technology Assessment, 1985). A behavior-based approach to safety provides a mechanism for employees to find simple changes to make in

their environment (including equipment) in order to improve ergonomics (or human/machine interactions). The research reported here used focus group meetings and mining tours to identify ergonomic issues central to the mining industry, as gleaned from the diverse perspectives of line workers, supervisors, and mining engineers.

Individual characteristics. There have been numerous attempts to find demographic variables (e.g., Dannenberg, Beilenson, Wilson, & Joffe, 1993; Fullerton & Becker, 1991), individual attitudes (Sims & Baumann, 1972), and personality characteristics (Donovan, Umlauf, & Salzberg, 1988) that identify employees at greatest risk for injury. Previous theoretical formulations and research findings (Wilson & Jonah, 1988) suggest that unsafe behavior may be a component of a general “risky” lifestyle, and that certain social, psychological, and behavioral factors can identify persons at high risk for unintentional injury (cf. Zuckerman, 1979).

The goal of these individual difference studies is usually to identify those people at greatest risk in order to design appropriate intervention strategies for critical population segments (Donovan, 1988; Donovan et al., 1988; Geller, 1989; Lastovicka, Murray, Joachimsthaler, Bhalla, & Sceurich, 1987). Unfortunately, most attempts to identify individuals more likely to take risks have not been very successful in detecting consistent differences in risk-taking propensity (Fischhoff, 1988).

The most consistent findings in the domain have been that most people see themselves as being less risky than others (Weinstein, 1980), and are willing to accept some level of risk when engaging in recreational and other pleasurable activities (Waller & Klein, 1971). Individual differences are often viewed as person states which can be shaped and improved with training. Unfortunately, no studies were found which examined person factors specifically related to mining safety. To do this, the current study used a comprehensive Safety Culture Survey.

Education and training strategies. A 1996 survey of over 1200 readers of *Industrial Safety and Hygiene News* revealed industrial education and training in BBS to be a top priority for 1997 (Johnson, 1996). Clearly, effective training is critical for mining safety. As one mining expert notes, “The bottom line in a BBS program is thorough training...how well safety awareness is developed in an employee depends on how well we have trained them” (Boling, 1995, p. 2).

Although widespread, education/training interventions have rarely been evaluated systematically as a safety countermeasure in any type of industry, especially mining organizations (McAfee & Winn, 1989; Vojtecky & Schmitz, 1986). The lack of substantial evaluative research in occupational safety is very likely due to methodological and design constraints which prohibit various industry-based teaching methods from being evaluated in a rigorous manner (U.S. Department of Health and Human Services, 1991). Given this, it is easy to understand why approximately 40% of individuals involved in the evaluation of safety and health programs (n = 124) were dissatisfied with attempts to demonstrate the beneficial impact of safety education/training (Vojtecky & Schmitz, 1986).

There is a need to investigate the “longer-term benefit of educational/training programs and how these approaches can be combined with others to accelerate behavior change” (Institute of Medicine, 1988, p. 11). Research is also needed to specify the conditions under which employees are most likely to participate willingly in the development and implementation of methods to increase the occurrence of safe work behaviors among themselves and others. Our

research addressed each of these issues by: a) customizing BBS education/training program for the mining industry; b) presenting the customized training/education to the employees of a mining company; c) evaluating the educational impact of a BBS training program for miners; and d) investigating the benefits of involving target employees in all significant decisions and planning stages of an intervention process (i.e., empowerment). Comprehensive BBS education/training occurred in the second year of the research, after the implementation procedures, metrics, and evaluation tools were developed during the first year.

Applied behavior analysis. Behavior-based approaches to injury control have a number of advantages over other approaches, including: a) they can be administered by individuals with minimal professional training; b) they can reach people in the setting where a problem occurs (e.g., community, school, workplace); and c) the leaders in these settings can be taught the behavior-change techniques most likely to work under specific circumstances (Baer, Wolf, & Risley, 1968, 1987; Daniels, 1989; Geller, 1998c). Research has also shown this approach to be cost effective, primarily because behavior-change techniques are straightforward and relatively easy to administer, and because intervention progress can be readily assessed by indigenous personnel monitoring target behaviors (e.g., Daniels, 1989; Geller, 2001; Geller, Winnett, & Everett, 1982; Rudd & Geller, 1985; Sulzer-Azaroff & de Santamaria, 1980).

The antecedent-behavior-consequence model of applied behavior analysis has been applied frequently and successfully over the past 20 years to prevent occupational injuries (e.g., Alavosius & Sulzer-Azaroff, 1986; Komaki, Barwick, & Scott, 1978; Streff, Kalsher, & Geller, 1993). Indeed, behavior analysis has a great deal to offer the field of injury control by enhancing understanding of the determinants of at-risk behavior and guiding the development of effective behavior change strategies (e.g., Elder et al., 1994; Geller, 1988, 2001; Geller, 1989; Krause, Hidley, & Hodson, 1996; Petersen, 1989).

Behavior-based approaches to safety focus on systematically studying the effects of various interventions on target behaviors, first by defining the target behaviors in a directly observable and recordable way, and second by observing and recording behavioral observations in a naturalistic setting. When a stable baseline measure of the frequency, rate, or duration of behavior is obtained, an intervention is implemented to change the behavior in beneficial directions. Interventions typically involve modifying or changing the salience of the antecedents and/or consequences of specified target behavior(s). To determine intervention effectiveness, the frequency, duration, or rate of the target behavior is recorded during and/or after the intervention and compared to baseline measures of behavior (e.g., Daniels, 1989; Geller, 1996, 1998c). For this two-year grant period, this approach to occupational safety was applied at six mining facilities.

Property damage. Industrial safety experts have documented the need to consider property damage as both a predictor and indicator of safety performance (Bird & Germain, 1997). For example, broken guards on machines, tools in disrepair, dents in equipment and walls signal safety-related incidents that need to be investigated. Property damage is a physical trace of an accident, and could signify to employees that management doesn't care about their safety. In some cases, faulty and damaged equipment is the root cause of a serious injury. In other cases, property damage reflects poor housekeeping which, in turn, can be a precursor to at-risk behavior.

Large-scale incident analysis (from near misses to serious injuries) have led experts to estimate that for every major injury, there are approximately 30 property damage incidents. In

other words, as the number of property damage incidents increase, the probability of a major injury increases proportionally. Moreover, workers' attitudes are negatively impacted when property damage embodies the culture of an organization (Geller, 2001). Clearly, the repair of environmental damage (or lack thereof) needs to be continuously tracked as an ongoing measure of safety performance and areas needing attention. Thus, our research developed a protocol for using property damage as a measure of an organization's safety performance.

STUDY 1: Effectiveness of Behavior-Based Safety in Mining Operations

Method

Participants and Setting

We conducted behavioral observations and employee training sessions at four above ground rock quarries. Mine A (n=18) and Mine B (n=15) are located in southwestern Virginia. Mines C (n=30) and D (n=22) are both located in northern Virginia. Participants were 99% male and 95% Caucasian. Though the sites differed in the number of employees, each was similar with respect to equipment used, size of quarry, and activity level. Materials from these mines were used mainly for road construction and building formation.

Procedure

Sites A and B were located within one hour from Blacksburg, VA. At both of these sites, research assistants made behavioral observations by riding throughout the mining site with the site supervisor. The behavioral observations consisted of the research assistants completing critical behavior checklist (CBC) on all the employees seen while driving through the mining site. The distance of Sites C and D (approximately four hours from Blacksburg, VA) prevented research assistants from making frequent observations. Thus, only employee observations were available at these sites.

The research assistants (RA) were trained by a graduate research assistant (GRA) who instructed them on how to complete a CBC correctly. See Appendix A for the CBCs used by RAs at each mining site. This included discussing the operational definitions on the CBC and role-playing possible target behaviors. See Appendix B for operational definitions of target behaviors. A RAs data was not entered into the database until the individual made three consecutive behavioral observations with at least 80% reliability across *all* behaviors.

All RAs drove to the mining location (Site A or B) in pairs. Once the RA entered the quarry, they signed-in at the front office and decided who would be the primary/reliability observer for their data collection session. Due to the dangerous operations on-going in the rock quarry, each quarry's foreman drove the RAs through the site. The only communication between RAs occurred when an employee was identified to be observed. The RAs independently recorded behavioral observations on their CBCs (marking safe/at-risk target behaviors and additional comments). Observations were attempted each weekday for one school year (August, 1999 to May, 2000). Site visits were hampered by the limited availability of the foreman to escort the RA's around the quarry, and poor weather conditions. The observation sessions lasted 30-120 minutes.

Baseline

Baseline observations were conducted for two-weeks prior to training at Sites A and B. Employees were naïve to the behaviors being targeted, although they did know they were being observed. Baseline observations were conducted a month before training at Sites C and D. Since frequent observation were not realistic at Sites C and D, the foremen and safety coordinators at each site were given brief, but descriptive instructions on how to properly complete CBCs for baseline measurements. No data are given for Site D due to an inadequate number of CBCs returned (n = 8).

Training

Behavior-based safety (BBS) education/training was conducted at each of the four sites. Training sessions for miners lasted four hours and were conducted in the morning before the first shift, and starting at approximately 6:00 am. Each site received the same training, but we staggered the introduction of observation cards at Site A to assess if training alone had an effect on safety performance. See Appendix C for the training manual developed in Year 1.

Safety leaders at each site designated a convenient place to display the CBCs and provided a drop-box nearby for the employees to deposit completed checklists. It is important to note that the CBCs are anonymous; they cannot be traced to any one employee. The completed CBCs were collected by research assistants and analyzed. The data were provided to each site periodically, updating the safety leaders and the employees on their safety progress.

Safety Culture Survey. The Safety Culture Survey (SCS) was administered to employees prior to BBS training. All employees at each site completed the SCS, as given in Appendix D. The SCS is made up of six sub-scales that assess the following:

- Management Support for Safety
- Peer Support for Safety
- Personal Responsibility for Safety
- Safety Management Systems
 - Safety performance
 - Stress, drugs, and alcohol
 - Discipline
 - Incident reporting and analysis
 - Rules and regulations
 - Training
 - Safety communications/conversation strategies
 - Safety suggestions
 - Incentives and rewards
 - Hazards identification and correction
 - Employee involvement
 - Other safety management systems
- Actively Caring for Health and Safety
- Person Factors
 - Self-Esteem
 - Self-Efficacy
 - Personal control
 - Optimism
 - Belonging

Focus group questions. A focus group discussion was held after completion of the SCS. Any supervisors present were politely asked to leave so employees would feel comfortable answering questions. The focus group questions allowed employees to discuss pertinent issues not attainable in the SCS. See Appendix E for the focus-group questions.

Results were extremely similar for all sites, as detailed in Appendix F. Employees indicated they had tried several unsuccessful safety programs in the past and did not have much faith in new “flavor of the week” safety programs. Employees at Sites A and B indicated they

thought their supervisors implemented safety programs only to avoid repercussions from the Mine Health and Safety Administration (MSHA), not because they cared about the employees' safety. In fact, several employees at Sites A and B said the superintendent actually encouraged them to put their safety in jeopardy in order to get a job completed quicker. These employees also indicated they would like to be more involved in the decision-making process concerning safety issues.

When asked their opinion regarding a behavioral checklist and giving feedback to coworkers, employees at Sites A and B had very different responses than did employees at Sites C and D. Employees at Sites A and B indicated they did not want their coworkers looking over their shoulders and telling them how to do their jobs. However, employees at Sites C and D indicated they already had such a BBS system in place, with less paper work. The employees said they always make it a habit to look out for their coworkers and if they see them doing something at-risk, they inform their coworker and encourage them to be more cautious.

Behavioral observation and feedback training. This segment consists of the bulk of the training process. Participants learned about the principles and practical applications of BBS, with an emphasis on behavioral observation and feedback. Employees were informed and educated about the process through lectures, discussions, and group activities. Training included an educational component that taught the employees the basic principles of BBS as well as a training component that gave the participants an opportunity to: a) practice observing a coworker's behavior, b) complete an observation checklist, and c) provide feedback regarding the coworker's safe and at-risk behaviors. After the training session, the employees participated in a discussion group to help develop an observation checklist tailored for each site.

Peer Observation

After education/training, employees were given a modified (condensed to fit on an index card) CBC, and instructed to make at least one behavioral observation each day on a coworker's work practices. Employees were also instructed to give their coworkers feedback on their safety performance. See Appendix G for the CBCs used at each site.

Results

Interobserver Reliability

Inter-rater agreement or reliability was recorded on 41% of the 3,103 behavioral observations at Mines A and B. Due to the abundance of safe observations, and the all-or-nothing nature of the behavioral categorizations (i.e., safe or at risk), an inter-observer reliability formula was used that assessed reliability separately for safe and at-risk behaviors. The formula for reliability was as follows:

$$\text{Percent Agreement for At-Risk Behavior} = \frac{\text{At-Risk Agreements}}{\text{At-Risk Agreements} + \text{At-Risk Disagreements}} \times 100$$

$$\text{Percent Agreement for Safe Behavior} = \frac{\text{Safe Agreements}}{\text{Safe Agreements} + \text{Safe Disagreements}} \times 100$$

The mean inter-rater reliability percentages for each site and behavioral category, are listed below in Table 1:

Behavior	Site A		Site B	
	Safe	At-Risk	Safe	At-Risk
PPE	95%	83%	92%	89%
Housekeeping	98%	81%	87%	83%
Mobile Equipment	81%	73%	82%	73%
Lock-out/Tag-out	100%	100%	100%	100%
Lifting	85%	73%	88%	75%

Table 1. Mean Inter-Rater Agreement Percentage per Behavioral Category.

Baseline

At Site A, the RAs made 358 behavioral observations (M=77.8%). At Site B, the RAs made 171 behavioral observations (M=81.7%). At Site C, employees made a total of only 22 behavioral observations (M=85.8%). See Figures 1, 2, and 3 for Sites A, B, and C baseline safety performance, respectively.

Training

At Site A, CBCs were withheld to assess the effectiveness of training alone. The RAs made 581 behavioral observations during this phase. A 2 X 3 ANOVA (safe and at-risk behaviors across baseline,

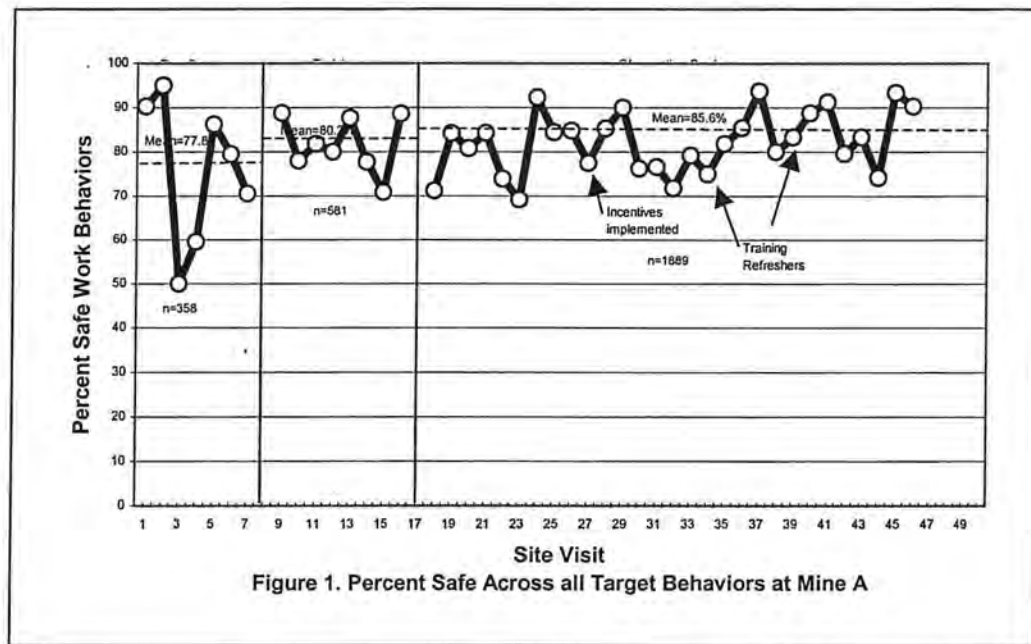


Figure 1. Percent Safe Across all Target Behaviors at Mine A

training, and observation card conditions) was conducted. Percent safe work behaviors were nearly identical in the Training (M= .80) versus Baseline (M= .78) conditions. See Figure 1 for the time series presentation of these results.

Training and Observation Manipulation

At Site A, RAs made 1,889 behavioral observations during this phase. Analyses were the same as described above. Percent safe work behaviors were slightly higher during the Observation Card condition (M=85.6%) than Baseline (M=77.8%). The difference between the Observation Cards and Baseline conditions was statistically significant (p< .05). Percent safe work behaviors were slightly higher in the Observation Cards (M= 85.6%) versus Training (M=80%) conditions. The difference between the Observation Cards and Training conditions. See Figure 1 for a time series presentation of these safety performance results.

At Site B, RAs made 426 behavioral observations during this phase. Percent safe work behaviors were substantially higher in the Training plus Observation Cards (M=93%) than the Baseline (M=81.7%) conditions. This difference between Training and Observation Cards vs. Baseline was statistically significant ($p < .01$). All analyses

treated each behavioral observation session as a separate subject and used 2 X 2 ANOVA (safe and at-risk behaviors across baseline and observation card conditions). See Figure 2 for the time series display of percentage safe work behaviors at this site.

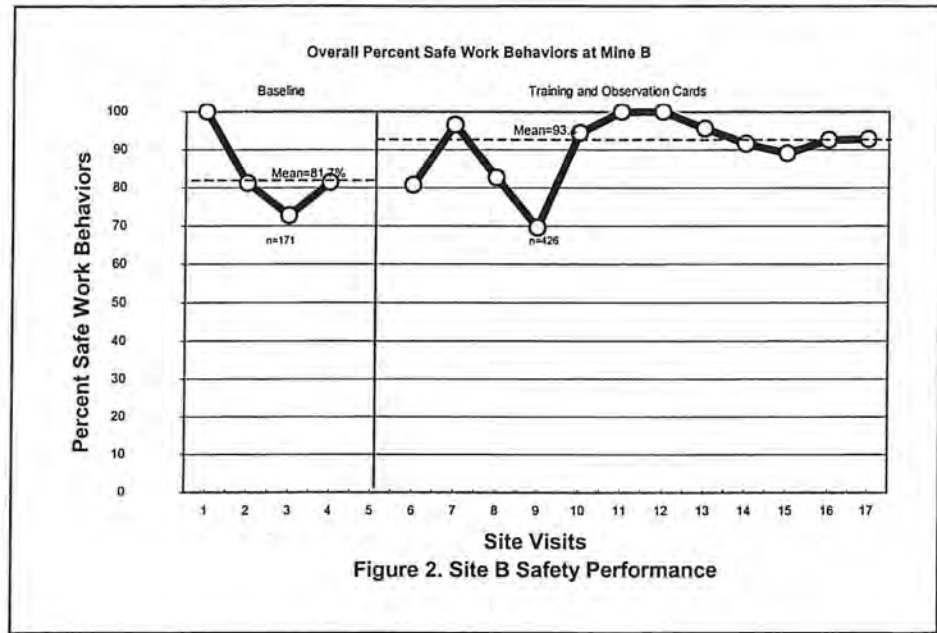


Figure 2. Site B Safety Performance

At Site C, employees made 426 behavioral observations during this phase. Percent safe work behaviors were slightly higher in the Observation Card condition (M=91.6%) than the Baseline (M=85.6%) conditions. This was statistically significant ($p < .05$). All analyses treated each behavioral observation session as a separate subject and used 2 X 2

ANOVA (safe and at-risk behaviors across baseline and observation card conditions). See Figure 3 for the time series display of these results.

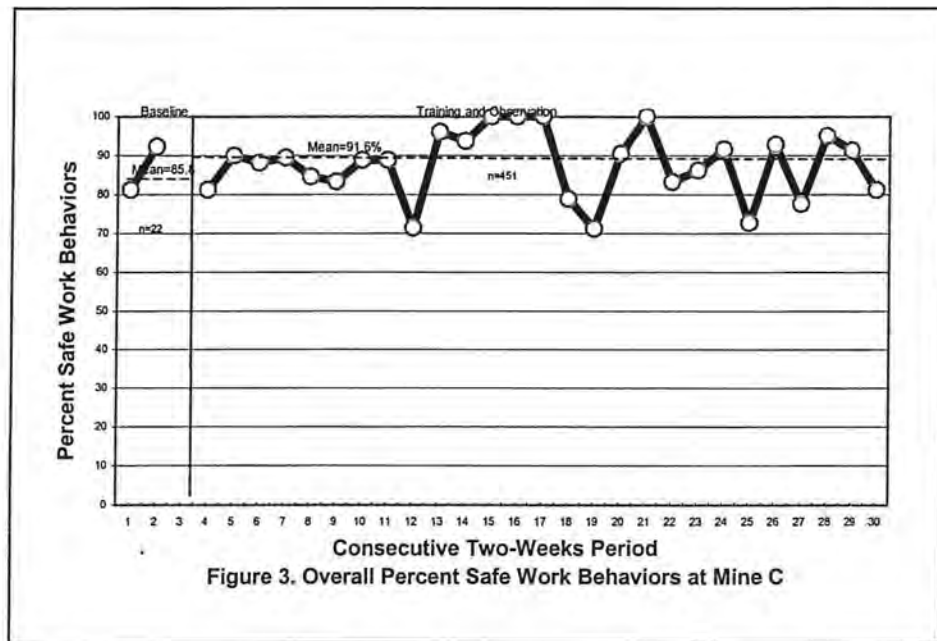


Figure 3. Overall Percent Safe Work Behaviors at Mine C

Observations of Safety Goggles

Site A. The RAs made 46, 70, and 246 behavioral observations for safety goggle's in the Baseline, Training, and Observation Cards conditions, respectively. The percentage of employees wearing safety goggles was nearly identical during the Baseline (M= 52%) and Training (M= 51%) conditions. The percentage of employees wearing safety goggles rose substantially during the Observation Cards (M= 68%) condition. The differences between the

Observation Cards and Training conditions, and the Observation Cards and Baseline conditions were statistically significant. All analyses treated each observation session as a separate subject and used a post-hoc one-way ANOVA across baseline, training, and observation card conditions. See Figure 4 for the percentage of individuals wearing safety goggles at Site A.

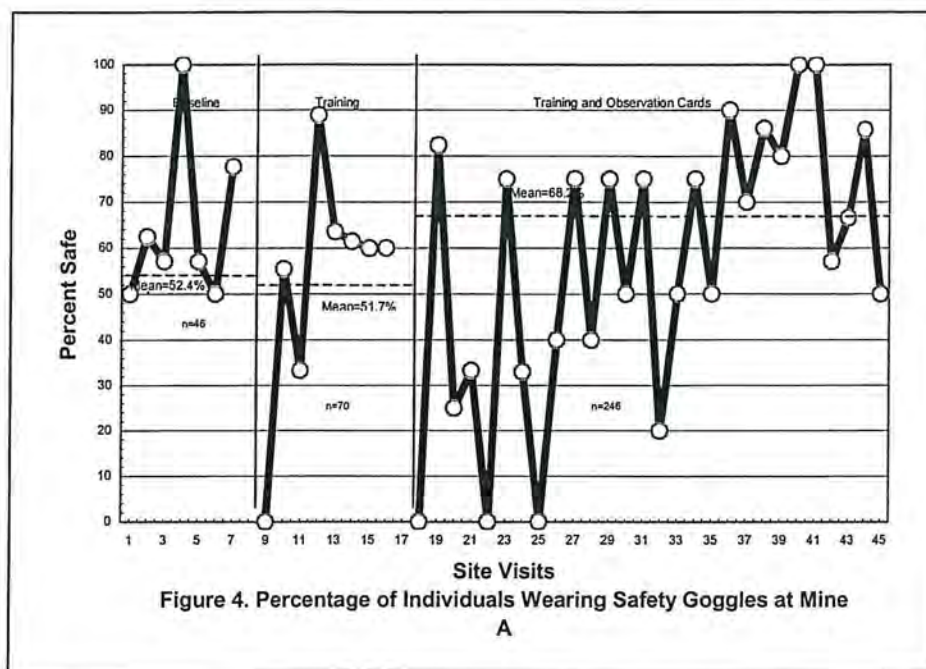


Figure 4. Percentage of Individuals Wearing Safety Goggles at Mine A

Site B. The RAs conducted 15 and 76 behavioral observation sessions for safety goggles in the Baseline and Training and Observation Cards conditions respectively. The percentage of employees wearing safety goggles rose substantially during the Training and Observation Cards condition (M = 73%) from that observed during Baseline (M= 38%). The increase was statistically significant ($p < .01$). All analyses treated each observation session as a separate subject and used a post-hoc one-way ANOVA across baseline observation card condition. See Figure 5 for the percentage of individuals wearing safety goggles at Site B.

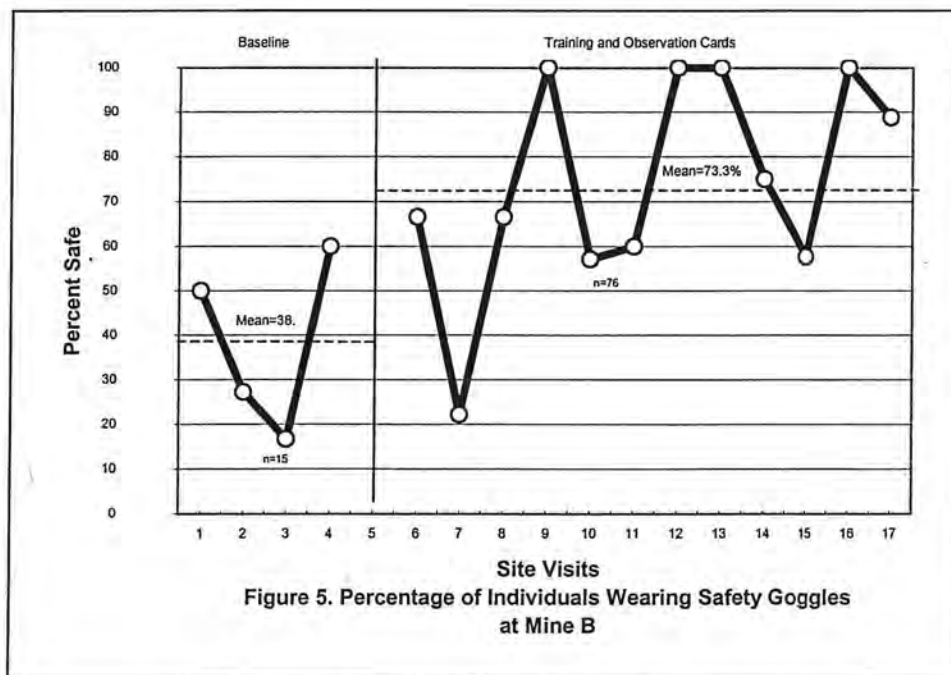


Figure 5. Percentage of Individuals Wearing Safety Goggles at Mine B

Sites A & B. The employees at both quarries continued to complete the CBCs incorrectly. Most of the CBCs completed reported only at-risk behaviors (not safe behaviors), and rarely included comments. It appeared the employees were using the process to report at-risk behavior and get their coworkers in trouble. During focus groups, the miners indicated they did not trust the process. Most made it very clear they did not want their coworkers “looking over their shoulder” while they were trying to work.

Discussion

Conclusions

The data from three above ground rock quarries indicated a safe work environment, although this may be an overly optimistic conclusion. Our research concludes that BBS is effective at increasing safe work practices. Education/training alone was not sufficient at increasing safe work behaviors at these sites. Similar to past BBS feedback research, behavioral feedback led to clear improvements in objective safety performance. Based on 3,898 observations over an 8-month period, overall percent safe scores increased significantly and consistently following the introduction of BBS feedback. The current results support the use of a BBS process to increase safe work practices.

Limitations

One factor contributing to the ceiling effect observed across all sites was our inability to observe all possible work behaviors. We were only allowed to make observations when the quarry foreman was present. If a piece of equipment broke down or the miners had a problem needing his assistance, we were unable to make behavioral observations that day. As such, the data collected reflect information when the quarries were running smoothly.

Further limiting this study was the lack of employee participation. The miners never took ownership of the process. Some managers did not believe in the BBS process and stressed production ahead of safety. Employees continually completed the CBCs incorrectly by marking down only at-risk behaviors, tattling on fellow employees, and filling in their name without any behavioral observations. They continued to do this even after several training refreshers. See Appendix J for more details of the training refreshers.

Future Directions

After making several visits to the mines, it became apparent to our RAs that miners in above ground rock quarries are solitary workers. The only time employees could observe and provide feedback to a coworker was when some piece of equipment broke down. Thus it's likely safety self-management techniques would be a more appropriate approach than a peer feedback process.

Self-Management Intervention

Self-management (Mahoney, 1971, 1972) is a behavior-based improvement process whereby individuals change their own behavior in a goal-directed fashion by: a) manipulating behavioral antecedents, b) observing and recording specific target behaviors, and c) self-administering rewards for personal achievements (Geller & Clarke, 1999; Kazdin, 1993; Watson & Tharp, 1997).

The practical benefits of self-management processes have been demonstrated in numerous clinical settings, including the reduction of alcohol consumption (Garvin, Alcorn, Faulkner, & Kim 1992; Sitharthan, Kavanagh, & Sayer, 1996; Sobell & Sobell, 1995), the control of weight (Baker & Kirschenbaum, 1993), and the cessation of smoking (Curry, 1993; Shiffman, 1984). Unfortunately, the use of self-management techniques to improve safety-related behaviors has not been systematically evaluated. In fact, our review of the research literature indicated no published studies that investigated the efficacy of using self-management technique to improve safe work practices, including driving behaviors.

Self-management strategies. Research indicates that five self-management procedures can facilitate behavioral improvement, including: a) activator management (Heins, Lloyd, & Hallahan, 1986), b) social support (Stuart, 1967), c) goal setting (Latham & Yukl, 1975; Locke & Latham, 1990), d) self-observation and self-recording (Ericsson, Krampe, & Tesch-Romer, 1993; Lau, Bradley, & Parr, 1993), and e) self-rewards (Sohn & Lanal, 1982).

Activator management involves identifying environmental, behavioral, and personal factors that precede the occurrence of safe and at-risk behaviors. Strategies are then employed to eliminate activators that precede at-risk behaviors and add activators to increase the probability of safe behaviors (e.g., reminder messages that specify a target behavior).

Creating a supportive interpersonal climate can also improve the success of a self-management intervention (Stuart, 1967). Sources of social support can involve supervisors, coworkers, friends, and family who can encourage the targeted behaviors (Heinzelman & Bagley, 1970; Lawson & Rhodes, 1981; Moss & Arend, 1977). For example, social support can include positive feedback and encouragement for personal achievement (Perri & Richards, 1977), particularly when self-observation data are displayed so others can see accomplishments (Taylor, Neter, & Wayment, 1995).

Regularly engaging in the self-observation and self-recording of specific behaviors is a key component of self-management (Bagozzi, 1992; Kazdin, 1993). Social cognitive theory (Bandura, 1991) suggests that self-observation is one of the primary components of the self-regulation of behavior change. According to Bandura (1991), critical elements in the application of self-observation include specific self-set goals, and a belief in the “value” of behavior change. Research also indicates that perceptions of choice, and increased self-awareness of specific behaviors, can focus individual’s attention on behavior improvement (Binswanger, 1991).

Specific behavioral goals should be: a) set high, yet b) be achievable, c) specify expectations for improvement, and d) include the tracking of progress (Geller, 1996, 1998b; Geller & Clarke, 1999).

Self-observation involves observing one’s own behaviors soon after they occur, as well as noting related environmental events that precede and follow the target behaviors (Watson & Tharp, 1997). Recording the occurrence of safe and at-risk behaviors provides an objective record of current safety performance; and charting progress toward reaching specific behavior-based safety goals provides feedback on accomplishment, and identifies areas for improvement.

Characteristics of successful and unsuccessful self-management programs. A review of the self-management research literature by Cromier and Cromier (1991) points out a number of factors associated with successful versus unsuccessful self-management programs. Successful self-management was associated with: a) using a combination of strategies that focus on antecedents such as goal setting and reminders, self-observation, and consequences or self-reward (Mahoney, Moura, & Wade, 1973; Perri *et al.*, 1987), b) goal setting and feedback concerning progress toward goal attainment (Nelson, 1977), c) social support from individuals who come in daily contact with the self-manager (McCaul, Glasgow, & O’Neill, 1992), and d) the consistent and regular use of multiple self-management strategies to maximize improvement and ensure long-term behavioral improvement (Hefferman & Richards, 1981; Perri & Richards, 1977).

Unsuccessful applications of self-management are associated with: a) targeting too many behaviors at the same time (Nelson, 1977), b) soliciting insufficient social support (Peterson, 1983; Wood, Hardin, & Wang, 1984), c) using only a single self-management strategy (Holman & Baer, 1979; Perri *et al.*, 1987), d) inconsistent or sporadic observations or recording of the target behavior(s) (Thorensen & Mahoney, 1974), and e) failing to set challenging and attainable goals (Perri & Richards, 1977).

Individual factors. Our review of the literature indicates that four individual characteristics may moderate the effectiveness of self-management for safety-related behavior: a) personal control, b) self-efficacy, c) optimism, and d) a sense of belonging. As reviewed above, personal control reflects the degree to which a person believes most life events and performance outcomes are caused by internal factors such as intelligence, desire, ability or external factors such as luck, chance, or powerful others (Rotter, 1966; Norwicki & Strickland, 1973). Individuals who believe they control their future outcomes (i.e., internal locus of control) should be more likely to believe self-management can result in behavior change than those who believe fate or luck determines future outcomes (i.e., external locus of control).

Self-efficacy refers to an individual's perception of personal capability to execute a particular course of action and self-confidence in the mastery of the skills required to improve (Bandura, 1997). Efficacy judgments are believed to influence a person's choice of actions, effort expended, perseverance in the face of obstacles to behavior change, and the quality and strength of attempts to change behavior (Brown, 1991; Cervone & Scott, 1995). In addition, those high in self-efficacy may be more likely to attempt new behaviors (Ajzen, 1991), including those involved in safety self-management.

Optimism is the degree to which individuals feel optimistic about their future (Peterson, 2000; Scheier & Carver, 1993). Research suggests that persons high in optimism are more likely to sustain self-management efforts (Bagozzi, 1992), and are more apt to reach their personal goals (Scheier & Carver, 1993). In addition, goal attainment may influence individuals' optimism regarding future efforts at behavior change (Fresco, Sampson, Clark, Enns, & Criagnead, 1995). Thus, individuals who feel optimistic about their future should be more successful at self-managing their driving safety.

Finally, research indicates that feelings of belonging are related to perceived and actual social support (Cohen, 1983). Since social support is a critical factor in successful self-management (Kanfer, 1980; Watson & Tharp, 1997), those individuals who feel like a part of a cohesive work group should be more successful at safety self-management. Finally, although self-management requires a great deal of self-directed focus, a self-management program that promotes feelings of interdependency and working toward a shared goal (such as a reduction in group injuries) may increase feelings of belonging and social support (Jeffery, Gerber, Rosenthal, & Lindquist, 1983).

Implementing self-management programs. Self-management is typically a six-step process, including: a) establishment of a behavioral baseline using self-observation, including the identification of antecedents and consequences associated with the occurrence and non-occurrence of the target behaviors (Cromier & Cromier, 1991); b) identification of target behaviors (Cervone & Wood, 1995); c) selection of a self-management strategy to promote desired behavior change and chart progress; d) selection of a goal that is specific, motivational, attainable, relevant, and trackable (Geller, 2001); e) self-observation and self-recording of target

behaviors to measure progress toward the goal (Kirschenbaum, Ordman, Tomarken, & Holtzbauer, 1982), and f) administration of self-rewards that are accessible, individualized, valued, varied, and follow the targeted behavior as immediately as possible (Cromier & Cromier, 1991).

As indicated by the Behavior Change Taxonomy (Geller, 1998a) and our previous research (e.g., Ludwig & Geller, 1997, 2000), involving participants in the selection of target behavior(s) will increase the effectiveness of safety self-management. Ludwig and Geller (1997) investigated the effects of participated versus assigned goal-setting on one targeted and two non-targeted behaviors. Consistent with the response generalization theory, participative goal-setting had a positive effect on both the targeted and non-targeted behaviors, while assigned goal setting and feedback only affected the targeted behavior.

Once target behaviors have been identified, a “manageable” number of behaviors should be selected for improvement (Kirby, Fowler, & Baer, 1991). While there is no available prescription for the optimal number of behaviors to observe, the self-management literature suggests it is better to start with a few behaviors and build, than to tackle a myriad of behaviors which may lead to distress or discouragement (Cromier & Cromier, 1991; Watson & Tharp, 1997).

Once target behavior(s) are selected, a self-management strategy is developed. As discussed above, numerous self-management strategies are available and the success of self-management is positively correlated with the number of strategies used (Watson & Tharp, 1997). While miners should be involved in developing their own self-management strategies, the inclusion of goal setting, and the self-observation and recording of behavior are essential elements of self-management. However, since self-management is new in the field of occupational safety, little is known about the effectiveness and “social validity” of safety self-management (Geller & Clarke, 1999).

Goal setting should follow the SMART acronym: Specific, Motivational, Achievable, Relevant, and Trackable (Geller, 2001). The goal should specify the behavior(s), the desired change, and the time period in which the goal will be achieved (Latham & Yukl, 1975; Latham & Locke, 1991). Our Behavior Change Taxonomy (Geller, 1998a) and prior research (Geller, 1998b; Ludwig & Geller, 1999, 2000) indicates that allowing individuals to set their own goals will increase the effectiveness of self-management. When progress toward goal attainment is publicly posted, an opportunity is provided to activate social support from coworkers, reward individual and group achievement, encourage future improvement, and set expectancies for continuous improvement (Taylor *et al.*, 1995).

In general, the greater the frequency of self-observing and recording per behavior, the greater the impact of the process (Baker & Kirchenbaum, 1993). However, the length of time self-monitoring should occur to ensure response maintenance varies across situations and behaviors. In most cases self-observations should continue for at least three to four weeks (Kirschenbaum *et al.*, 1982).

Feedback. Performance feedback can be based on individual or group performance, and reported specifically per individual behavior or globally as a summary of individual behaviors (Williams & Geller, 2000). It can be delivered individually or in group settings, and is often combined with education or training (e.g., Zohar, Cohen, & Azar, 1980) and goal setting (e.g., Cohen & Jensen, 1984; Saarela, 1990). The behavior change literature has shown beneficial

effects of publicly posting information that displays the performance levels of a community or work group. For example, Van Houten and his colleagues (Van Houten & Nau, 1983; Van Houten, Nau, & Marini, 1980) found that community signs posting the daily percentages of drivers exceeding the speed limit increased the percentage of drivers who subsequently complied with the speed limit. Similarly, Jonah (1989) and Geller (2000) reported significant increases in safety-belt use following the posting of roadway signs that displayed "percentage of drivers wearing seat belts yesterday."

Summary. The Behavior Change Taxonomy (Geller, 1998a) predicts self-management may be one of the most effective behavior change techniques in situations where interpersonal observation and feedback is impossible. In fact, it is the only BBS technique that can be applied by solitary workers. Self-management is straightforward, non-invasive, and practical in many situations. And it could include posting feedback, thereby soliciting social support. If self-management activities can be integrated with other job activities, safety practitioners will have an effective tool for improving safety-related behaviors that occur when there is little or no opportunity for interpersonal observation and feedback.

Feedforward versus Feedback

Information about individual performance can be given before or after behavior targeted for improvement. Kreitner (1982) referred to antecedent behavioral information as "feedforward," and information following behavior as "feedback." However, Kreitner did not address the issue of the relative impact of these alternative approaches. Since the early identification of presenting behavioral information as feedforward or feedback within the activator-behavior-consequence (ABC) paradigm of applied behavior analysis (Kreitner, 1982), we could find no published research that compared these approaches in the same study. In fact, the term "feedforward" is rarely used when referring to behavior-improvement interventions. Instead, the term "feedback" is used for both applications. Actually, some leaders in the field of organizational behavior management refer to feedback as only a behavioral antecedent (Daniels, 1989, 2000); whereas others discuss feedback as only a behavioral consequence (Geller, 1996; Krause, Hidley, & Hodson, 1996; McSween, 1995).

Recently, Geller (1999, 2001) proposed that the objective of a behavioral intervention should determine whether behavior-focused information should precede or follow the targeted behavior(s). More specifically, if the aim is to give direction or instruction, behavioral information should be given before an opportunity to perform (as feedforward), but if motivation rather than direction is needed, feedback is called for. This simple intuitive theory explained why feedforward information was more effective than feedback at increasing the safe behaviors of teenagers taking driving lessons (DePasquale & Geller, in press). Presumably, the teens needed more instruction than motivation in their situation.

In contrast, nonspecific global feedback regarding workers' safety performance was sufficient at improving safety-related behaviors beyond levels attained with specific behavioral feedback when a global social comparison score was added to group feedback graphs (Williams & Geller, 2000). The authors explained their unexpected finding by assuming the workers did not need instruction as to what specific behaviors are safe versus at risk. Rather they only needed some added motivation to select the safe alternatives. Apparently, the public accountability provided by general comparisons with a similar work group provided effective motivational consequences.

STUDY 2: The Power of Consequences: Increasing Employee Participation

Method

Subjects/Setting

An incentive/reward program was implemented at Site A (n=18), located in southwestern Virginia. Participants were 99% male and 95% Caucasian. Materials from these mines were used mainly for road construction and building formation.

Procedure

During the weekly safety meeting, the safety coordinator announced there would be a raffle held every two-weeks. A completed CBC was an entry in the raffle. The winner of the raffle was randomly selected from the completed CBCs. The winning entry received a small tool kit. In addition, every employee who completed two CBCs per day received a coupon redeemable for a large pizza at a local restaurant. Two locked boxes were placed in the employee lounge (one box for the names and one box for the data). This prevented the linkage of an employee to a particular observation card, yet enabled an evaluation of individual participation in the behavioral observation process.

Results

The use of performance-based incentives dramatically increased employee participation at Site A. After the announcement was made for the incentive program, the number of completed CBCs

tripled and the number of different employees completing a CBC more than doubled. After the first prize drawing was held, the number of completed CBCs and the number of different employees completing a CBC doubled from the prior week. In a one-month span, the incentives were responsible for a 600% increase in the number of completed CBCs, and a 500% increase in the number of different employees completing a CBC.

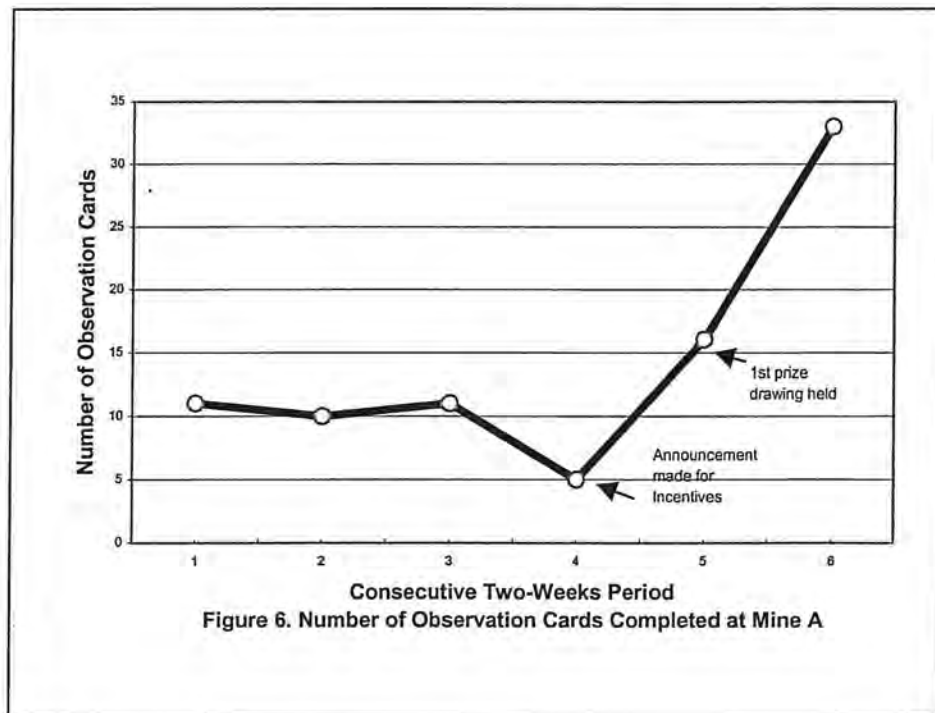
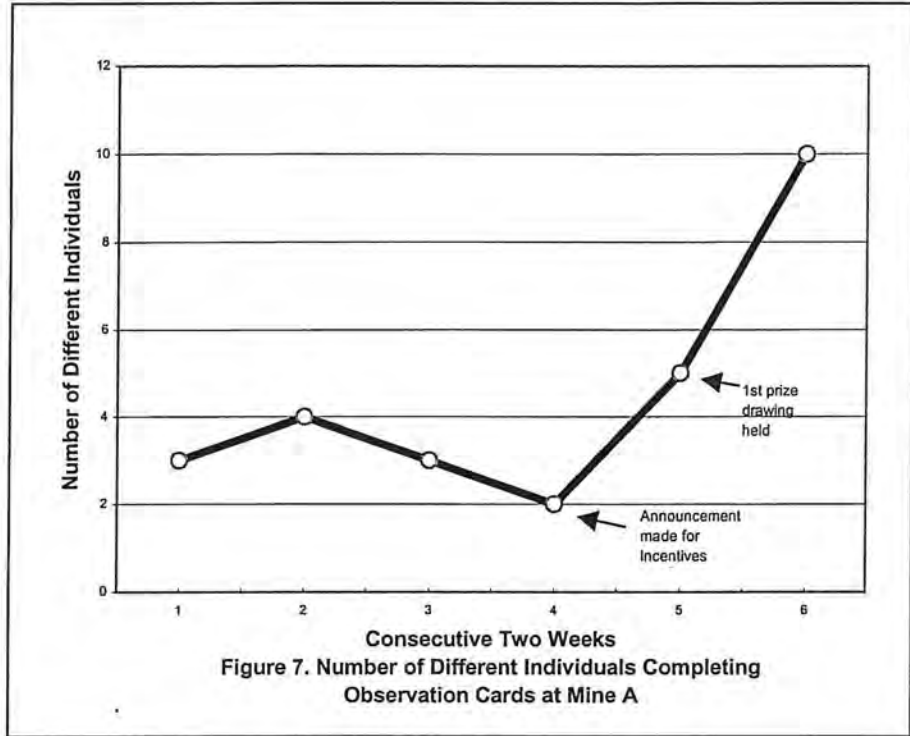


Figure 6. Number of Observation Cards Completed at Mine A

See Figures 6 and 7 for the number of completed CBCs and number of different employees completing a CBC. Although the incentive program was extremely effective at increasing employee participation, the quality of the CBCs did not improve. In fact, most of the

CBCs reported only at-risk behaviors. Thus, we showed that inexpensive rewards like a tool kit or food coupon can have a large impact on employee participation, but more is needed to motivate improved quality of the CBCs.



STUDY 3: Initial Administration of Safety Culture Survey to Assess Applicability in Mining Operations

Introduction

The Safety Culture Survey (SCS) was developed as a result of assessing employees' perceptions of safety and health issues in a variety of corporate settings, including plants within Ford Motor Company, Chrysler, General Motors, Exxon Chemical, Hoechst Celanese, Sara Lee Knit Products, and the Tennessee Valley Authority (Geller, Roberts, & Gilmore, 1996). The survey was refined considerably to focus on factors the authors believed were critical for assessing the safety culture in a mining setting. In its current version, the survey incorporates four separate scales: the **Safety Perception Scale**, the **Safety Management Systems Scale**, the **Actively Caring Scale**, and the **Person Factor Scale**. Each scale measures a unique component of employee health and safety. The following survey was administered to Kennecott employees (n=345) in February of 1999. Kennecott is a surface coal mining company located in Wyoming. Specifically, we worked with Kennecott's Cordero Rojo plant.

The results of the SCS are useful in several ways. First, the results can serve as a diagnostic tool to help identify issues which may be negatively impacting the organization's safety culture and/or which may serve as an obstacle to improvement efforts. Follow-up on areas of particular concern may be needed to help understand the reasons for the negative perceptions and identify strategies for change.

Next, the results can be used as a performance measure to assess the success of safety improvement efforts. Specifically, when implementing a behavior-focused safety improvement process, care and attention must be paid to employees' perceptions about safety and their opinions about the behavior-change processes. Otherwise, if behaviors change without subsequent attitude change, the change is likely to be short term and limited in scope. Therefore, repeated administrations of the SCS can help determine if the behavior-change interventions are occurring in a way which leads to the attitude change needed for long-term continuous improvement.

Comparisons across positions within a single organization and between an organization and the norm (i.e., the average of other sites having taken the survey) can suggest targets for improvement or areas where attention and support should be focused. Accordingly, this report compares data from distinct demographic classifications within the organization.

Overview of the Survey

The SCS incorporates four separate scales, each measuring a unique component of employee health and safety.

Safety Perception Scale. The Safety Perception Scale assesses employees' perceptions and opinions regarding how strongly they believe they and others within the organization support safety. In particular, it addresses perceived *management* support for safety, *peer* (e.g., coworker) support for safety, and *personal responsibility* for safety.

Safety Management System Scale. The Safety Management Systems Scale measures employee perceptions of many formal safety management systems including: discipline; incident reporting and investigation; safety rules and procedures; safety training; safety communications; safety suggestions; rewards and reinforcement; and hazard identification and correction. In addition, it also asks for employees' opinions about the company's overall safety performance, the effects of stress, drugs, and alcohol on safety, and the level of employee involvement in safety efforts.

Actively Caring Scale. Actively caring behaviors are those behaviors which directly or indirectly impact the safety of others. For each actively caring behavior addressed on the survey (e.g., cautioning another employee when observing him or her performing an at-risk behavior), three separate questions are asked: a) if they felt employees *should* perform the specific behavior (e.g., "Employees should caution their coworkers when they are observed working unsafely"), b) if they are *willing* to perform the behavior (e.g., "I am willing to caution my coworkers about working unsafely"), and c) if they often *do* perform the behavior (e.g., "When I see a coworker working unsafely, I caution him/her").

Person Factor Scale. When individuals feel good about themselves, their work teams, and the organization as a whole, they are more likely to go out of their way to assist others (i.e., to actively care). Therefore, person factors (i.e., expectancies or mood states) influence people's safety-related behaviors and their willingness to intervene on behalf of another person's safety. In particular, five person factors have been shown to be predictive of actively caring behavior: self-esteem, belonging, personal control, optimism, and self-efficacy (Geller, 2001; Geller *et al.*, 1996). The Person Factors Scale measures these five different person states.

Interpreting the Results

Respondents were asked to respond to the survey items according to a five-point Likert scale of: (1) Highly Disagree, (2) Disagree, (3) Neither Agree nor Disagree, (4) Agree, and (5) Highly Agree. A higher response value generally represented a favorable opinion, although there are several reverse-scored items in which agreement with the statement would be undesirable. Scores on these items were reversed accordingly prior to analysis.

This report graphically illustrates the responses (graphs for each question can be found in Appendix H), overall and by demographic categorization, to each survey scale. Overall responses for each scale (e.g., management support for safety, behavior-focused actively caring, self-esteem) was computed by taking the mean of all the questions making up that scale. The graphs depict the percentage of respondents who agree (responses of 4 and 5 combined), neither agree nor disagree (response of 3), or who disagree (responses of 1 and 2 combined) with the questions of the particular scale.

In addition to graphically illustrating the responses to each survey scale, the response patterns for each survey item are also shown in Appendix H, with the exception of the items making up the Person Factors Scale, which is meant to be interpreted by subscale only, not by individual items. As before, the graphs for each item depict the percentage of respondents who agree (responses of 4 and 5 combined), neither agree nor disagree (response of 3), or who disagree (responses of 1 and 2 combined) with the individual survey question.

About the Norm

As mentioned previously, this report provides data from current respondents as well as data from over 35,000 respondents from nearly 100 organizations who have administered the survey in **recent years** (i.e., the norm). Comparing a particular organization's results with the norms can be a useful exercise but must be done with care.

As mentioned, the organizations comprising this database are not necessarily representative of industry in general. Rather, most tend to have somewhat advanced safety management systems and above average safety performance when compared to peer organizations within their industries. In addition, a large portion of the represented companies are from traditionally high-hazard industries. In particular, organizations from the chemical, oil and gas, pulp and paper, and automotive industries make up a large portion of the database. One might expect that because of the differences in which safety is managed in these versus less hazardous industries, employee perceptions may be quite different. As a result, organizations which fall within these or similarly hazardous industries are comparing themselves against similar situations. Organizations within traditionally less hazardous industries, on the other hand, may see differences in employee perceptions.

Keep in mind also that the survey measures perceptions. Employee perceptions are influenced by many factors, including current practices, past practices and, levels of expectations. Differences seen between two organizations may be due to any number of factors. However, it is important to understand employee perceptions at a target site, and to work continuously to improve relevant safety-related perceptions, given the important contribution employee beliefs and attitudes have on an organization's safety performance.

Finally, comparisons with the norm are made to provide a reference point only. Scores falling at or above the norm do not necessarily indicate areas not needing attention and performance improvement. Rather, in many cases it may simply suggest that an organization is experiencing problems common to other organizations.

Interview/Focus Group Comments

Before the Safety Culture Survey was administered, all miners participated in a structured, yet open-ended, interview process. Managers were politely asked to leave so employees would feel comfortable speaking their mind without fear of repercussion. Participants were encouraged to speak on any topic they wished, as well as provide answers to the structured questions listed below.

In some sections a discussion outlining miners' statements made during an interview process is presented. These responses are discussed when they conflict with the survey results, or help explain why respondents answered the questions in a particular way. Though each employee (n=345) at each site was included in the interview process, not all workers made comments during this time. All participants at each site were asked (by the trainers) the following structured questions:

- What are some past safety programs used in the organization?
- What are your attitudes toward current and past safety programs?
- What changes in the organization (specific to safety) would you like to see?
- What is management's commitment to safety?

- How would you feel if a coworker gave you feedback on your safe or at-risk behaviors?
- What safety issues are pertinent to your plant and your coworkers?

Results of the Survey

On the following page is a breakdown of the survey respondents by position: a) preparation (Prep)-employees involved in the processing of the raw coal for transportation, b) production (Prod)-employees involved in loading the coal and transporting the coal off site, c) maintenance (Maint)-employees involved in repair and upkeep of the plant, and d) salary (Salary)-management personnel involved in running the day to day activities of the plant (e.g., administration, accounting, payroll and, human resources).

A. Survey Description

The Safety Culture Survey was administered to site personnel (Prep, Prod, Maint, and Salary) in February 1999 and includes 132 items designed to assess perceptions about a site’s safety culture. Respondents selected one of five responses for each item, ranging from ‘Highly Agree’, ‘Agree’, ‘Not Sure’, ‘Disagree’, to ‘Highly Disagree’. The survey measures management support, peer support, and personal responsibility for safety, support for existing safety management systems, actively caring behaviors, and actively caring person factors predictive of an individual’s willingness to go beyond the call of duty for a coworker’s safety.

B. Survey Respondents

A total of 351 surveys were received and examined. Six returned surveys were discarded due to respondents failing to complete 10 or more survey items. Of the surveys discarded, 1 was Prep, 1 was Prod, 1 was Maint, 2 were Salary, and 1 did not provide demographic information. Table 2 indicates the number of employees in each group and their percentage relative to all employees given the SCS.

Groups	Discards	Count	% of Total
Prep	1	28	8.1
Prod	1	192	55.7
Maint	1	74	21.4
Salary	2	51	14.8
Total	6	345	100%

Table 2. Distribution of SCS Respondents

C. Survey Results at a Glance

Overall Results

Table 3, shown on the following page, displays how the mining site as a whole compared to the industrial norms for the Safety Culture Survey Scales (e.g., Mining scored similar to the norm on Management Support for Safety). Table 3 also displays how groups compared to the Site average. Example: Prep scored similar to the site average for Management Support for Safety, but below the site average for Peer Support for Safety.

	Mgt.	Peer	Pers	Safety	AC	AC
--	------	------	------	--------	----	----

Groups	Support	Support	Resp	Mgt. Sys	Beh	Factors
Cordero vs. Norm	λ	σ	σ	τ	σ	σ
Prep vs. Site Avg.	λ	τ	τ	τ	τ	σ
Production vs. Site	λ	λ	λ	λ	λ	λ
Maintenance vs. Site	τ	λ	λ	τ	λ	λ
Salary vs. Site	σ	σ	σ	σ	σ	σ

[σ = Above Industrial Norm/Avg., λ = Similar to Industrial Norm/Avg., τ = Below Industrial Norm/Avg.]

Table 3. Overall Safety Culture Survey Results

Safety Management Systems Results

Table 4 displays how the mining site compared to the industrial norm for Safety Management Systems (e.g., σ = site scored above the norm on Safety Performance).

Survey Sub-Scale	# Of Items	Appendix Page	Site vs. Norm
Safety Performance	6	51	σ
Stress, Drugs, and Alcohol	3	57	τ
Discipline	5	60	σ
Incident Reporting and Investigation	9	65	σ
Rules and Regulations	4	74	σ
Training	5	78	λ
Communication	5	83	λ
Safety Suggestions	3	88	σ
Rewards and Recognition	4	91	λ
Hazard Identification and Correction	4	95	σ
Employee Involvement	3	99	τ
Other	2	102	λ

Table 4. Safety Management Systems Results

Actively Caring Person Factors Results

Table 5 displays how site compared to the industrial norm for Actively Caring Person Factors (e.g., σ = site scored above the industrial norm on Self-Esteem).

Survey Scale	# Of Items	Appendix Page	Site vs. Norm
Self-Esteem	6	132	σ
Optimism	6	133	σ
Self-Efficacy	5	134	σ
Personal Control	6	135	σ
Belonging	7	136	σ

[σ = Above Norm, λ = Similar to Norm, τ = Below Norm]

Table 5. Overall Actively Caring Person Factors Results

D. Interpretation Tips

- Scores differing by greater than 3 percentage points are considered significantly different (e.g., 54% is ‘equal’ to 51% or 57%, but significantly different than either 50% or 58%).
- When comparing scores from different groups, examine all three response categories. While two groups could have similar ‘percent agree’ scores, they could have very different ‘percent disagree’ scores, thus changing the interpretation of the data.
- ‘Not Sure’ as a response could indicate an uncertain response, but could also indicate an ‘it depends on the circumstances’ response (e.g., “sometimes yes, sometimes no”).
- Scale graphs are calculated by averaging all respondents’ average scores (e.g., I rate peers high on one item but low on a second item. While each facet of peer support is rated differently, the average of my two responses regarding peer support look like a ‘Not Sure’—the high and low rating cancel each other).

E. Summary Analysis

1. Management Support for Safety (Overall score: λ)

Description

This scale measures respondents’ perceptions about how well management fulfills its responsibilities for safety. Scores indicate whether respondents believe management is

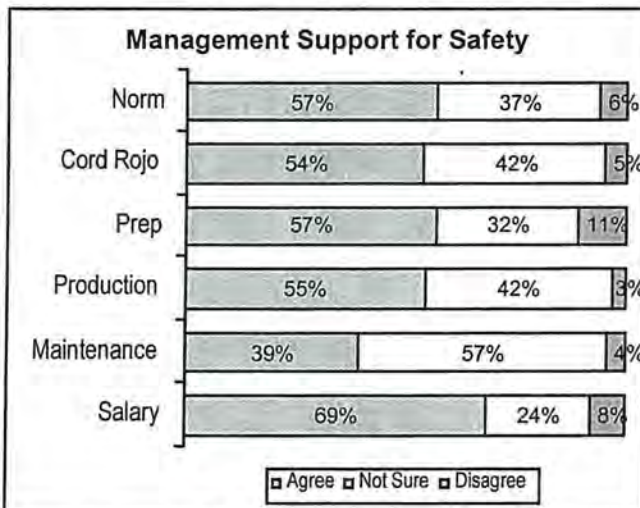


Figure 8. Overall Results at Cordero for Management Support for Safety

performing the necessary activities to support safety, and often predict the likely success of new safety initiatives. The importance of management support to the over-all safety culture cannot be over emphasized. Managers must believe employee safety is of paramount concern, one that should never be compromised. They must consistently demonstrate that concern through their own practices, as well as through their formal decisions. Unless employees believe safety is indeed a shared organizational value, they will be less willing to contribute extra effort to safety improvement initiatives, and will be more likely to succumb to the natural and imposed pressure to circumvent safe work

practices. Figure 8 displays overall results at Cordero for management support for safety.

Summary

- The overall score at Cordero was similar to the norm for Management Support for Safety.
- Salaried respondents rated management support highest, while Maintenance respondents rated management support lowest.
- Highest scoring item (82% overall vs. 76% norm, see Appendix H p. 8):
“Management here seems genuinely interested in reducing injuries.”

- Most positive deviation from the norm (28% overall vs. 36% norm, see Appendix H p. 9):
“Management is more concerned about keeping the injury statistics low than with truly keeping people safe.”
- Lowest scoring item (51% overall vs. 46% norm, see Appendix H, p. 11):
“Production demands do not override senior management’s concern for safety.”
- Most negative deviation from the norm (same as above):
“Production demands do not override senior management’s concern for safety.”

Management Support for Safety Analysis

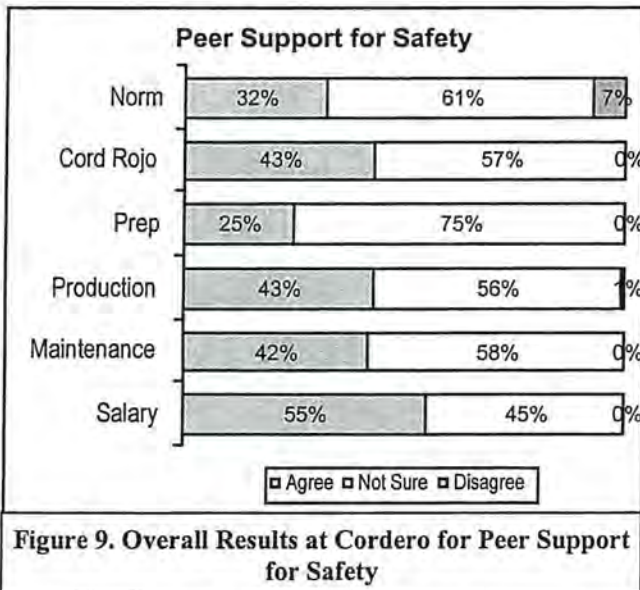
- Site personnel feel management exhibits adequate support for safety.
- Most respondents believed management is sincere in its attempts to reduce injuries.
- A significant minority of both Prep and Maintenance respondents perceived less than adequate management support (e.g., regarding issues such as production overriding safety, management’s willingness to invest money and effort to improve safety, and management being fully informed or aware of safety issues at the site).

2. Peer Support for Safety (Overall score: σ)

Description

This scale measures respondents’ perceptions about how well peers fulfill their responsibilities for safety. Scores indicate whether respondents believe coworkers are

performing the necessary activities to support safety, and could predict the likely success of new safety initiatives. Figure 9 displays overall results at Cordero for peer support for safety.



Summary

- Site’s overall score was above the Norm for Peer Support for Safety. This indicates Site respondents’ collective *perception* about their coworkers’ support for safety is *more favorable* than that of Norm respondents.

- Salaried respondents rated peer support highest, while Prep respondents rated peer support lowest.

- Highest scoring item (81% overall vs. 72%

norm, see Appendix H, p. 29):

“I would be willing to have a coworker observe me in order to give me feedback regarding safe and unsafe behaviors.”

- Most positive deviation from the norm (77% overall vs. 50% norm, see Appendix H, p. 23):
“Employees in my area caution each other about unsafe behaviors.”
- Lowest scoring item (35% overall vs. 42% norm, see Appendix H, p. 26):
“Employees appreciate receiving feedback from their coworkers about their unsafe behaviors.”

- Most negative deviation from the norm (59% overall vs. 66% norm, see Appendix H, p. 24):
“When employees in my area are cautioned about working unsafely, they begin working more safely.”

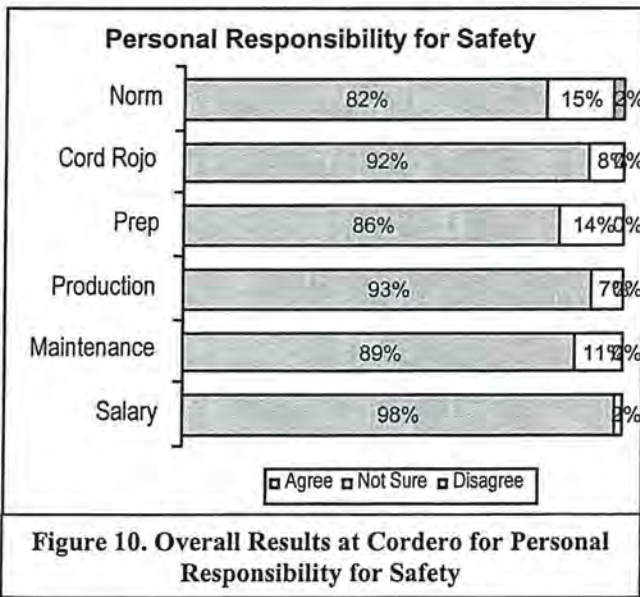
Analysis

- Site personnel possess strong peer support for safety.
- Employees currently give peers feedback about unsafe behaviors, but it doesn’t always bring about changes in behavior.
- For the most part, employees give each other praise for safe behaviors (particularly in Prod) and the recognition is generally appreciated.
- Although ‘short-cuts’ do occur, there is strong support for company safety programs.
- Employees at Site are ready for a structured observation and feedback process (if one does not already exist).

3. Personal Responsibility for Safety (Overall score: σ)

Description

This scale measures respondents’ perceptions about how well they themselves fulfill their responsibilities for safety. Scores indicate whether respondents believe they are performing the necessary activities to support safety, and could predict the likely success of new safety initiatives. Figure 10 displays overall results at Cordero for personal responsibility for safety



Summary

- Site’s overall score was above the norm for Personal Responsibility for Safety.
- Salaried respondents rated personal responsibility for safety highest, while Prep respondents rated personal responsibility for safety lowest.
- The typical pattern observed for this scale is for respondents to rate their own support for safety much higher than either that of management or their peers.
- Highest scoring item (95% overall vs. 91% norm, see Appendix H, p. 40):
“When a safety rule or procedure is followed, I try to follow it as best I can.”

- Most positive deviation from the norm (8% overall vs. 18% norm, see Appendix H, p. 44):
“Besides performing my own job safely, there is little I can do to improve safety.”
- Lowest scoring item (29% overall vs. 25% norm, see Appendix H, p. 41):
“I sometimes overlook hazards to get the job done.”
- Most negative deviation from the norm (82% overall vs. 90% norm, see Appendix H, p. 43):
“I am willing to put forth a little extra effort to improve safety at our site.”

Personal responsibility for safety analysis

- Site personnel possess strong personal responsibility for safety.
- Employees feel obligated to their own safety, but also the safety of others.
- Employees believe and are willing to do other things to improve safety, beyond performing their own jobs safely.
- Significant differences exist between groups as to whether they overlook hazards to complete a job.

4. Safety Management Systems (Overall score: τ)

This scale measures employees' perceptions about how the various management systems influence the culture. Scores could indicate perceptions about the overall design of the system, how faithful site personnel are in using the system, and/or whether or not a particular system even exists. This section highlights a sampling of items receiving favorable (σ) or unfavorable (τ) responses. In some cases, two same scoring items are listed. Figure 11 displays overall results at Cordero for safety management systems.

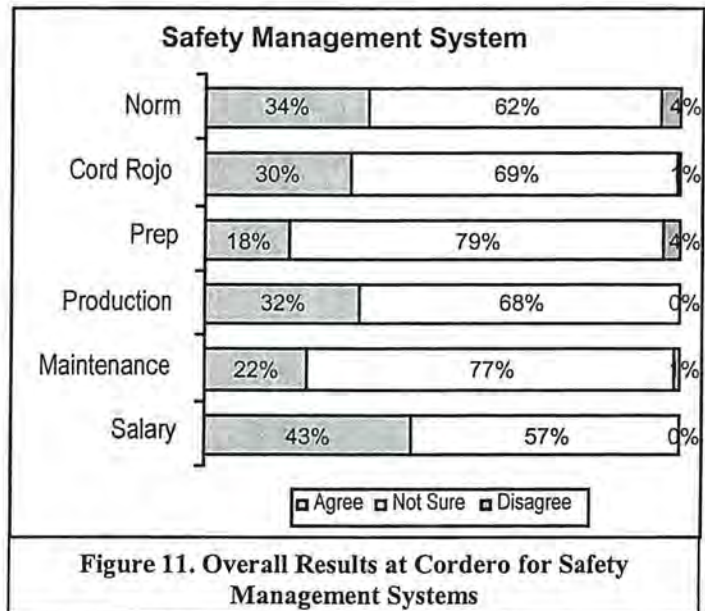


Figure 11. Overall Results at Cordero for Safety Management Systems

Safety Performance

- σ The company's current safety performance is very good.
- σ The company currently spends too much effort on safety.

Communications

- σ Employees are provided information on such things as the type, frequency, cause, and cost of accidents.
- τ Safety rules and procedures are regularly reviewed with employees.

Safety Suggestions

- σ My supervisor asks me what I need to do my job safer.
- λ Employees receive prompt feedback in response to their safety suggestions.

Stress, Drugs, and Alcohol

- σ Alcohol or drug abuse is a problem in my plant.
- τ I believe that stress caused from factors outside of work affects my ability to perform my job safely.

Incident Reporting and Investigations

- σ Management truly wants to know about all incidents and injuries, even if they are minor.

τ Near misses are consistently reported and investigated at our site. See Figure 12 for a display of the overall results at Cordero to this question.

Rules and Regulations

- σ Compliance with safety rules and regulations needlessly slows down my job.
- σ The company has too many rules and regulations governing safety.

Training

- σ When asked to do a new job, I receive adequate training to do it safely.
- τ Information needed to work safely is made available to all employees.

Discipline

- σ Discipline is not used often enough with serious safety violations.
- τ The company uses a consistent procedure for dealing with employees who violate safety rules. See Figure 13 for a display of the overall results at Cordero to this question.

Rewards and Reinforcement

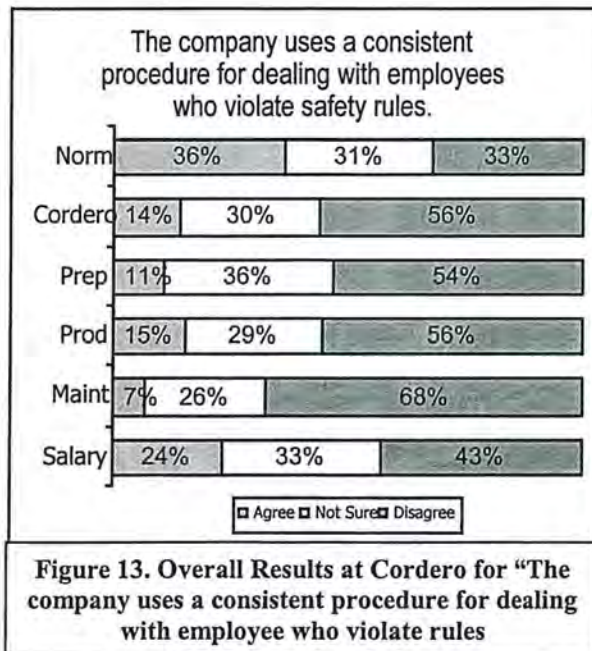
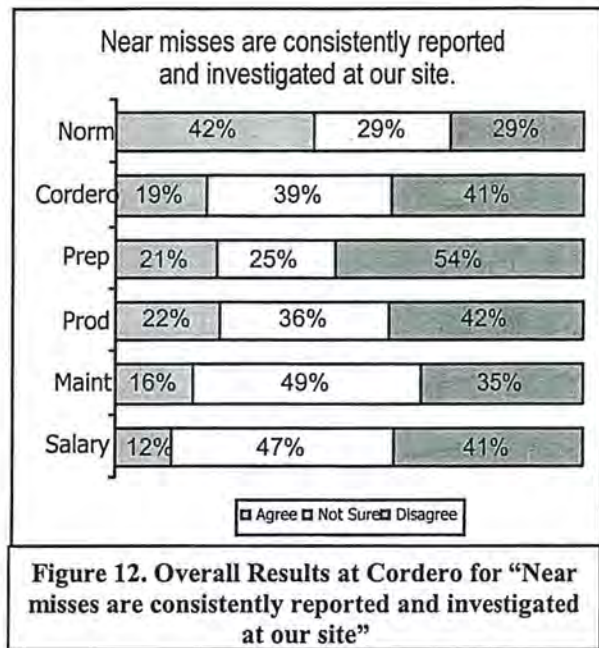
- σ Employees who work safely have a better chance for promotion than those who don't.
- τ First line supervisors acknowledge and/or reward employees for safe behaviors.

Employee Involvement

- λ Employees in my work group participate in defining safe work practices.
- τ Employees participate in inspections for potential hazards.

Safety Meetings and Committees

- λ Safety meetings are effective at making this a safer place to work.
- τ The safety committees' efforts are effective in improving safety.



Hazards Identification and Correction

- σ Employees are encouraged to correct safety problems themselves wherever possible. See Figure 14 for a display of Cordero’s overall results to this question.
- τ Safety audits/inspections are conducted regularly in my work department.

5. Actively Caring Values, Intentions, and Behaviors (Overall score: σ)

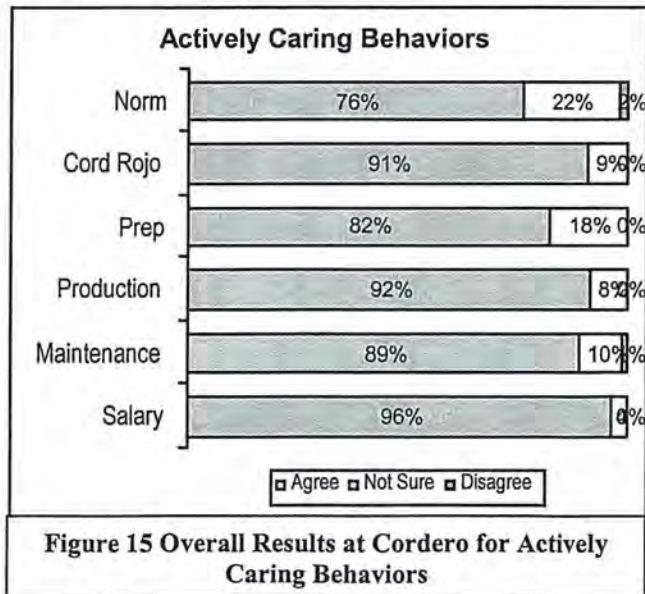
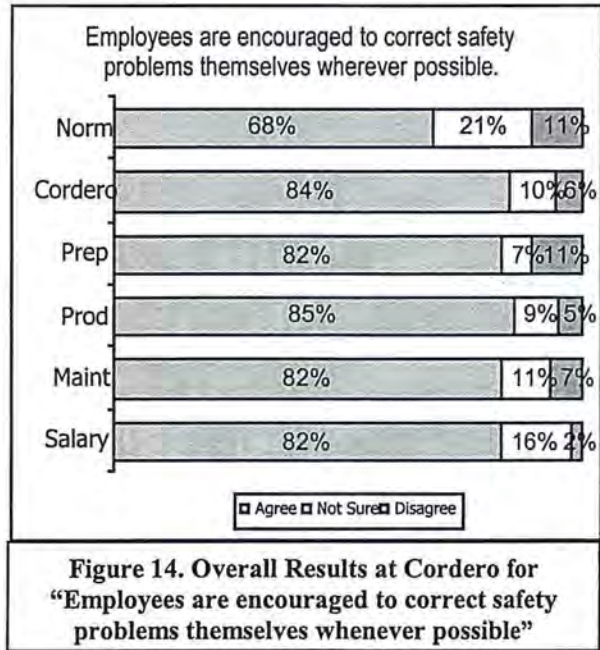
Description

In a Total Safety Culture, employees not only feel a sense of responsibility for their own safety, they also feel a sense of responsibility of the safety of others. Further, individuals are willing and able to act on that feeling of responsibility by “going beyond the call of duty” for the safety of a coworker. That is, they routinely actively care for the safety of others by performing behaviors, which will directly or indirectly influence the safety of others. Actively caring may be demonstrated through a variety of behaviors such as offering to assist a coworker lift a heavy load, performing housekeeping duties other than those assigned directly to you, cautioning a coworker about a potentially risky behavior, or recognizing coworkers for their safe work practices. This scale measures respondents’ intentions, attitudes, and reported behaviors

toward performing actively caring behaviors for fellow employees. For each issue addressed, three separate items were asked (all items are listed below). Respondents are asked 1) if they feel employees *should* perform the specific behavior, 2) if they are *willing* to perform the behavior, and 3) if they currently *do* perform the behavior. Figure 15 displays overall results at Cordero for actively caring behaviors.

Summary

- Site’s overall score was significantly above the norm for actively caring behaviors. This indicates Cordero respondents’ collective *perception* about their own support for safety is much *more favorable* than that of Norm respondents.
- Salaried respondents reported the highest ratings of actively caring behaviors, while Prep respondents reported the lowest ratings of actively caring behaviors.
- Highest scoring item (96% overall vs. 86% norm, see Appendix H, p. 112): “Employees should caution their coworkers when they are observed working unsafely.”



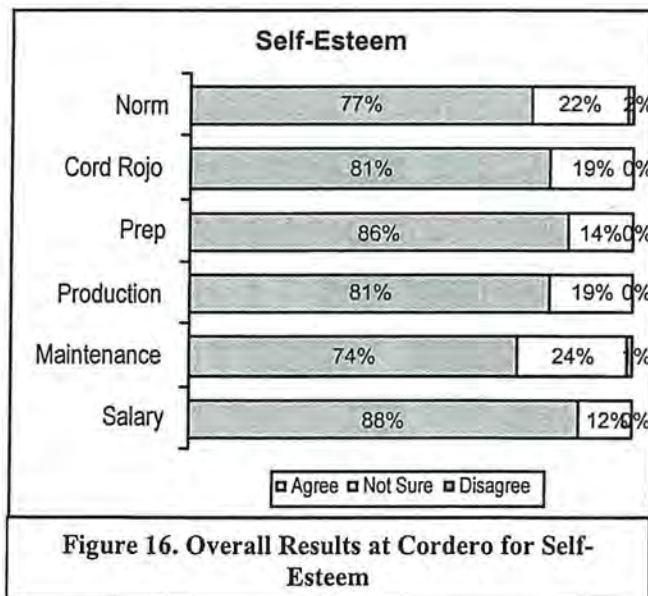
- Most positive deviation from the norm (93% overall vs. 78% norm, see Appendix H, p. 122):
“When I see a potential safety hazard, I correct it myself if possible.”
- Lowest scoring item (67% overall vs. 82% norm, see Appendix H, p. 114):
“When I see a coworker working safely, I praise him/her.”
- Most negative deviation from the norm:
None—all Site responses were at or above the Norm within this scale.

Actively caring analysis

- Site personnel actively care for each other’s welfare and safety (even the lowest scoring group scored several points higher than the norm).
- Cordero employees displayed the same pattern as the norm. High agreement to “Should...” and “Willing...” statements, but much lower agreement on “Do...” statements. This means Cordero employees have the ‘right’ values for safety and are willing to help others, but don’t demonstrate that help as much as they say they should.
- Critical safety-related feedback occurs often between Cordero personnel. This is a highly desirable component of a well-functioning safety culture.

6. Actively Caring Person Factors (Overall score: σ)

An individual’s likelihood to demonstrate actively caring behaviors is influenced by several characteristics. Research shows that five key factors (self-esteem, belonging, personal control, self-efficacy, and optimism) influence an individual’s willingness to become actively involved in safety improvement efforts.



Self-esteem (81% overall vs. 77% norm) is the general evaluation of self worth an individual makes about him- or herself. This evaluation indicates the extent to which a person feels capable, significant, important, and valuable. Individuals who possess feelings of self-worth, are more likely to help others since they feel their help is worthwhile. When individuals do not feel valuable, they are unlikely to feel they have anything valuable to offer others, and hence are not likely to intervene on behalf of someone else’s safety. **Strategies for increasing self-esteem** include: giving praise for high performance (or close approximations of

the desired behavior), being an active listener, asking others for their input, asking others for their opinion, giving tactful, actively caring feedback about others’ at-risk behaviors, and unexpectedly helping others with their work. Figure 16 displays overall results at Cordero for self-esteem.

Self-efficacy (60% overall vs. 57% norm) relates to one’s judgments of personal competence and skill levels in dealing with the situations around them. Those high in self-

efficacy are more likely to attempt new behaviors, exert more effort, and persist in the face of adversity. Individuals high in self-efficacy are also less likely to relinquish responsibility to others (“I better fix that hazard because someone else won’t”) or use the reactions of others to interpret events (“If it’s the right process, I’ll give it my support regardless of what I see others doing”). Feelings of self-efficacy require both knowledge (education) and some successful experiences from which to base personal confidence. **Strategies for increasing self-efficacy** include: giving praise for high performance (or close approximations), providing needed information to others prior to exposing them to new situations, providing adequate training for work and safety performance, and asking others to teach you a particular skill. Figure 17 displays overall results at Cordero for self-efficacy.

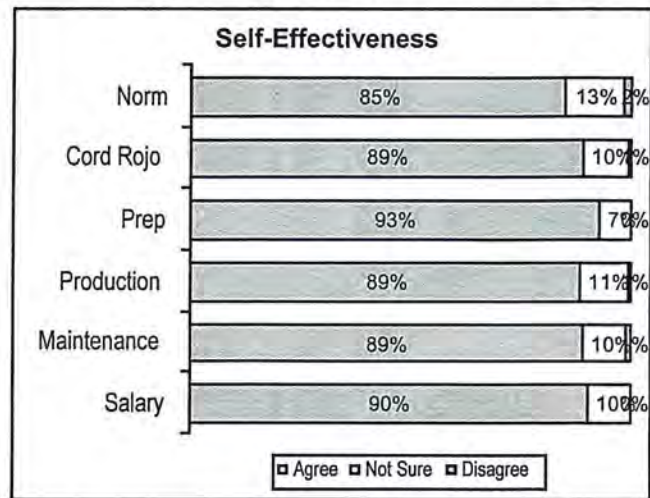


Figure 17. Overall Results at Cordero for Self-Efficacy

Optimism (68% overall vs. 57% norm) is a learned expectation that things will go well and the anticipation of positive outcomes from our actions. Those high in optimism are more likely to demonstrate actively caring behaviors because they believe their assistance will actually lead to improvements. Those low in optimism assume their actions will not result in desired changes and thus, may not even attempt to perform desirable behaviors (e.g., give others feedback about at-risk behaviors). **Strategies for increasing optimism** include: giving praise for high performance (or close approximations), pointing out how individual or team effort led to desired outcomes, highlighting past successes of the individual or team, and discussing how attitude can influence one’s interpretation of events (e.g., if we look for the positive, we are more likely to find it). Figure 18 displays overall results at Cordero for optimism.

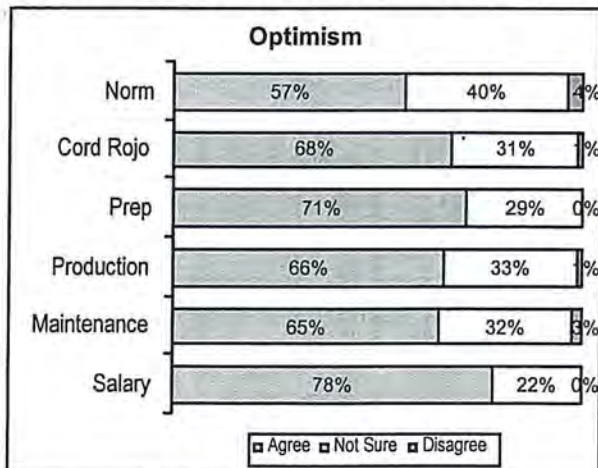


Figure 18. Overall Results at Cordero for Optimism

the location of control in a person’s life. Those with an *internal locus of control* feel as if they have direct personal control over the things that happen to them, through their knowledge, skills,

Personal Control (84% overall vs. 70% norm) refers to a general expectancy regarding

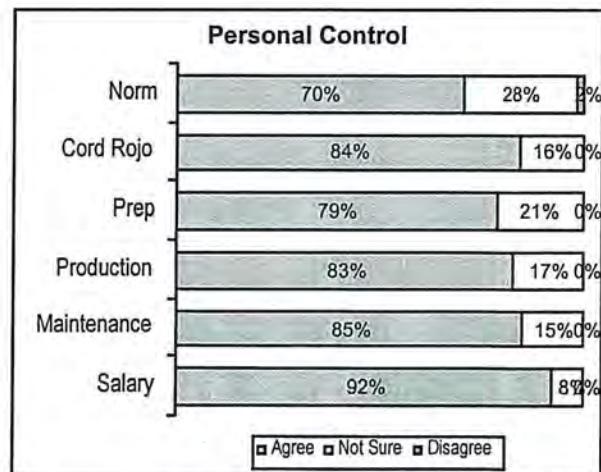


Figure 19. Overall Results at Cordero for Personal Control

and abilities. In contrast, persons with an *external locus of control* believe things like chance, luck or fate play important roles in their lives. Those high in personal control are more likely to intervene to assist others because they believe they can influence future outcomes through their behaviors. **Strategies for increasing** personal control include: giving praise for high performance (or close approximations), pointing out how individual or team effort led to desired outcomes, highlighting past successes of the individual or team, and provide individuals with the necessary authority to support their responsibilities. Figure 19, shown on the previous page, displays overall results at Cordero for personal control.

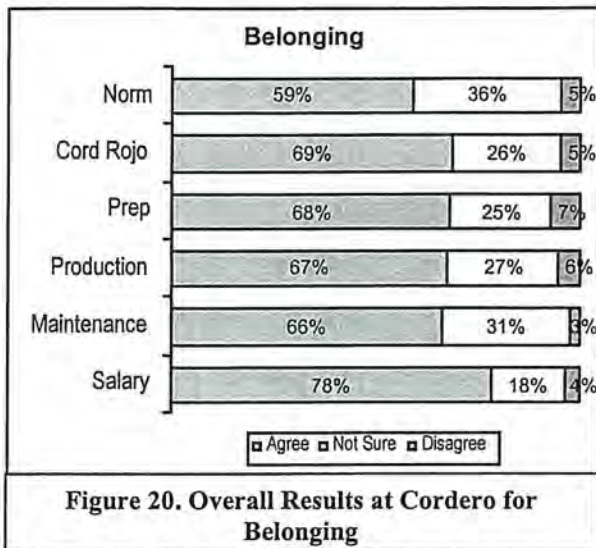


Figure 20. Overall Results at Cordero for Belonging

Belonging (69% overall vs. 59% norm) or cohesion refers to the feeling of solidarity or closeness with a group. Five main consequences result from a strong sense of group cohesion: 1) high quantity and quality of communication, 2) high member loyalty and satisfaction, 3) enforcement of group norms, 4) increased directing and focusing of group goals, and 5) a strong group culture, including special behavioral routines. Furthermore, group members are not only more likely to help individuals who they feel are part of their group, but are more likely to help outsiders. **Strategies for increasing** belonging include: having a common purpose or mission, team ownership of

team activities, giving praise when safety or performance goals are achieved (or come quite close), engaging in group-oriented activities such as work-related celebrations or social gatherings, and providing feedback to team members for safety-related behaviors. Figure 20 displays overall result at Cordero for belonging.

F. Recommendations

- Site should establish (if one does not already exist) a committee composed of a diagonal cross-section of site personnel to further review SCS results:
 - Review issues on which Cordero scored favorably (e.g., Peer Support for Safety) and look for ways to maintain or improve those areas receiving favorable ratings;
 - Review issues on which Cordero scored similar to, or below, the norm (e.g., Management Support for Safety and Safety Management Systems, respectively) and look for ways to improve those areas where employee perceptions are not as favorable.
- As part of this safety culture improvement effort, SCS results should be discussed in upcoming safety meetings to share positive results and identify improvement opportunities within the culture.
- Cordero scored above the norm on the majority of Safety Management Systems. For those systems scoring similar to, or below, the norm, this joint committee should gather additional information to determine where discrepancies exist.
 - For example, review disciplinary data and procedures to determine the actual number of injuries resulting in discipline. Interview employees to assess why the perception exists

that injured employees receive discipline. Review discipline procedures to determine if the system itself can be refined to remove aversive, redundant, or unnecessary steps.

- Initiate discussions with personnel from responding groups to determine why differing responses were observed for certain issues. Wage (i.e., Prod, Maint, & Prep) vs. Salaried differences are common, but sharing information about why certain groups responded in certain ways can reveal opportunities for improvement within the culture. Discussions should not focus on 'placing blame,' but on addressing perceived deficiencies.
- Cordero should take advantage of actively caring attitudes and behaviors that presently exist. Continue to support and encourage formal and informal interactions between site personnel regarding safe and at-risk behaviors (e.g., praise for safe behaviors, tactful corrective feedback for at-risk behaviors, more discussions about safety activities and less emphasis on the safety statistics, stressing the reason we give feedback is to help others remain safe).

STUDY 4: Safety Culture Survey Results for All Experimental Sites

Participant Breakdown for the Survey

Please refer to Study 3 for further description of the Safety Culture Survey (SCS) or information regarding interpretation of results. Table 6 displays a breakdown of the survey respondents by mining site. Stone Quarry A (SQ-A)-located in southwestern Virginia, is an above-ground mine manufacturing stone aggregates. Stone Quarry B (SQ-B)-located in northern Virginia, is an above-ground mine manufacturing stone aggregates. Coal Processing Plant (CPP)-located in southeastern West Virginia, processing coal for distribution to other sites. Underground Coal Mine (UCM)-located in southeastern West Virginia, is a below-ground coal mine manufacturing raw coal.

<u>Company</u>	<u>Number</u>	<u>% of Total</u>
SQ-A (2 sites)	31	24.6%
SQ-B (2 sites)	33	26.2%
CPP (1 site)	13	10.3%
UCM (1 site)	49	38.9%
Total	126	100.0%

Table 6. Number of Mining Surveys Completed per Mining Site

A total of four returned surveys were discarded because the respondents failed to complete 14 or more survey items (>10%). Of these, 2 were from Stone Quarry A and 2 were from Coal Mine A.

Summary of Results

Management Support for Safety (across all sites)

- Perceived management support for safety was slightly above the norm (52% overall vs. 47% norm)¹.
- Employees generally feel that management was more concerned about injury statistics than truly keeping employees safe (41% overall vs. 35% norm).
- Employees were slightly more willing to stop a job if a safety hazard has been identified compared to the norm (76% overall vs. 70% norm).
- Management was perceived to be below the norm in its willingness to invest money and efforts to improve safety (54% overall vs. 63% norm).
- Management was well below the norm regarding its ability to understand “real” safety issues within a plant (16% overall vs. 28% norm).

Peer Support for Safety (across all sites)

- Peer support for safety was slightly above the norm (41% overall vs. 37% norm).

¹ Percentages reflect the overall agreement to a question or category.

- Employees were more willing to caution each other about at-risk behaviors compared to the norm (79% overall vs. 69% norm).
- Employees were above the norm in their appreciation of receiving feedback from their peers about their safety-related work behavior (58% overall vs. 39% norm).
- Employees were above the norm in their "unwillingness to be comfortable if their work practices were observed and recorded by a coworker (44% overall vs. 38% norm)."
- Some reported "short-cutting" safe work practices (33% overall vs. 31% norm). Many suggested pressure to do so comes from their peers (25% overall vs. 15% norm).
- Employees were slightly below the norm in their support of the company's safety programs (61% overall vs. 68% norm).

Personal Responsibility for Safety (across all sites)

- Personal responsibility for safety was slightly below the norm (70% overall vs. 78% norm).
- Employees' willingness to follow safety procedures was slightly below the norm (83% overall vs. 87% norm).
- Employees' willingness to overlook hazards was slightly above the norm (39% overall vs. 24% norm).
- Workers were slightly more inclined than the norm to believe "there is little they can do to improve safety, other than their own job" (24% overall vs. 17% norm).

Safety Management Systems (across all sites)

Miners responded to the following systems more favorably than the norm:

- Hazard identification and elimination (71% overall vs. 46% norm).
- Rules and regulations (79% overall vs. 48% norm).
- Rewards for safety performance (40% overall vs. 14% norm).
- Safety suggestions (48% overall vs. 35% norm).
- Training (66% overall vs. 55% norm).
- Employee involvement (59% overall vs. 48% norm).
- Safety communication (49% overall vs. 40% norm).

Actively Caring (across all sites)

- Employee's propensity to actively caring was similar to the norm.
- The typical decreasing patterns between "should" (80% overall vs. 78% norm), "willing" (78% overall vs. 79% norm), and "do" (71% overall vs. 68% norm) existed for all groups.
- Large differences between "should", "willing", and "do" existed for the following questions:
 - ... praise others for working safe (79%-56% range).
 - ... observing the work practices of their coworkers in order to provide them with safety-related feedback (78%-67% range).
 - ... do other things besides working safely to improve workplace safety (87%-74% range).
- Small differences between "should", "willing", and "do" existed for the following questions:

- ... cautioning coworkers about working safely (83%-78% range).
- ... correcting potential safety hazards when possible (79%-74% range).
- ...trying to make a coworker feel better when their depressed (77%-72% range).

Actively Caring Person Factors (across all sites)

- Similar to the norm on self-esteem (77% overall vs. 79% norm).
- Less than the norm on optimism (53% overall vs. 62% norm).
- Less than the norm on self-efficacy (74% overall vs. 85% norm).
- More than the norm on personal control (75% vs. 66%).
- More than the norm on belonging (75% overall vs. 60% norm).

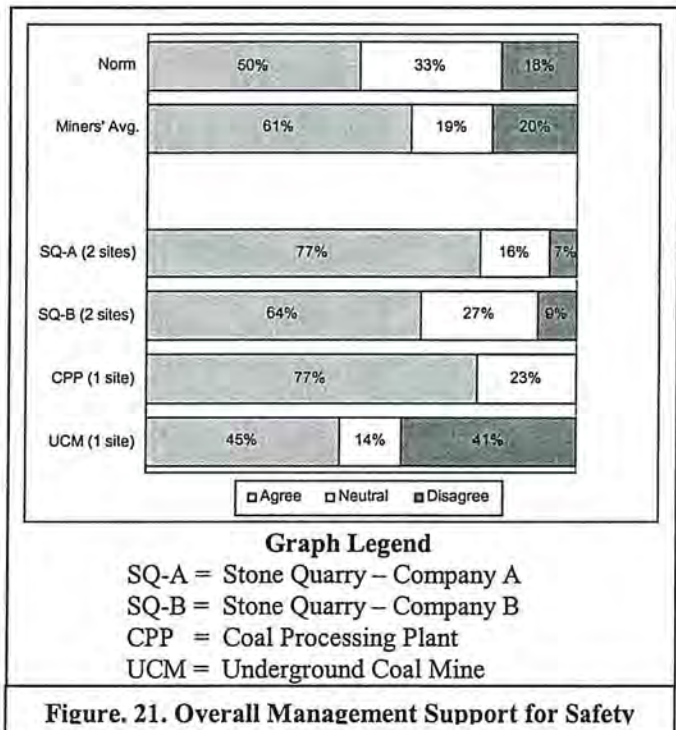
Safety Perception Scale

The Safety Perception Scale assesses employees’ perceptions and opinions regarding how strongly they believe they and others within the organization support safety. In particular, it addresses perceived *management* support for safety, *peer* or coworker support for safety, and *personal responsibility* for safety. Each subscale is described separately.

Management Support for Safety

The Management Support for Safety Scale assesses whether employees feel the actions and attitudes of management are supportive to building and maintaining a Total Safety Culture. Specific survey items are listed below:

- Management here seems genuinely interested in reducing injuries.
- Management is more concerned about keeping the injury statistics low than with truly keeping people safe.
- At my workplace, work productivity and quality usually have a higher priority than work safety.
- Production demands do not override supervisors’ concern for safety.
- Production demands do not override senior management’s concern for safety.
- Supervisors sometimes encourage employees to overlook hazards to get the job done.
- I have never been forced to perform a task which I said I thought was unsafe.
- I am encouraged to stop a job if a safety hazard is identified.
- Management is willing to invest money and effort to improve our safety performance.
- When told about safety hazards, my immediate supervisor is appreciative and tries to correct them quickly.
- My immediate supervisor is well informed about relevant safety issues.



- Management does not fully understand the real safety issues within the plant.

Mining Results

As depicted in Figure 21 on the previous page, respondents perceived more overall management support for safety, somewhat more favorable than the norm (61% overall vs. 50% norm). Responses were quite variable among the sites surveyed. The UCM (45%) subgroup was slightly below the norm with regard to management support for safety. Interestingly, the CPP (77%), SQ-A (77%), and SQ-B (64%) sites overall responses were much more positive than the miners' overall average.

In examining individual questions within this scale, a great deal of variability is evident for each subgroup. That is, at each site, responses on some items were quite favorable, while unfavorable on others. As shown in the lower portion of Figure 21, the UCM site pulls the overall average down on most of the safety questions. The SQ-A, SQ-B, and CPP sites were well above the norm on many of the safety management support questions. For example, on the item "At my workplace, work productivity and quality usually have a higher priority than work safety" (p.5 in Appendix I), SQ-B and CPP (18% & 23% respectively vs. 31% norm) responded more favorably than the norm, SQ-A (32%) was equal to the norm, and the UCM (49%) site was well above the norm. Even more discrepancies between these sites were demonstrated by the responses to the item "Supervisors sometimes encourage employees to overlook hazards to get the job done" (p.8 in Appendix I). The SQ-A, SQ-B, and CPP sites (13%, 3%, & 0% respectively vs. 19% norm) were all well below the norm, while the UCM (41%) site was more than twice the norm.

Interview comments support these survey results. An overwhelming majority of the individuals interviewed felt strongly that while safety is often a primary concern of managers, it quickly takes a back seat when production is at stake. Interviewees readily gave examples of employees knowingly taking short cuts to save time. And although no one suggested managers direct them to violate safety rules, many miners believe managers and supervisors are aware such practices routinely take place, but choose to pretend otherwise. Further, several provided examples of employees being praised for completing tasks within a certain time period, even though they had to violate safety rules to do so. They went on to suggest that in many cases, supervisors and managers knew at-risk short cuts had been taken.

On the other hand, most miners were complimentary of the handling of hazards identified within the work environment. With a few notable exceptions, those interviewed felt management is quick to resolve identified hazards. One common complaint, however, was the lack of feedback to the initiator of a safety suggestion regarding its status if not addressed immediately.

Conclusions

Where response patterns indicate lower than acceptable levels of perceived management support for safety, two underlying causes are common. First, the issue may be one of communication rather than of a true lack of management commitment. Second, despite their best intentions, managers may, in fact, send contradictory messages.

Because miners are often far removed from the day-to-day decisions being made by management, their experience of management's consideration of safety issues may be limited.

Without effective communications systems in place, many management decisions and actions positively impacting safety are never known or realized by employees. Conversely, the rationale for decisions, which may appear to not take safety into account, are not understood. An extra effort should be made to “publicize” safety initiatives to the workforce. The employees need to be aware of the safety improvement efforts being championed, and the rationale behind decisions made. This enables them to realize management’s commitment to improving safety.

To further increase the visibility of management support for safety among the hourly employees, organizations should continue to emphasize their traditional initiatives, taking special care to ensure the efforts are communicated and understood by the miners. These may include providing quick follow-up and/or feedback to environmental hazards identified (see Hazards Identification and Correction subscale), redesigning ineffective safety training courses (see Training subscale), and giving employees opportunities to express their safety concerns (see Safety Suggestions subscale). Of course, anytime employee input is sought, it is essential to have a process in place for providing prompt feedback and follow-up.

Managers may also send mixed messages through their design of formal management systems. For example, since companies are frequently ranked according to their OSHA recordables and lost-time injuries, managers often emphasize lowering these numbers in their communication to employees, perhaps even offering safety awards to employees for fewer injuries. With such emphasis on the *injury statistics*, employees often indicate they believe management is more concerned about keeping the injury statistics low than with *truly* keeping people safe. Principles of behavioral psychology should be used to design more effective incentive programs which do not undermine the true intent. Other safety management systems (e.g., incident reporting and investigation processes, discipline) should be examined also (see Safety Management Systems Scale) to determine if their designs are ineffective and thereby degrading employee’s perceptions of management’s true commitment to safety.

Finally, it should be acknowledged that many miners are simply not in a position to have the systems perspective necessary to understand and appreciate the decisions which may appear to be inconsistent with safety. Though more effective communication and sound management practices will help, these individuals may never fully appreciate the degree of support their management has for safety.

Peer Support for Safety

The Peer Support for Safety Scale assesses employees’ perceptions and opinions regarding how strongly they believe their peers or coworkers support safety. The specific survey items are as follows:

- Employees in my work area caution each other about unsafe behaviors.
- When employees in my work area are cautioned about working unsafely, they begin working more safely.
- Employees appreciate receiving feedback from their coworkers about their safe behaviors.
- Employees appreciate receiving feedback from their coworkers about their unsafe behaviors.
- If I approach my coworkers about their unsafe behaviors, they will react negatively.
- Employees in my work group recognize each other for working safely.
- I would be willing to have a coworker observe me while I work in order to give me feedback regarding safe and unsafe behaviors observed.

- Most employees in my group would not feel comfortable if their work practices were observed and recorded by a coworker.
- Employees do not like it when coworkers bypass safety policy, even when no harm is done.
- I feel pressure from my coworkers to “short-cut” safe work practices.
- Employee’s here often “short-cut” safe work practices.
- Most of my coworkers actively support the company’s safety programs.

Mining Results

As depicted in Figure 22, the overall scores for peer support for safety were marginally higher than the norm, with 41% of all respondents showing an overall satisfied impression (vs. 37% norm), and only 2% showing an overall dissatisfied impression (vs. 3% norm). Because of the wider range of questions contained in this scale, a larger portion of respondents’ overall scores generally falls within the middle, or “neutral/not sure” range, as is the case illustrated in Figure 22.

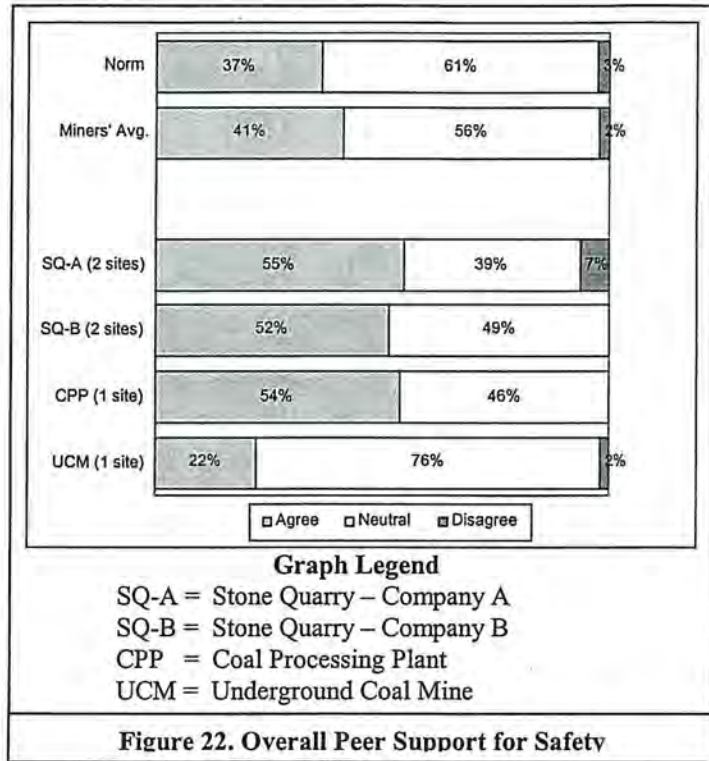
Many of the questions in this section focus on the issue of peer feedback. For these items, miners responses were generally quite favorable. A large portion of miners indicated that coworkers in their area

“caution one another about unsafe behaviors” (79% overall vs. 69% norm). Although a significantly smaller number report recognizing one another for working safely (62% overall), this response is still higher than the norm of 60% (see p.17-18 in Appendix I)

Some employees stated that they appreciate receiving feedback from their coworkers about their safe behavior (46% overall vs. 44% norm), but more employees appreciate receiving feedback from their coworkers about their at-risk behaviors (58% overall vs. 49% norm, see p.19-20 in Appendix I).

Similarly, miners reported they believe their coworkers would feel uncomfortable if their work practices were observed and recorded by a coworker compared to the norm (44% overall vs. 38% norm). And 71% report a willingness to “have a coworker observe me while I work in order to give me feedback regarding safe and unsafe behaviors observed” (see p.23-24 in Appendix I).

However, during focus groups and one-to-one interviews, miners revealed that they felt awkward giving coworkers feedback. This was especially true for experienced employees. Many felt awkward giving feedback to experienced miners, making statements like the following, "How can I give Joe feedback on his work behaviors when he's been working at the plant for ten years, he must know what he's doing." Others stated it was extremely difficult to



give peer feedback. Some workers in the mining environment are solitary workers, in that they work by themselves for most of their shift or they drive a vehicle all day, and are unable to give and receive peer feedback.

In addition to peer feedback, other issues concerning peer support for safety were addressed as well. A large percentage, but slightly below the norm, of employees responded that their coworkers actively support the company's safety programs (61% overall vs. 68% norm, see p.28 in Appendix I). However, when asked about the "company's safety programs" during the same interviews, miners simply stated that "people try to work safely".

Marginally more than the norm indicated "employees often short-cut safe work practices" (33% vs. 31% norm). However, miners elaborated to suggest that short cuts are, in fact, commonplace, but that "serious ones" are not. And as mentioned previously, many miners suggested the pressure to take such risks comes from above. Yet, significantly more than the norm suggest the pressure to take short cuts comes from their coworkers (25% vs. 15% norm see p.26-27 in Appendix I).

The UCM site pulled down the overall average for peer support for safety. One conspicuous example of this trend can be seen when examining the following item, "When employees in my work area are cautioned about working unsafely, they begin working more safely" (p.18 in Appendix I), sites SQ-B and CPP (91% & 85% respectively vs. 60% norm) were well above the norm, SQ-A (65%) was slightly above the norm, while UCM (35%) was almost half the norm. This pattern held true for ten out of the twelve questions (see p.17-19, 21-22, & 24-28 in Appendix I).

Conclusions

Achieving a Total Safety Culture requires active participation by a majority, if not all, employees. Since safe behaviors often require additional time and effort, and don't provide immediate naturally reinforcing consequences, it is imperative for coworkers to provide the necessary support to one another to cultivate and maintain safe work practices.

Low agreement scores for Peer Support for safety often reflect a culture where employees perceive their peers do not support safety to the extent they should. Whether true or not, this negative perception can strongly influence individual behaviors in a pervasive way. When individuals do not believe their coworkers are strong supporters of safety, their own safety-related and actively caring behaviors will likely decline. As a result, others will view them as being unsupportive of safety and *that* perception will negatively influence *their* safety-related behaviors.

The importance of strong peer support for safety is based on a concept from social psychology called conformity. Whether we like to acknowledge it or not, individuals seek the approval and acceptance of others. Within an organization, even the most conscientious individuals often behave in ways counter to their beliefs in an effort to conform to the peer group's norms. These norms are often demonstrated through modeling and feedback.

Individuals learn much of what they know by observing and emulating the behavior of others; not just the mechanics of *how* to perform a behavior, but also what the culture has defined to be *acceptable* behavior. Others' behaviors--whether safe or at-risk--provide a model for an individual to mimic. Therefore, if safe work practices are the exception rather than the rule, well-intentioned individuals may elect to forgo safe work practices themselves in an effort to conform to the accepted norm.

In addition to modeling, one-on-one feedback from peers defines what the peer group considers to be acceptable work practices. Where an at-risk behavior is the norm, coworkers tend to give feedback to one another to that effect. Through their verbal and nonverbal interactions, they indicate that the unsafe behaviors are "cool" or "macho" or that they are quicker and more efficient, thereby lessening others' workloads. It takes a strong, self-assured individual to resist such peer pressure. On the other hand, where safe behavior is the norm, employees give each other appropriate feedback (e.g., recognize one another for safe behaviors and provide corrective feedback for unsafe actions). In this situation, employees who perform unsafe behaviors deviate from the standard and run the risk of inviting the disapproval of their peer group.

When individuals are given the opportunity to become personally involved in improvement initiatives, a sense of commitment and ownership results. And, this heightened sense of commitment tends to generalize to other similar situations. Therefore, the more personally involved an individual can become in an organization's safety improvement initiative, the more personally committed to safety in general he or she will become. The greater the number of individuals an organization recruits as safety champions, the greater the number of individuals providing a positive influence on their peers. Formal systems, like a behavioral observation and feedback process, which encourage direct peer interaction and recognition concerning safety can magnify this influence. Individuals' efforts should, of course, be reinforced through appropriate recognition by supervisors and managers, including appropriate consideration through the performance evaluation system.

Personal Responsibility for Safety

The Personal Responsibility for Safety Scale assesses employees' perceptions and opinions regarding how strongly they believe *they* support safety. Specific survey items are listed below:

- It is the responsibility of each employee to seek out opportunities to prevent injury to him- or herself.
- It is the responsibility of each employee to seek out opportunities to prevent injury to others.
- I have more respect for workers who work safely than for those who do not.
- When a safety rule or procedure is issued, I try to follow it as best I can.
- I sometimes overlook hazards to get the job done.
- When I see a potential safety hazard, I personally do something to correct it.
- I am willing to put forth a little extra effort to improve safety at our site.
- Besides performing my own job safely, there is little I can do to improve site safety.

Mining Results

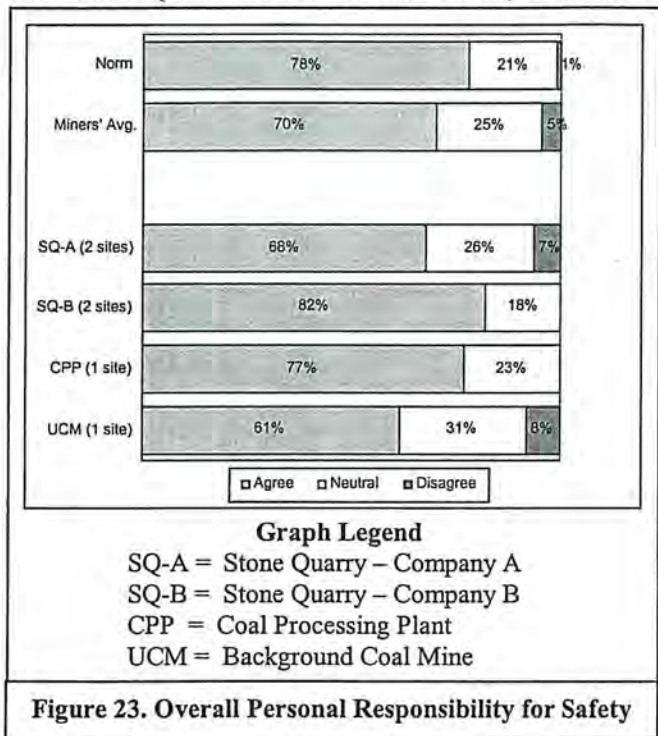
As depicted in Figure 23, miners were below the norm on the overall personal responsibility for safety scale (70% overall vs. 78% norm). Many miners stated they believe it is each individual’s responsibility to seek out opportunities to prevent injury to him- or herself (83% overall vs. 87% norm). Accordingly, many report trying to follow safety rules or procedures to the extent possible (83% overall vs. 91% norm, with the notable exception of UCM which responded 71% favorable). And while the number reporting trying to correct potential safety hazards themselves approached the norm (74% overall vs. 80% norm, UCM site was at 61%), there is still a sizeable portion of the population who reported they do not do so (see p.31, 34, & 36 in Appendix I).

Although most try to prevent injuries to themselves, some miners also admit, “sometimes overlooking hazards to get the job done” (39% vs. 24% norm). This response was as high as 45% for SQ-A and 39% for UCM (see p.35 in Appendix I).

In addition to trying to prevent injury to oneself, many also believe it is their responsibility to seek out opportunities to prevent injury to *others* (83% overall vs. 80% norm) (p.32 in Appendix I). Few reported a reluctance to “put forth a little extra effort to improve safety at our site” (85% favorable vs. 88% norm) (p.37 in Appendix I), and this high response was consistent across all subgroups. A slightly larger number, however, reported not having such an opportunity, as indicated by the question, “Besides performing my own job safely, there is little I can do to improve site safety” (24% overall, 17% norm) (p.38 in Appendix I). Interview comments on this issue were interesting. When asked about their own willingness to do more to actively support safety, most responded positively. However, when asked about others’ interest to do the same, many were skeptical. In other words, there seemed to be substantial interpersonal mistrust regarding the improvement of safety.

Conclusions

Individuals with a high sense of personal responsibility for their own and others’ safety are more willing to get involved in making a difference. These individuals see hazards and assume the obligation to minimize the danger. They are more likely to interact with others to caution them about an at-risk behavior. Though they are not always vocal safety champions, they share common characteristics: they value safety, they prefer not to ignore at-risk conditions or behaviors, and they are willing to urge others to perform safe behaviors through feedback or through the modeling of appropriate behaviors.



In most organizations, high scores are found consistently on the Personal Responsibility for Safety Scale. Contributing to this pattern may be the fact that people tend to evaluate their own behaviors and intentions more leniently than they evaluate those of others. However, most individuals *truly do* feel a strong sense of responsibility for themselves and to some degree for others as well. They may not, however, know how to demonstrate that commitment or be willing to act in a manner that is not supported by the organizational culture.

The results of this subscale, when high, provide a good starting point for a discussion, not only of the survey findings, but also of the desire and plan for culture change in general. Personal responsibility is a necessary building block to increasing interdependence in safety through actively caring behaviors.

We can foster individuals' sense of personal responsibility for safety by providing the systems to allow additional opportunities to improve safety and then providing recognition to support these efforts. In a Total Safety Culture, employees realize these opportunities take many forms. Reporting a near miss, correcting a hazard, reporting injuries, observing peers and giving feedback all present employees with the chance to help improve safety performance. Holding people accountable for safety means helping them set reasonable safety goals for themselves, then providing them with the tools to achieve those goals. As employees begin to see improvements resulting from their efforts, they continue to develop added commitment to safety and subsequent ownership over the safety process.

Safety Management Systems

The Safety Management Systems scale measures employee perceptions of a variety of formal management systems including discipline; incident reporting and investigation; safety rules and procedures; safety training; safety communications; safety suggestions; rewards and reinforcement; and hazard identification and correction. In addition, it also assesses employee's opinions about the company's safety performance; the effects of stress, drugs, and alcohol on safety; and the level of employee involvement in safety. Specific survey items are listed below. Those items appearing in *italics* are repeated in two or more categories.

Safety Performance

- The risk level of my job concerns me quite a bit.
- Compared to other workplaces, I think mine is rather risky.
- The company's current safety performance is very good.
- If the company maintains its current safety performance, that will be good enough.
- The company currently spends too much effort on safety.
- The company should be doing more to improve workplace safety.

Stress, Drugs, and Alcohol

- Alcohol or drug abuse is a problem in my plant.
- I believe that work-related stress affects my ability to perform my job safely.
- I believe that stress caused from factors outside of work affects my ability to perform my job safely.

Discipline

- It is common for employees to be disciplined for having a work injury.
- I have been disciplined for having a work injury.
- The company uses a consistent procedure for dealing with employees who violate safety rules.
- Discipline of some sort should be assessed for serious safety violations.
- Discipline is not used often enough for dealing with serious safety violations.

Incident Reporting and Investigations

- I am encouraged to report near misses.
- Near misses are consistently reported and investigated at our plant.
- Minor injuries often go unreported.
- If I received a minor injury on the job, I would report it.
- Management truly wants to know about all incidents and injuries, even if they are minor.
- Incidents and injuries are thoroughly investigated.
- I would feel free to discuss the causes of my injury with the investigation team.
- Management places most of the blame for an accident on the injured employee.
- *When an incident or injury is investigated, the results are promptly reported back to involved employees.*

Rules and Regulations

- Employees understand the safety rules and procedures for their own jobs.
- Employees get sufficient background and reasons behind the company's safety rules.
- The company has too many rules and regulations governing safety.
- Compliance with safety rules and regulations needlessly slows down my job.
- *When a safety rule or procedure is issued, I try to follow it as best I can.*
- *Safety rules and procedures are regularly reviewed with employees.*

Training

- I have received adequate job safety training.
- Information needed to work safely is made available to all employees.
- Employees fully understand the potential hazards of the operations they perform.
- When asked to do a new job, I receive adequate training to be able to do it safely.
- New employees receive sufficient safety training before being allowed to work alone.

Communication

- Employees are provided information on such things as the type, frequency, cause, and cost of accidents.
- Supervisors discuss safety improvement goals and efforts with employees on a regular basis.
- Employees are routinely given feedback by supervisors regarding their safe and unsafe work behaviors.
- When an incident or injury is investigated, the results are promptly reported back to involved employees.
- Safety rules and procedures are regularly reviewed with employees.
- *Information needed to work safely is made available to all employees.*
- *Employees receive prompt feedback in response to their safety suggestions.*

Safety Suggestions

- My supervisor asks me what I need to do my job safer.
- Employee safety suggestions are listened to and taken seriously.
- Employees receive prompt feedback in response to their safety suggestions.

Incentives and Rewards

- Our safety award program(s) motivate me to work more safely.
- First line supervisors acknowledge and/or reward employees for safe behaviors.
- Employees who work safely have a better chance for promotion than those who don't.
- An employee who gets injured will likely receive a poorer performance evaluation.

Hazards Identification and Correction

- Safety audits/inspections are conducted regularly in my department.
- Safety audits/inspections are effective in identifying and correcting safety hazards.
- Safety hazards found during inspections are usually followed-up on quickly.
- Employees are encouraged to correct safety problems themselves wherever possible.
- *Employees participate in inspections for potential hazards.*

Employee Involvement

- Employees should be given more opportunities to become involved in safety improvement efforts.
- Employees in my work group participate in defining safe work practices.
- Employees participate in inspections for potential hazards.
- *Employees are encouraged to correct safety problems themselves wherever possible.*
- *My supervisor asks me what I need to do my job safer.*
- *Employee safety suggestions are listened to and taken seriously.*

Other Safety Management Systems

- Safety meetings are effective at making this a safer place to work.
- The safety committees' efforts are effective in improving safety.

Mining Results

Safety Performance. As depicted in Figure 24, many survey respondents had a neutral opinion of the "company's current safety performance", with 7% holding a

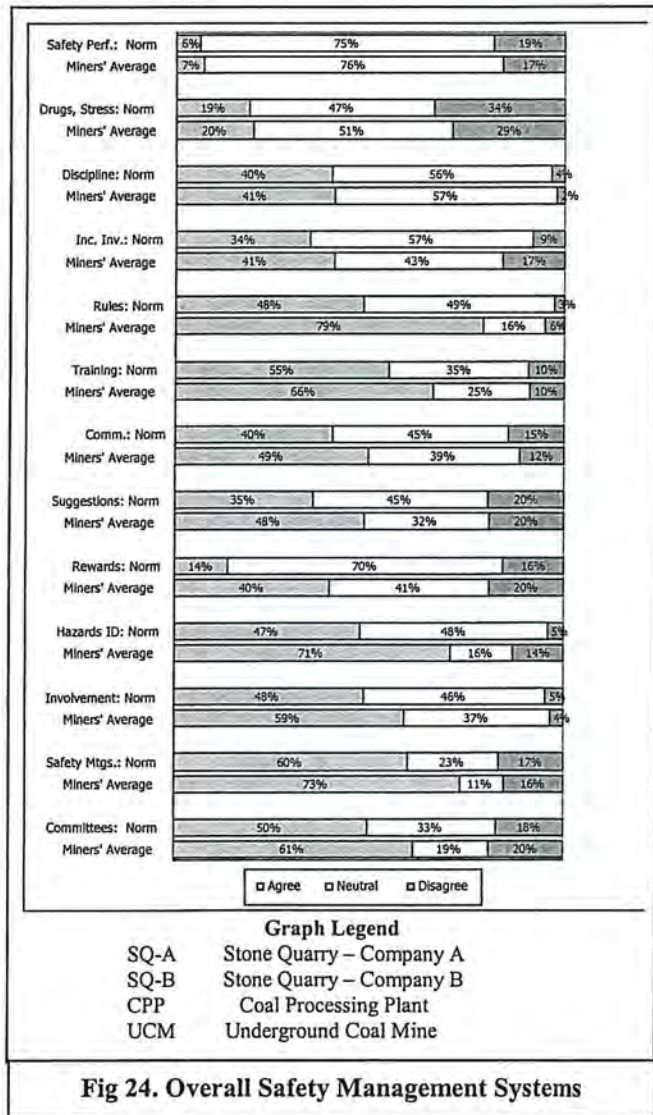


Fig 24. Overall Safety Management Systems

positive opinion and 17% reporting a negative opinion (p.40 in Appendix I). The individual responses within several subgroups, however, were quite variable, with some responding favorably, many responding neutrally, and some responding unfavorably. Although this differing of opinion is partially due to individual expectations, there also does not appear to be a consistent understanding of how miners' behavior relates to overall safety performance (see p.40 in Appendix I).

Regardless, many also reported a need to continue to improve. Miners were consistent with the norm in responding to the belief the current level of performance is “good enough” (vs. 56% norm). Following this consistency with the norm, 10% of miners believe “the company currently spends too much effort on safety (vs. 10% norm) and 51% feel the “the company should be doing more to improve safety” (see p.45, 47, & 52 in Appendix I).

These responses suggest that most share an appreciation for continuous improvement in safety. The UCM responses, however, showed a different pattern. Here, 35% (vs. 54% norm) believed the company's current performance is “very good”, and 27% believed it is currently “good enough.” Further, 18% believed the company currently spends too much effort on safety, while 59% believe the company should be doing more.

Miners stated they believe the risk level of their job is of concern more than the norm (44% overall vs. 33% norm). Related to this question is the item “Compared to other workplaces, I think mine is rather risky.” Miners endorsed this question twice as much as the norm (31% overall vs. 15% norm). Not surprising, UCM responses to both items were even higher (49% & 47% respectively, see p.43-44 in Appendix I).

Stress, Drugs, and Alcohol. Eighteen percent of mining employees believed alcohol or drug abuse to be a problem in the plant (vs. 12% norm). Both work and non-work related stress were indicated as affecting individual's ability to perform their job safely by a portion of a respondents, however the scores were close to or below the norm. Increased workload and fear of job loss were cited as examples of sources of stress (see p.50-52 in Appendix I).

Discipline. Miners endorsed questions, similar to the norm, in their willingness to be disciplined (41% overall vs. 40% norm). However, almost half believe “the company uses a consistent procedure for dealing with employees who violate safety rules (43% overall vs. 27% norm) (p.53 & 56 in Appendix I).

Almost twice as many miners report having been disciplined *for having a work injury* (15% vs. 9% norm); slightly more than the norm believe it is common for people to receive discipline *for having an injury* (27% overall vs. 22% norm). Interview comments consistently confirm this to be a very strong concern among miners. Such an association between *injuries* and discipline (vs. *safety violations* and discipline) inhibits reporting of incidents. As illustrated in the following section, this should be a prime area of concern for mining management (see p.54-55 in Appendix I).

Incident Reporting and Investigations. Across most subgroups, the majority of employees believed management truly wants to know about all incidents and injuries, even minor ones (64% overall vs. 64% norm, with the exception of UCM at 33% (p.64 in Appendix I). Also,

miners seem less likely than the norm to report near misses (44% overall vs. 63% norm) (p.60 in Appendix I).

Fewer respondents believed that near misses are consistently reported and investigated (23% overall vs. 37% norm, with a low of 18% within UCM). Likewise, many believed minor injuries often go unreported (56% overall vs. 48% norm, with a high of 59% within UCM). Yet, 62% suggested *they* would report a minor injury received on the job (53% norm; with a range of 47-77% within the subgroups). Interview comments were even stronger on this issue. Many miners suggested that if an injury can possibly be hidden, it will be. But they indicated belief others would be more likely than themselves to hide an injury (see p.61-63 in Appendix I).

Although most indicated they would feel free to discuss the causes of an incident with the investigation team (75% overall vs. 75% norm) (p.66 in Appendix I), and that incidents and injuries tend to be thoroughly investigated (59% overall vs. 61% norm) (p.65 in Appendix I), under-reporting appears problematic. While survey responses indicated that miners believed incidents are “thoroughly investigated”, interview comments suggest few believe the investigations go beyond documenting the event and punishing those involved. In other words, injury investigations were generally viewed as “fault finding” more than “fact finding” (see p.65-66 in Appendix I).

In addition, reported not being formally informed of incidents, even those that could provide learning opportunities for them. Likewise, the results of investigations do not appear to be shared systematically.

Rules and Regulations. Most employees viewed the safety rules and regulations quite favorably. Few employees believed “the company has too many rules and regulations governing safety” (13% overall vs. 15% norm). Only slightly more than the norm believed “compliance with the rules needlessly slows down their jobs” (18% overall vs. 12% norm). Further, most respondents believed that employees understand the safety rules and procedures for their own job (79% overall vs. 68% norm). But some do not feel employees get sufficient background rationale behind those rules (60% overall vs. 51% norm, with responses as low as 43% at UCM). The largest concern expressed, as mentioned previously, is the tendency for many to violate safety rules when time constraints exist (see p.69-72 in Appendix I).

Training. Overall, employees reported moderate satisfaction with the current training system. Most indicated they have received adequate job safety training (66% overall vs. 55% norm) and that information needed to work safely is available (71% overall vs. 69% norm). Significantly more employees believed coworkers fully understand the potential hazards of the operations they perform (75% vs. 57% norm) (see p.73 & 75-76 in Appendix I).

New employee training was viewed generally in a positive light, with 65% responding that new miners receive sufficient safety training before being allowed to work alone (vs. 55% norm). Several interviewees, however, suggested that while the “classroom” training was sufficient, the on-the-job portion needs to be improved. They expressed concern that inexperienced workers were often paired with new employees. Also, regardless of the experience level of the on-the-job trainer, s/he was often too busy to do an adequate job overseeing the new employee. Finally, when asked whether they received adequate training before being asked to do

a new job, more than half agreed they did (64% overall vs. 48% norm, see p.77-78 in Appendix I).

Communication. Overall, mining participants responded at or just above the norm on most communications items. However, there appears to be varying opinions across the four subgroups. For example, when asked whether “employees are provided information on such things such as type, frequency, cause, and cost of accidents, the SQ-A and CPP subgroups responded well above the norm (68% & 69% respectively vs. 54% miners overall and 44% norm, see p.80 in Appendix I).

When asked whether “supervisors discuss safety improvement goals and efforts with employees” and whether “employees are routinely given feedback by supervisors regarding safe and unsafe work behaviors”, SQ-A, SQ-B, and CPP responded well above the norm (68%, 73%, & 54% respectively vs. 49% norm), while UCM responded significantly below the norm (37%, see p.81 in Appendix I).

The interviews revealed additional examples suggesting safety communications may be less than desirable. As mentioned previously, lessons learned from incidents and incident investigations do not appear to be effectively shared. Feedback concerning the status of safety work orders, especially those for which implementation is delayed, appears inconsistent. Feedback following a safety suggestion appears to be handled somewhat better, but the resulting improvement does not appear to be communicated to others affected. And, although most interviewees indicated that monthly safety meetings usually take place, they are considered to be little more than a vehicle for providing required OSHA training. In other words, there seems to be a dependent perspective with regard to safety "OSHA and management will keep us safe if we follow the rules", instead of an interdependent perspective "we need to look out for each others' safety."

Safety Suggestions. Over half of the respondents believed their safety suggestions are listened to and taken seriously (62% overall vs. 56% norm). This is undoubtedly due, at least in part, to the fact that 52% reported receiving prompt feedback in response to their suggestions (vs. 33% norm). Interview comments suggest that many of the concerns may stem from “suggestions” made directly to supervisors or through a safety work order, rather than through the safety suggestion system. In addition, there also appears to be some confusion regarding the types of issues that should go through the safety suggestion system vs. a safety work order system (see p.87-88 in Appendix I).

Proactive solicitation for input from supervisors appears to be variable. Overall, 52% of miners responded positively to the question “My supervisor asks me what I need to do my job safer” (vs. 39% norm). Again, however, there was a great deal of variability between subgroups. Responses per subgroup ranged from 37% to 67%. This may be a result of each site unique training program (see p.86 in Appendix I).

Incentives and Rewards. Most miners reported that the organization’s safety award programs are very effective at motivating them to work safely (41% overall favorable vs. 29% for norm, see p.90 in Appendix I). They also indicated the rewards are small, especially when compared to those provided by other organizations within the geographical area.

However, almost one half of all respondents indicated that an employee who *gets injured* will likely receive a poorer performance evaluation. Interview comments also suggest a strong relationship between *being injured* and a poor performance evaluation. Fortunately, however, actually *working safely* is considered to be a significant part of the evaluation. Further, the majority of supervisors also acknowledge and/or reward employees for working safely; 55% suggested that they do (vs. 33% norm, see p.87 & 93 in Appendix I).

Hazards Identification. In general, interviewees responded quite favorable regarding the organization's efforts to identify and correct hazards within the work environment. With only a few exceptions mentioned, miners felt that identified hazards are addressed in a timely fashion. When asked specifically about hazard identification audits, most employees reported that safety audits are conducted regularly (59% overall vs. 54% norm). However the range of responses was considerable across sites (39% to 81%). The SQ-A, SQ-B, and CPP sites were well above the norm (81%, 67%, & 62% respectively). The UCM responses, however, were well below the norm (39%). Many miners believed the audits are effective at identifying and correcting hazards (74% overall vs. 69% norm, see p.95-96 in Appendix I).

Follow-up to hazards identified during inspections is considered to be handled quite well (67% overall vs. 56% norm, with a range of 45% to 85% favorable, see p.97 in Appendix I). Interviewees suggested that the types of items identified during most audits are often those fixed immediately, but then left to reoccur time and again. For larger issues, many suggested there does not appear to be a system in place to ensure issues are resolved.

Many miners reported they are encouraged to correct safety problems themselves when possible (overall 68% vs. 64% norm, see p.98 in Appendix I). Again, although this finding is similar to the norm, it is lower than desirable and indicates room for improvement.

Employee Involvement. Fifty-six percent of the respondents reported employee involvement in conducting safety inspections (vs. 52% norm), although several miners stated they do not know who is involved or how they are chosen. Somewhat more miners reported being involved in defining safe work practices (66% overall vs. 48% norm) (p.101 in Appendix I). Encouragingly, 72% of all miners reported that employees should be given *more* opportunities to become involved in safety improvement efforts, slightly more than the norm of 66%. This latter issue is also addressed in other questions within the Actively Caring and Personal Responsibility sections. Again, the majority of responses on these questions were also favorable. Eighty-nine percent responded favorably to the item "Besides working safely myself, I am willing to do other things to help improve workplace safety (vs. 85% for the norm, see p.100-102 in Appendix I).

Other Safety Management Systems. The effectiveness of safety meetings was rated more favorable than the norm (73% overall vs. 60% norm), and safety committees were seen as more favorable than the norm (61% overall vs. 50% norm, see p.104-105 in Appendix I). Statements made by miners during the interview process suggest many view the safety meetings solely as a vehicle for providing OSHA required training, and many are uninformed about the structure, objectives, and accomplishments of the safety committee.

Conclusions

Each of these safety management systems has an important contribution to make in terms of improving workplace safety and influencing the organization's safety culture. At best, when the system is poorly designed or operating ineffectively, its benefits will be lost. At worst, a poorly designed, badly implemented, or ill-functioning system can actually have a destructive influence on the organization's overall safety culture. To further compound the situation, these systems are interactive and, in many cases, overlap. For example, **hazard identification and correction** requires an atmosphere fostering **employee participation**, sufficient **training** so employees can recognize and correct hazards, and ample **communication** of the hazard and its solution. So, poor features of one system can have negative influences on other systems, making the problem areas more difficult to isolate and correct.

As with the other scales, it is important to remember this scale measures perceptions not necessarily reality. That is, the results indicate how employees *feel* **incident investigations** are being handled, not necessarily how the actual process is working or not working. Similarly, items in the **discipline** category measure only what employees perceive as common practice or at least an active threat. Perhaps only one incident in one hundred results in an employee being formally disciplined but if that event is what employees discuss and remember, discipline may be viewed as the norm. Further complicating this scenario is the fact that perceptions often lag reality. Therefore, recent changes to any of these management systems may not yet be reflected in the survey findings.

The central themes of a Total Safety Culture (e.g., employee involvement, focus on the process of achieving safety, emphasis on behavior as *part* of the safety system) can serve as a ruler against which to measure and modify an organization's safety management systems. The same principles of psychology which underlie the behavioral observation and feedback process are equally applicable for creating other safety management systems which motivate and reinforce safe work practices. For example, in many organizations **rewards** in the area of safety focus on outcomes (i.e., injury rates) and avoiding failure. If employee incentive programs and/or supervisor performance evaluations are based primarily on injury rates, it is unreasonable to expect those employees to embrace an open injury reporting system or to feel comfortable being observed performing risky behavior which may result in injury.

Examine the scores associated with each safety management system. Where undesirable patterns exist, two options for action may be considered. First, look at the actual practices of the company, department, or team to assess the strengths or weaknesses. For example, **safety-training** concerns may be caused by a variety of issues, each with different solutions. Safety training may be too short, too complicated, poorly conducted, or too general for application on the job. Training may be given by employees who lack credibility, or may be conducted on required overtime either for the trainee or his counterpart back on the job. The training itself may be top notch but is treated by the employee's supervisor as a nuisance or as secondary to "getting the work done." All these issues and more may give training a bad reputation and, more importantly, cause it to be ineffective at maintaining or improving employee safety and health.

The second option is to analyze how *perceptions* of the system are being managed (or not managed). For example, a **safety suggestion process** will likely be seen as beneficial only by those whose suggestions have been implemented or at least have warranted feedback.

Suggestions may be actively solicited, fairly evaluated by a cross-functional team of employees, amply funded, and quickly acted on *but* poorly communicated to the rest of the workforce. Employees may negatively evaluate this system, but the situation is addressed easily without revamping the entire safety suggestion system.

Two items in this scale give particular insight into an organization's safety culture. Examine the responses to the **safety performance** items to assess employee perception of the *need* to place additional focus on safety. If employees agreed with Statement #19, "The company should be doing more to improve safety" and disagreed with Statement #40, "If the company maintains its current safety performance, that will be good enough", the workforce appears open to a new safety process. On the other hand, if employees already feel, "The company currently spends too much effort on safety" (Statement #73), introducing new safety improvement initiatives of any type will require convincing employees there is a need for safety improvement.

A second system which is very telling of the current culture is **incident reporting and investigation**. The level of first aid cases and near miss reporting is higher in organizations where employees share trust and a problem solving perspective. If incident reporting is suppressed, investigations may be less than thorough, communications of findings may be spotty, or discipline may be feared. Initiating and maintaining a peer observation and feedback process in this type of culture takes more time, effort, and patience.

Organizations serious about changing their safety culture should critically analyze each system to be certain it is aligned with Total Safety Culture principles. Even when weaknesses are identified, organizations should be cautious about overhauling existing safety management systems too abruptly. For example, employees accustomed to receiving "a payoff" for working a certain length of time without an injury may be resistant to changing the incentive program. The redesign process is not a quick one and some systems may need to transition through several intermediate stages before they reflect employee ownership, achievement orientation, or a systems perspective.

Actively Caring

In a Total Safety Culture, workers not only feel a sense of responsibility for their own safety, they also feel a sense of responsibility of the safety of one another. Further, individuals are willing and able to act on that feeling of responsibility by "going beyond the call of duty" for the safety of a coworker. That is, they routinely *actively care* for the safety of others by performing behaviors which will directly or indirectly influence the safety of others. Actively caring may be demonstrated through a variety of behaviors such as offering to assist a coworker lift a heavy load, performing housekeeping duties other than those assigned directly to you, cautioning a coworker about a potentially risky behavior, or recognizing coworkers for their safe work practices.

The Actively Caring Scale measures individual's intentions and attitudes toward demonstrating Actively Caring behaviors for fellow employees. For each issue addressed, three separate questions are asked. Respondents are asked 1) if they feel employees *should* perform the specific behavior, 2) if they are *willing* to perform the behavior, and 3) if they currently *do* perform the behavior. Specific survey items are as follows:

- Employees should praise each other for working safely.
- I am willing to praise my coworkers for working safely.
- When I see a coworker working safely, I praise him/her.

- Employees should caution their coworkers when they are observed working unsafely.
- I am willing to caution my coworkers about working unsafely.
- When I see a coworker working unsafely, I caution him/her.
- Employees should observe the work practices of their coworkers in order to provide them with safety-related feedback.
- I am willing to observe the work practices of my coworkers in order to provide them with safety-related feedback.
- I observe the work practices of coworkers in order to provide them with safety-related feedback.

- Besides performing their own jobs safely, employees should do other things to help improve workplace safety.
- Besides working safely myself, I am willing to do other things to help improve workplace safety.
- Besides working safely myself, I do other things to help improve workplace safety.

- When an employee sees a potential safety hazard, they should correct it themselves if possible.
- When I see a potential safety hazard, I am willing to correct it myself if possible.
- When I see a potential safety hazard, I correct it myself if possible.

- If an employee gets down or depressed, that person’s coworkers should try to make him/her feel better.
- If a coworker gets down or depressed, I am willing to try to make that person feel better.
- When I see a coworker looking down or depressed, I try to make that person feel better.

Mining Results

The overall Actively Caring scores reveal a similar decreasing pattern (for ‘should’, ‘willing’, and ‘do’) as reflected in the norm. As depicted in Figure 25, miners’ “should”, “willing”, “do” scores were 80%, 78%, and 71%, while the norm is 78%, 79%, and 68%. Respectively, the UCM site

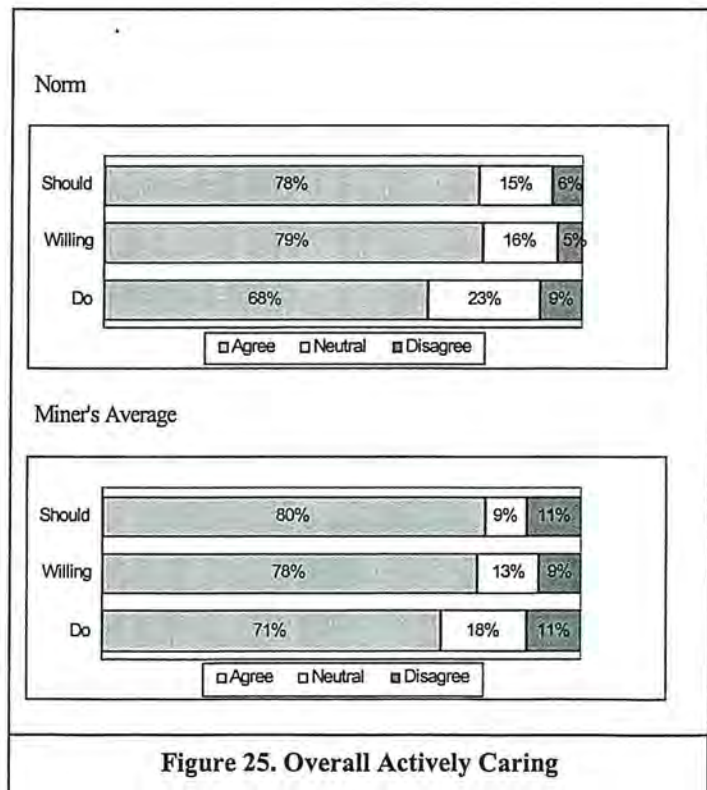


Figure 25. Overall Actively Caring

showed somewhat lower overall responses than other subgroups, particularly on the “do” questions (71%, 70%, & 60% respectively, see p.107-109 in Appendix I).

Regarding the individual issues addressed, the greatest differences between what miners reported they “should” do, what they are “willing” to do, and what they actually “do” appear for the questions involving “praising others for working safely” (79%, 77%, 56%, see p.111-113 in Appendix I), and “*observing* the work practices of coworkers in order to provide them with safety-related feedback” (78%, 68%, 67%, see p.117-119 in Appendix I). These responses indicate an ideal opportunity for improvement, since people recognize the value of providing peer feedback for safety-related behaviors, but do not currently do. The scores on all three questions pertaining to the issue of “cautioning coworkers when seen working at-risk” (87%, 83%, 78%, see p.114-116 in Appendix I) were higher than items addressing, “praising others for working safely “and” observing coworkers to provide safety related feedback.”

The smallest differences are seen for the questions regarding “doing other things to help improve safety besides performing their own jobs safely” (86%, 87%, 78%, see p.120-122 in Appendix I), and “correcting hazards oneself” (78%, 79%, 74%, see p.123-125 in Appendix I). Although these responses are not unlike the norm, they are not ideal; just 74% of the respondents reported they actually correct hazards themselves where possible. However, because the “should” is also relatively low (i.e., 74% believe employees *should* correct hazards themselves if possible), increasing actual performance in hazard correction will present a challenge, worker norms are changed. Some behaviors need to be uncovered in this area.

Once again these overall scores should be viewed with caution. The UCM site responded less favorably than the other sites on many of the questions. It seems these individuals are working in an environment that fosters a dependent or independent rather than interdependent perspective with regard to occupational safety.

Conclusions

The typical data for these survey items illustrate employees agree in concept to the idea of actively caring (*Employees should ...*). Most even report a willingness to perform the specific actively caring behaviors addressed (*I am willing to...*). However, far fewer employees report actually performing the actively caring behaviors on a regular basis. Although most have the necessary values and intentions, their reported behaviors are not consistent. That is not to say if an individual sees a fellow coworker in imminent danger, most would not intervene immediately. However, when the potential impact on the coworker’s safety is not so readily apparent, individuals are often hesitant to go out of their way to intervene. Being willing to provide a coworker feedback about an seemingly minor at-risk behavior or cleaning-up a spill caused by another individual are examples of behaviors prone to this pattern. Although very complex in nature, there are several influences which predominantly account for this tendency.

First, individual behavior is governed by the consequences that follow it, and one of the most influential consequences is peer acceptance and support. Therefore, unless the organizational culture promotes and encourages an actively caring environment, even well intentioned, caring individuals may pass up opportunities to intervene on behalf of another’s safety.

One method for creating a culture that supports key actively caring behaviors is to put in place processes which formalize the conduct of those desirable behaviors. For example, a behavioral observation and feedback process systematically promotes and encourages peer feedback. Over time, peer feedback is likely to become more and more accepted, eventually becoming a natural part of even informal interactions among coworkers.

In addition, management must, through their own individual practices, foster an actively caring environment. They must themselves demonstrate actively caring behaviors and consciously reinforce others who do so. Finally management systems and processes must support a culture which encourages, recognizes, and reinforces actively caring, rather than act to subdue such behaviors. Specific systems and their influence on the organizational safety culture are discussed in a separate section of this report: "Safety Management Systems."

An individual's likelihood to demonstrate actively caring behaviors is also influenced by personal characteristics; to actively care for others requires an individual have sufficient levels of several key internal person states. That is, research has shown individuals with a healthy sense of self-esteem, a strong sense of group belonging, and a true feeling of empowerment (as measured by feelings of self-efficacy, optimism, and personal control) are more likely to actively care for others than those with depreciated levels of these five person states. Another important distinction is that these person factors are states, rather than traits. That is, they fluctuate over time, largely as a result of our interactions with others and the organizational environment, rather than being permanent characteristics of our personalities. Practices and policies within an organization can serve to either build or destroy these states within its members. The final scale of the SCS (i.e., the Person Factors Scale) measures individuals' levels of each of these five person states. The discussion in that section describes ways in which organizations can ensure they are positively rather than negatively influencing employees' propensity to actively care for the safety of others.

To create a culture in which individuals hold safety as a value, feel a sense of responsibility for the safety of others, and are willing and able to act on that sense of responsibility by routinely demonstrating actively caring behaviors is the ultimate goal of Total Safety Culture efforts. Therefore, following efforts to improve an organization's safety culture, a re-administration of the survey typically demonstrates changes in responses to the actively caring scale items. While the level of "should" and "willing" responses often rise, the "do" responses show the most significant improvement, demonstrating an organization's efforts are resulting in not only attitude change, but also actual behavior change.

Person Factors

As indicated in the discussion of the previous scale, an individual's likelihood to demonstrate actively caring behaviors is influenced by several characteristics. Research shows that five key factors (self-esteem, belonging, personal control, self-efficacy, and optimism) have a significant impact on an individual's willingness to become actively involved in safety improvement efforts (Geller, 2001; Geller *et al.*, 1996). That is, research shows that individuals with a high sense of self-esteem, a strong sense of group belonging, and a true feeling of empowerment (as measured by feelings of self-efficacy, optimism, and personal control) are more likely to actively care for others than those with depreciated levels of these five person

states. The Person Factors Scale measures these five person states which are most strongly related to the likelihood of Actively Caring for the safety of others.

Self-Esteem. Self-esteem is the general evaluation of self worth an individual makes about him- or herself. This evaluation indicates the extent to which a person feels capable, significant, important, and valuable. When individuals do not feel valuable, they are unlikely to feel they have anything valuable to offer others, and hence are not likely to intervene on behalf of someone else's safety. The Self-Esteem subscale includes the following questions:

- I feel I have a number of good qualities.
- I am able to do things as well as most other people.
- At times, I think I am no good at all.
- I feel I don't have much to be proud of.
- I certainly feel useless at times.
- I wish I had more respect for myself.

Optimism. Optimism is the learned expectation that things will go well and the anticipation of positive outcomes from one's actions. People high in optimism are more likely to demonstrate Actively Caring behaviors because they believe that their assistance will actually lead to improvements. The Optimism subscale includes the following questions:

- I hardly ever expect things to go my way.
- In uncertain or difficult times, I usually expect the best to happen.
- I rarely count on good things happening to me.
- If anything can go wrong for me, it probably will.
- I always look on the bright side of things.
- Things never work out the way I want them to.

Self-Efficacy. Self-efficacy relates to ones judgments of personal competence and skill levels in dealing with the situations around them. Those high in self-efficacy are more likely to attempt new behaviors, exert more effort, and persist in the face of adversity. Individuals high in self-efficacy are also less likely to relinquish responsibility to others ("I don't need to do it because someone else will") or use the reactions of others to interpret events ("I'll give my support only after I see others doing so"). Feelings of self-efficacy require both knowledge (education) and some success experiences from which to base personal confidence. The Self-Efficacy subscale includes the following questions:

- I give up on things before completing them.
- One of my problems is that I cannot get down to work when I should.
- When trying to learn something new, I soon give up if I am not initially successful.
- I do not seem capable of dealing with most problems that come up in life.
- I avoid trying to learn new things when they look too difficult for me.

Personal Control. Personal control refers to a general expectancy regarding the location of control in a person's life. Those with an *internal locus of control* feel as if they have direct personal control over the things that happen to them, through their knowledge, skills, and abilities. In contrast, persons with an *external locus of control* believe things like chance, luck or fate play important roles in their lives. Those high in personal control are more likely to intervene to assist others. The Personal Control subscale includes the following questions:

- People's injuries result from their own carelessness.
- I am directly responsible for my own safety.
- Whenever someone is injured, it's usually due to something he/she has done or has not done.
- People can change what might happen tomorrow by what they do today.
- If people follow safe practices, they can avoid many unnecessary injuries.
- Most incidents that result in injuries are largely preventable.

Belonging. Group belonging or cohesion refers to the feeling of solidarity or closeness with a group. Five main consequences result from a strong sense of group cohesion: 1) high quantity and quality of communication, 2) high member loyalty and satisfaction, 3) enforcement of group norms, 4) increased directing and focusing of group goals, and 5) a strong group culture, including special behavioral routines. Furthermore, people are not only more likely to help individuals who they feel are part of their group, but are more likely to help others outside the group. The Belonging subscale includes the following questions:

- My coworkers do many helpful things for each other.
- I feel close to my coworkers.
- I enjoy being with my coworkers.
- I trust my coworkers.
- I feel like I belong to my work group.
- My coworkers are not very close at all.
- My coworkers share much in common.

Mining Results

Mining employees responded less favorably than the norm on each of the scales measuring self-esteem (77% overall vs. 79% norm), optimism (53% overall vs. 62% norm), and self-efficacy (74% overall vs. 85% norm, see p.130-132 in Appendix I). Miners responded moderately higher than the norm on personal control (75% overall vs. 66% norm, while they responded significantly above the norm on belonging (75% overall vs. 60% norm, see p.133-134 in Appendix I). Deviations from the norm were largely do to the UCM data. The miners at this site showed consistently lower mean scores for each of the five subscales, bringing down the overall average.

Conclusions

It is important to note that unlike traits these person factors are states which fluctuate over time, changing from situation to situation. Although individuals may tend toward higher or lower levels of a given factor, each is highly influenced by interactions with both other individuals and with the overall organizational environment. Practices and policies within an organization can serve to either build or destroy these states within its members. Efforts to increase these critical person factors can take many forms.

To enhance self-esteem, people should be recognized and complimented on a job well done. They should be given opportunities to add their input or express their opinions. Belonging and teamwork can be promoted by recognizing group safety efforts, as well as individual achievement. Group goals and group feedback should be implemented, and group celebrations should occur as goals are reached. Teams should be enabled to develop through empowering experiences, rather than lectures, mandates, or top-down policy.

Self-efficacy, personal control, and optimism contribute to feeling empowered--the personal feeling that "I can make a difference." Self-efficacy can be increased by giving employees sufficient resources (including skills, time and personnel) to do the task at hand. A person's sense of "being in control" can also be developed; people need responsibility, the freedom to make mistakes, and the training to know how to do assignments correctly. They also need to believe the beneficial consequences they're experiencing are the result of their own effort. Optimism can be increased by recognizing the "small wins" in life, the little successes that can help to "shape" performance and add up to big achievements. Good planning also leads to optimism; giving people a sense that "we know how we're going to do this."

Finally, it is also important to recognize that stable changes in these person factors are usually not realized as readily as are behaviors. And, in fact, it is much more difficult to *measure* changes in these person factors than in objective, observable behaviors. However, because of their influential relationship with safety-related and actively caring behaviors, attention should be directed at assessing and improving the organizational influences on these critical person factors in order to initiate and sustain safety improvements.

STUDY 5: Property Damage Assessment

Introduction

Industrial safety experts have recently documented the need to consider property damage as both a predictor and an indicator of safety performance (Bird & Germain, 1997). For example, broken guards on machines, tools in disrepair, dents in equipment and walls signal safety-related incidents that need to be investigated. Property damage is a physical trace of an accident, and could signify to employees that management doesn't care about their safety. In some cases, faulty and damaged equipment is a root cause of a serious injury. In other cases, property damage reflects poor housekeeping which, in turn, can be a precursor to at-risk behavior.

Large-scale incident investigations (from near misses to serious injuries) have led experts to estimate that for every major injury, there are 30 corresponding property damage incidents. In other words, as the number of property damage incidents increase, the probability of a major injury increases proportionally. Moreover, workers' attitudes are negatively impacted when property damage embodies the culture of an organization (Geller, 2001). Clearly, the repair of environmental damage (or lack thereof) needs to be continuously tracked as an ongoing measure of safety performance and areas needing attention. Thus, this proposed research developed a protocol for assessing property damage.

Size of the Problem

Unfortunately, to our knowledge there is no central agency for collecting accident damage data for mining and mining related facilities. The mining organizations we worked with were no exception. Few of the sites kept any sort of formal recording procedure for property damage (often preferring to just fix damaged equipment as needed), and the others did not allow us access to their data. In any event, more legislation is requiring property damage to be reported to government agencies analogous to injury reporting. This process has been motivated by the growing awareness that property damage is correlated with personal injury (Veltri, 1990). Bird and Germain (1997) listed the following statistics:

- A non-ferrous metal multi-plant company conducted a pilot study to evaluate with reasonable precision the nature and scope of their accident losses. The results reveal 5:1 property damage to injury rate.
- A larger machine manufacturer conducted a plant study. During that study injury costs were \$208,300 compared to \$1,237,518 for property damage, a 1:6 ratio.
- An oil company reported property damage costs at \$5,740,700 compared to its injury costs of \$500,000, a 12:1 ratio.
- A small mining company reported \$615,750 in property damage for the years, compared to injury costs of less than \$100,000, a ration of 6:1.

Using the National Safety Council's figure for their 1995 work injuries of 120.7 billion dollars and the conservative 5:1 (damage to injury ration), we can estimate the cost of workplace damage in 1995 to be a staggering 603.5 billion dollars. In the mining industry alone, 548 workers were killed in both metal/non-metal and coal surface and underground mines from 1989-1993 (Langton, 1995). In 1995, more than 6% of all work-related fatalities occurred in mining facilities (U.S. Bureau of Labor Statistics, 1997). Also, there were more than 37,000 injury reports by miners in 1995 (U.S. Bureau of Labor Statistics, 1997).

Procedure

Focus groups were held with all mining employees at each of the four research sites. More in depth interviews were held with each site's foreman and safety coordinator to assess ways they record property damage. Also, we consulted the safety coordinator at a local trucking distribution company to assess alternative ways in which property damage could be recorded.

Due to the lack of an efficient recording system at our research sites, it became apparent we needed input from other mining facilities. A list of 432 names from the minenet.com database was compiled. These names represented safety coordinators, prospectors, geologists, and mining consultants from around the U.S. and from countries around the world (Australia, Canada, Mexico, South Africa, and South America). The document was sent via e-mail, see below for example of the e-mail survey. Due to a limited initial response, we sent the e-mail survey out again (12/16/2000). See Figure 26 on the following page for an example of the e-mail survey.

Results

We obtained many helpful suggestions and hints from our focus group meetings. Each site foreman and safety coordinator was extremely helpful and provided us with useful information on how they assess property damage. Unfortunately, our e-mail survey was met with limited success. Many of the e-mail recipient's addresses were no longer in service and we did not get the response we had hoped (i.e., we only received five responses out of 439 sent on e-mail). On our first attempt we only received one response. The second e-mailing only yielded three more responses. Nevertheless, the culmination of our focus groups, e-mail survey, and direct discussions with safety coordinators and site foreman yielded a variety of important tips. The following suggestions were gleaned from our e-mail survey, interviews, and focus groups.

The Identification and Reporting of Property Damage

Most property damage programs rely on voluntary employee participation to report the occurrence of incidents. However these "voluntary" employee participation programs will only succeed when employees are held accountable for completing property damage reports. An organized plan must be in place to find damage and follow-up to see that people are reporting it properly. This continuous effort cannot be met without coordination, training, and input from employees and others who will be using this system.

Damage. The initial job for the safety coordinator, or whoever is responsible for property damage is to determine what is "damage." Webster's New Collegiate Dictionary (1990) defines damage as: "injury or harm to something that makes it less valuable" (p. 323). While few will disagree with this definition it does little in the way of classifying property loss.

Although more subjective and difficult to obtain, qualitative analyses are probably more useful than quantitative measures of property damage. The most common quantitative measure is the use of dollars and cents to assess property damage. While at first this appears to be a sensible decision, it can lead to many problems. Different items have varying prices. Price does not determine function or importance. Tires for a 30-ton loader can be extremely expensive. Yet, tires deteriorate as a function of normal wear and tear. Can this property damage be compared to an incident where an employee damages an inexpensive screen to a crusher? The screen costs 1/10th the price of a new tire. Price does not allow a determination of what, if any, type of investigation needs to be performed.

Please **BOLD** the answer(s) that best corresponds to you. If more than one response is appropriate, then **BOLD** both responses and give relevant information under the "Other" section.

1) **How do you assess equipment damage at your facility?**

- A) Do not
- B) Checklist
- C) Equipment Log
- D) Tracking the number of manpower hours spent on repairs
- E) Money spent on repairs
- F) Frequency of repairs
- G) Other, please describe below

2) **What constitutes "damage" to equipment at your facility?**

- A) Dents and/or scrapes (Moderate damage)
- B) Various part(s) on equipment fail, but equipment is still functional (Major damage)
- C) Equipment is not functional (Equipment failure)
- D) Other, please describe below**

3) **How often do you conduct equipment damage audits?**

- A) Do not
- B) Every entry
- C) Once a shift
- D) Once a day
- E) Whenever it occurs
- F) Less than once a day

4) **How do you assess structural (i.e. damage to mine itself) damage at your facility?**

- A) Do not
- B) Checklist
- C) Self-evaluation (individuals' assessment)
- D) Other, please describe below

5) **How often do you assess structural damage at your facility?**

- A) Every entry
- B) Once a shift
- C) Once a day
- D) Less than once a day

6) **Please provide us with a copy of any checklist or audit form you use to assess structural or equipment damage at your facility.**

Please send or E-mail to:

E-mail: jehickma@vt.edu

Jeff Hickman

5100 Derring Hall

United States of America

Blacksburg, Virginia 24061-0436

Figure 26. Example of E-Mail Survey

Qualitative measures of property damage can greatly enhance the utility of an analysis. The data we have obtained suggest using at least three basic categories, including:

- *Minimum Damage*-any damage which is considered normal ‘wear & tear’ on property and structure. This mostly consists of dents, scratches, chipped paint, and normal deterioration due to its intended use.
- *Moderate Damage*-any damage that is considered ‘above and beyond’ normal wear and tear but does not interfere with normal function of item or plant. Damage that is preventable.
- *Major damage*-any damage that is considered ‘above and beyond’ normal wear and tear and directly interferes with the items functioning and safety. Damage that is preventable.

How often do I record damage? Our own observations and information gleaned from repair site personnel suggest general maintenance checks or ‘walk arounds’ should be completed at least twice a day. Vehicles, structural integrity, and tools should be assessed before use and after use. If your facility has shifts, then the items should be checked at the beginning and at the end of each workers’ shift. These daily checklists are used to assess minimum damage. While most front-line employees revealed they thought these checks were tedious and time consuming, they agreed they were necessary. They also suggested keeping these daily equipment checklists to a bare minimum in order to conserve time and effort, an example of such a checklist can be seen in Figure 27.


DAILY INSPECTION LOG		
FRONT _____ _____		
RIGHT SIDE _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> Truck# _____ Date _____ </div> 	LEFT SIDE _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____
REAR _____ _____ _____		

Figure 27. Daily Checklist for a Property Damage Report on a Truck

Service Requests. When a property damage form is received by the maintenance center personnel, two tasks are required. One, the severity of the damaged item needs to be assessed.

INCIDENT ENTRY	
Pit/Location of incident: _____	Date of incident: _____
Time of incident: _____	Date incident reported: _____
Type of Damage: _____	Item# _____
Observer: _____	Observer title: _____
Part of item damaged: _____	Body injury (Y or N): _____
Part of body injured: _____	Witness(es): _____
Doctor seen (Y or N): _____	When was doctor seen: _____
Days lost (Y or N): _____	How many days lost: _____
Able to continue regular job (Y or N): _____	DOT recordable: _____
MSHA recordable: _____	Preventable (Y/N/Unknown): _____
Road surface: _____	Road type: _____
Weather: _____	Item functional (Y or N): _____
Item salvageable: _____	
Describe, with as much detail as possible, what took place: _____	

Observer's signature: _____	Foreman/Investigator signature: _____

Figure 29. Detailed Checklist for a Periodic Property Damage Assessment

Secondly, repair shop personnel should complete a store request form so items needed to complete the work can be tracked. Because damage control costs are usually buried with all other maintenance costs, some very critical things may be happening. Not only is the company giving insignificant attention to the property damage incident that is costing them dearly, but ironically enough, they are really doing more to contribute to its occurrence than prevent it. It's commonly known that budget control is a basic barometer used frequently to measure a plant's efficiency. Once again it's important to know the difference between normal wear and tear versus damage.

The main question that routinely comes up with maintenance personnel is: "How do you tell from a maintenance request whether the results are from normal wear and tear. The answer can be quite simple. While front-line employees may not have the mechanical training or experience to make this distinction, repair personnel have the knowledge, logic, and common sense necessary to make such decisions. A double-check on work orders can determine an alternate root cause that could save the company large sums of money.

Investigating Property Damage Incidents

During the course of any business, people make mistakes. Unfortunately in the mining industry, if an employee makes a mistake in the area of safety, the consequences can be catastrophic. Incident analysis has long been recognized as a basic component of an organized safety endeavor. It serves as one of the most important sources of valuable information to prevent incidents (Bird & Germain, 1996a). By systematically analyzing incidents, one can determine the major program emphasis required to streamline risk reduction most efficiently. Objectives can be established to bring repetitive incidents into patterns that pinpoint common

consequences, causes, or training deficiencies. These analyses have long been recognized as fundamental to safety management (Ferry, 1990).

Once again, employee participation is critical in this area. Most employees we talked to viewed incident investigation as fault finding rather than fact finding. This view can hinder the whole process. If this belief is cultivated in the work culture, the safety coordinator will find resistance in any attempt to develop a participative property-damage process. Employees will not report property damage if they fear repercussion for their actions. After all, their suggestions and data are critical to identifying potential hazards and safety risks. Standardized methods for determining incident analysis and preventability should be made clear to front-line employees. This will dispel myths and create a climate of interpersonal trust. Procedures for analyzing property damage are essentially the same for injury control and are detailed below.

What Should be Analyzed? Common sense tells us that any serious incident producing harm to people or damaged property should be analyzed. While the occurrence of serious incidents are relatively rare, minor incidents and normal wear and tear on equipment occur frequently. Johnson (1976) suggests any incident not thought to be normal wear and tear should be formally investigated. Repair center personnel should also be encouraged to make their own informal analysis of the determinants of minor damage. Essentially all items, which fall under the rubric of either moderate or major damages, should follow more formal incident investigations.

Prompt Recording. The incident should be reported as soon as possible (Bird & Germain, 1996a; Ferry, 1990). Early reporting is necessary in order to minimize the chance of change and maximize the probability of finding witnesses and critical components that had an important part in the incident. Rules for reporting property damage incidents should be in place, and might include the following suggestions:

- Report any incident immediately to your safety coordinator or plant foreman that may cause injury to coworkers.
- Whenever you or the equipment you are operating are involved in a near miss or incident, regardless of severity, you must immediately report it to a the foreman or safety coordinator

Once again, the longer the delay in analyzing any incident, the more difficult it is to obtain accurate information that could be essential for bringing about remedial action to prevent or control future loss events. The goal of an organization should be to get all incidents reported as promptly as possible. This can only be achieved with a continuous monitoring process, coupled with the promotion of reporting by everyone. Attitudes towards reporting can change for the better when workers see and believe that incident analysis benefits them, does not eliminate jobs, and is used as a fact finding tool. Common reasons for not reporting property damage incidents include:

- Concern for losing one's job
- Fear of punishment
- Concern about one's work record
- Concern about one's reputation
- Avoidance of drug testing
- Desire to avoid work interruption
- Desire to keep personal record clear

- Avoidance of red tape
- Embarrassment about the attitude of coworkers
- Poor understanding of the importance of reporting

How to Get Property Damage Reported. Using basic BBS principles can be beneficial to get employees to report incidents. For example, give strong positive recognition for reporting. This can be done using thank you cards or appreciation stickers that can be displayed at a work station or on their PPE (Roberts & Geller, 1995). Raffles can be held for safety-related door prizes. Reporting property damage should be explained as a primary contribution to injury prevention. Management commitment can be attained by revealing to them the cost savings such reporting efforts can produce.

Who Should Investigate? As the severity of the loss involved with the incident increases, so does the level of management (Petersen, 1989). As described above we suggest three categories of damage. Front-line workers should usually assess minor damage. Repair center personnel should double-check these reports to make sure the damaged was caused by normal wear and tear (i.e., common cause) and not a special-cause incident.

Moderate and major damage should involve more formal investigation and therefore should be reviewed by several personnel. The incident investigation team at this level should include the supervisor/foreman, safety coordinator, and the department head. The supervisor or foreman can serve as the employee's advocate. This is critical in allowing employees to feel the analysis is to find the facts and not place blame. Also, this individual is similar with the working conditions and equipment, and thus can provide valuable information.

The safety coordinator is familiar with the rules and regulation of the company's safety policy and MSHA's enforcement policy. The safety coordinator does not necessarily have the field experience of the foreman, but can serve as a buffer between management and the first line supervisor (Bird & Germain, 1996b).

Ensuring an Effective Analysis. Good investigation depends on proper planning, preparation, implementation and follow-through. Here are several components of a successful program as suggested by site personnel (Bird & Germain, 1996b), and the National Safety Council (1994):

- Investigation policy—Good investigation systems start with a clear and objective policy. The policy should state the importance of the analysis and the benefits gained from a thorough analysis. They should specify which incidents will be investigated, who will be making the investigation, and the criteria for primary prevention. This policy should be read and understood by all front-line employees.
- Responsibilities—The system should specify to whom each type of incident should be reported so it can be analyzed properly. Those who are to be involved in the analysis should be properly trained.
- Resources—Many things are needed for the proper analysis, ranging from such basic supplies as clipboards, pencils, pads and survey forms, to more expensive testing tools, clean-up equipment and a digital or video camera.

- Procedure—The most important part of the incident analysis is planning and organizing the procedures. This tells everyone how things are to be done when an incident occurs.
- Pre-use checks—As stated earlier, crushers, haulers, cranes, continuous miners, and handling devices are a major agency of damager. Proper use of the pre-use form or equipment walk around plays a vital role in damage prevention.
- Tagging damaged items—Tagging damaged items much like tagging out equipment that is being serviced can be extremely helpful to coworkers. This can diminish the misuse of damaged equipment.
- Sharing damage information—It's extremely difficult to keep other shifts and work areas well informed on a timely basis regarding property damage. Not only does this provide valuable information to coworkers on the viability of certain items, but it also motivated everyone to report damage.

Interviewing People. People are the biggest source of information and energy for problem solving (Kuhlman, 1977). Even though workers may not want to “snitch” they will usually provide information and ideas to prevent future incidents. A context in which employees believe management is truly interested in finding facts rather than faults, increases workers’ willingness to provide accurate information. The following suggestions by Ferry (1988) are aimed at increasing the amount of information retrieval.

- Conduct interviews privately—This avoids undue influence of strong informal leaders who might sway others in a group discussion. It also allows workers anonymity and an atmosphere where they can ‘open up.’
- Get the individual’s version—Nothing is more important to these discussions than communicating the value of the person’s specific experience, viewpoint, knowledge, observations, and ideas for improvement.
- Ask necessary questions—Avoid ‘leading questions’ or those that might put the person on the defensive, and limit the use of questions that can be answered “yes” or “no.” Near the end of the interview it can be beneficial to ask a few control questions, (i.e., questions in which the interviewer knows the answer). This enables an evaluation of whether the person really saw clearly what happened.
- Give and get feedback—Reflect the interviewee’s key points. This assures the interviewee is listening and understanding, and it gives the interviewee a chance to correct possible misunderstandings. It also encourages active listening and interaction between the two parties, and gives the interviewee more opportunities to collect and organize information.
- Record critical information on the spot—Not only does taking notes ensure all essential information is remembered, it also shows the interviewee the investigation is taken seriously.
- Use visual aids—Using blue prints, pictures, video, and diagrams help interviewees get a clear picture of the situation, and sort out relevant facts.
- Use positive reinforcement—Thank the interviewees for their time and effort. Let the interviewees know when they give facts that are particularly useful. If anything has been given in confidence, give additional assurance that it will remain confidential.
- Follow-through—Instruct the interviewees to provide follow-up information if useful facts are remembered later. Follow-up with questions if there are conflicts

between different interviewees' comments. Keep the interviewees informed of the investigation's progress.

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Appendix A: CBC for Research Assistants

Appendix B. Operational Definitions for Intervention Sites

Mining Project Operational Definitions

PPE(not required in an enclosed cab)

Safety Glasses – Must be worn on face with the bridge on top of the nose and legs around ears. All glasses must have side shields as well as front lenses

Hearing – Flents (earplugs) must be placed securely in ear canal

Hard Hat – Hard Hat must be facing forward and placed on top of the head

Steel-Toe Boots – Boots with steel toes must be worn on the feet and securely tied.

Leather for Welding – When welding, leather apron should be worn over the head and fastened around the back

Housekeeping

Trash – Refuse (i.e., paper products, plastic bottles, aluminum cans, debris, etc) must be disposed of in the proper receptacles. Those that don't pose a tripping hazard.

Dust Build-Up – Dangerous build-up of dust around equipment, enough that one can't see the floor

Extension Cords – All cords must be free of frays and exposed wires.

Tripping Hazards – Any unnecessary items and/or substances on the ground that pose a danger to co-workers.(ex. Rocks, oil, water, bottles, cans, wood, boxes, cords)

Mobile Equipment

Left Side – All vehicles must drive on the left side of all roadways

Loading – When the dump truck is being loaded, the dump truck driver is required to be in the cab at all times during the loading process.

Seatbelts – All drivers must wear seatbelts anytime the driver is in the cab.

Speed – Drivers must not break the speed limit of 15 miles per hour.

Stop Sign – The wheels of any vehicle at a stop sign must come to a complete stop for 2 seconds before resuming travel.

Maintenance

Lock-Out/Tag Out – Machinery must have a lock and a tag on the appropriate fuse box when maintenance is performed on that machine.

Inspections of Tools – Employees should inspect tools for cracks, rust, cleanliness, and proper operation before use.

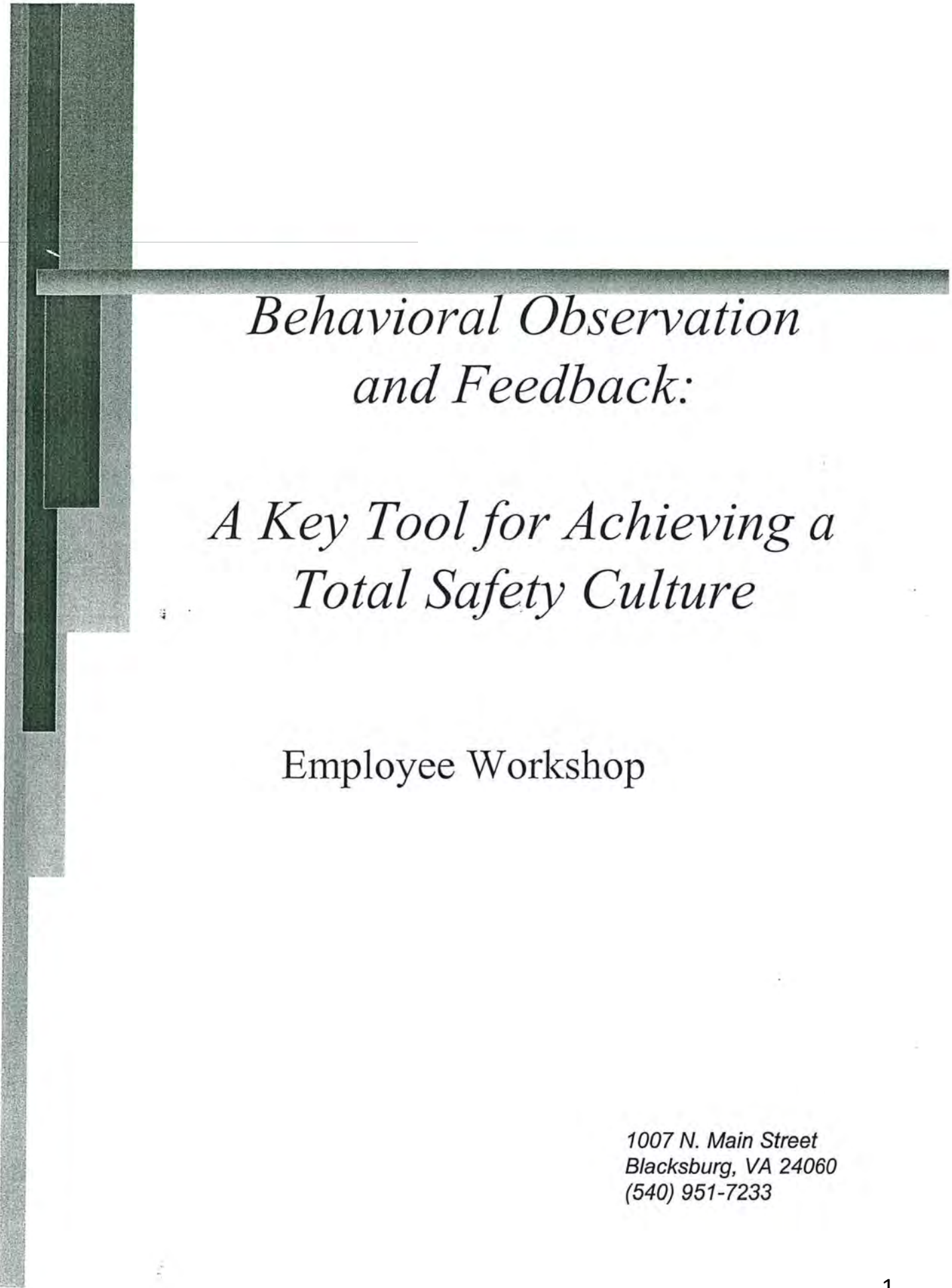
General Safety

Lifting – When lifting loads, the employee should: use legs, keep back straight, not twist back, and keep the load close to his/her body.

Stairs – Proper use of stairs includes not skipping any stairs and keeping the palm of the hand on the rail. One person on a ladder at a time

Catwalks – No running on catwalks

Appendix C: Safety Training Manual




*Behavioral Observation
and Feedback:*

*A Key Tool for Achieving a
Total Safety Culture*

Employee Workshop

1007 N. Main Street
Blacksburg, VA 24060
(540) 951-7233



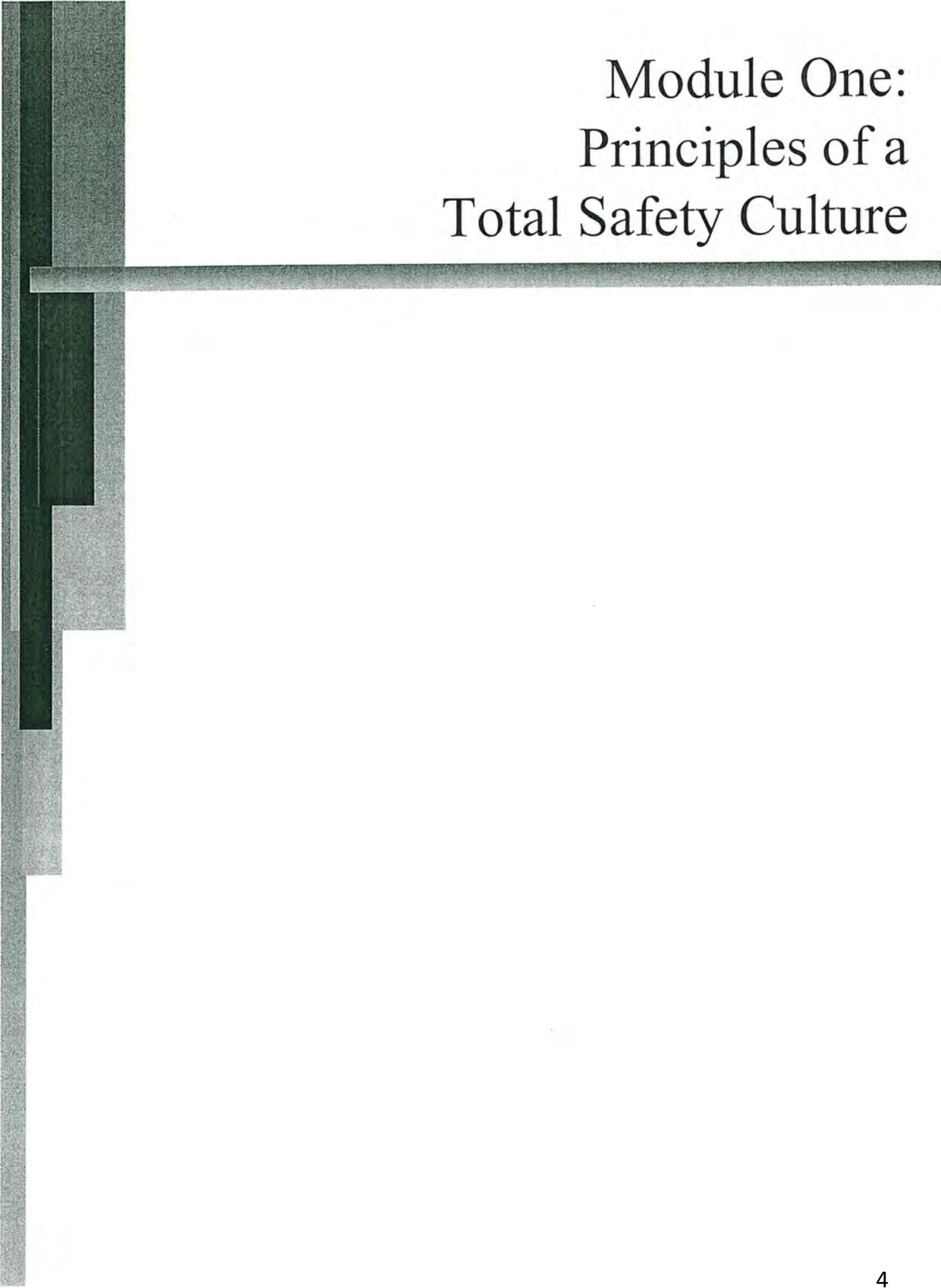
*Behavioral Observation and Feedback:
A Key Tool for Achieving a
Total Safety Culture at Rockville*

- I. Principles of a Total Safety Culture
- II. Behavioral Observation and Feedback Process
- III. Observation Skills for Coaches
- IV. Communication Skills for Coaches
- V. Analyzing Data
- VI. Actively Caring™ for A Total Safety Culture

Total Safety Culture

Employee Workshop Objectives

- Learn the principles behind the new safety improvement process being introduced.
- Learn how the new safety improvement process works.
- Learn how each employee can contribute to the new safety improvement process.
- Learn how to conduct a behavioral observation.
- Learn how to give and receive safety-related feedback.
- Learn how graphs can be used for group feedback and data analysis.



Module One: Principles of a Total Safety Culture

What is an Organizational Culture?

- The assumptions, shared beliefs, and values people live by.
- Corporate climate, attitudes toward work, degree of personal responsibility for work.
- Interactions, values, and attitudes visible among employees which come from traditions and past practices.
- The “rules of the game” for getting along in a company.

Exercise: Define An Ideal Safety Culture.

List characteristics of what you would consider to be an ideal safety culture here at Rockville. This includes environmental factors (e.g., equipment), as well as specific behaviors and attitudes of people.

A Total Safety Culture Has Four Characteristics.

- Safety is held as a value by all employees.
- Each individual feels a sense of responsibility for the safety of their coworkers as well as themselves.
- Each individual is *willing* and *able* to “go beyond the call of duty” for the safety of others.
- Each individual routinely *performs* safe behaviors for the benefit of others, also known as **Actively Caring™**.

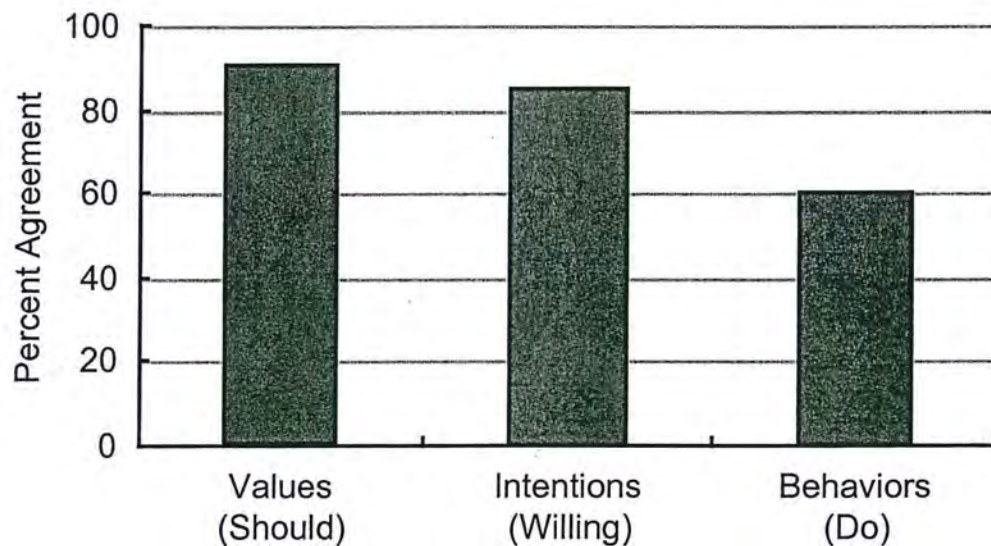
Responses Vary When Asked About Values, Intentions, and Behaviors.

“Employees should ...

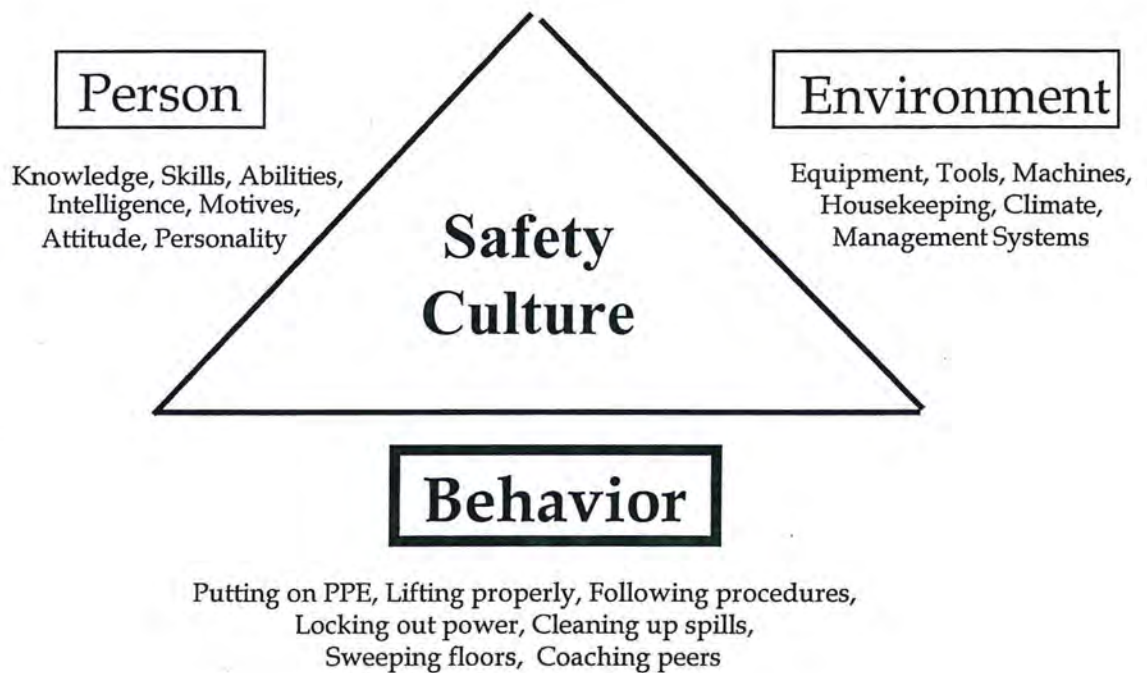
“I am willing to ...

“I do ...

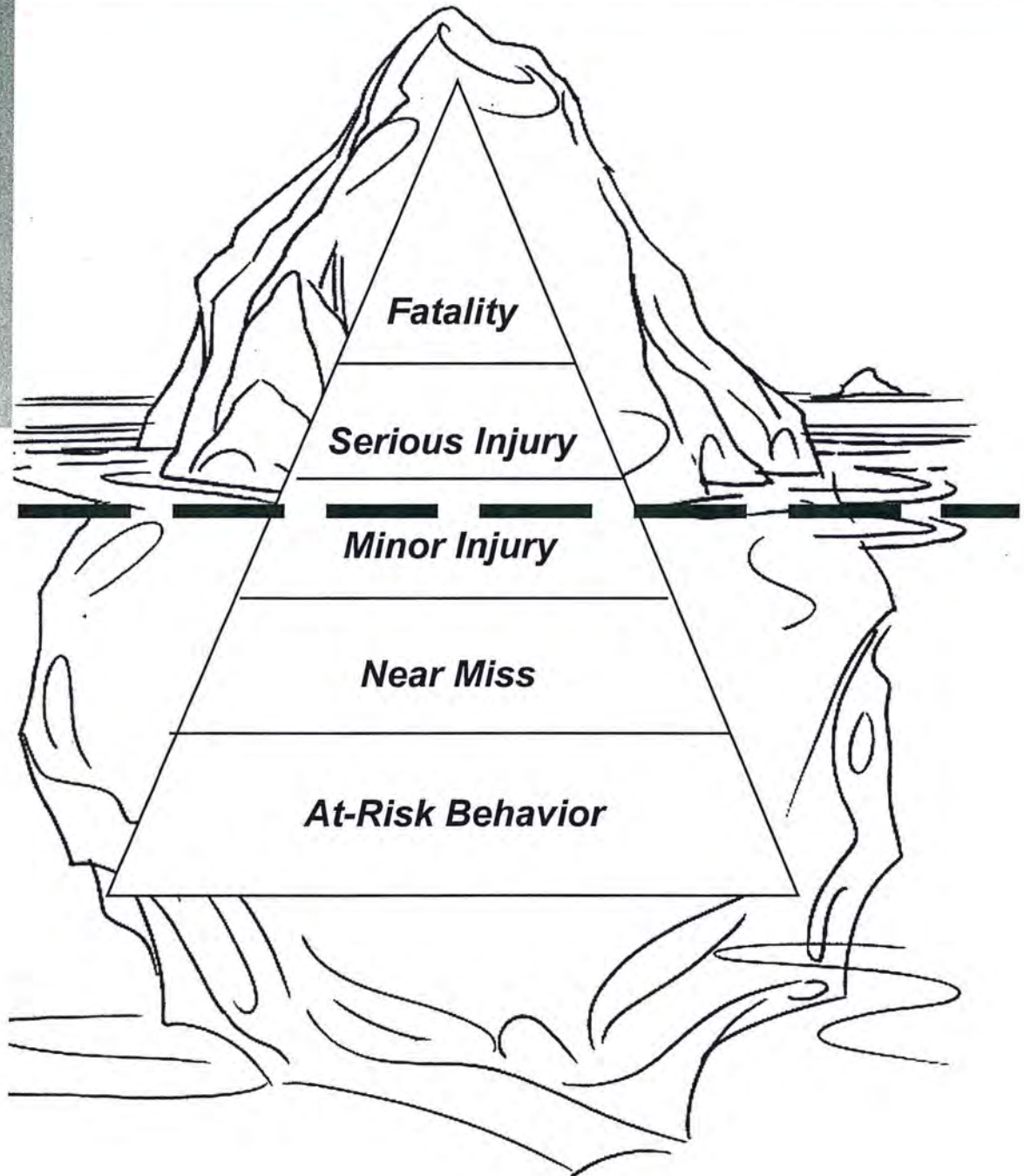
*...caution coworkers when observed
performing at-risk behaviors.”*



A Total Safety Culture Requires Constant Attention to Three Areas.



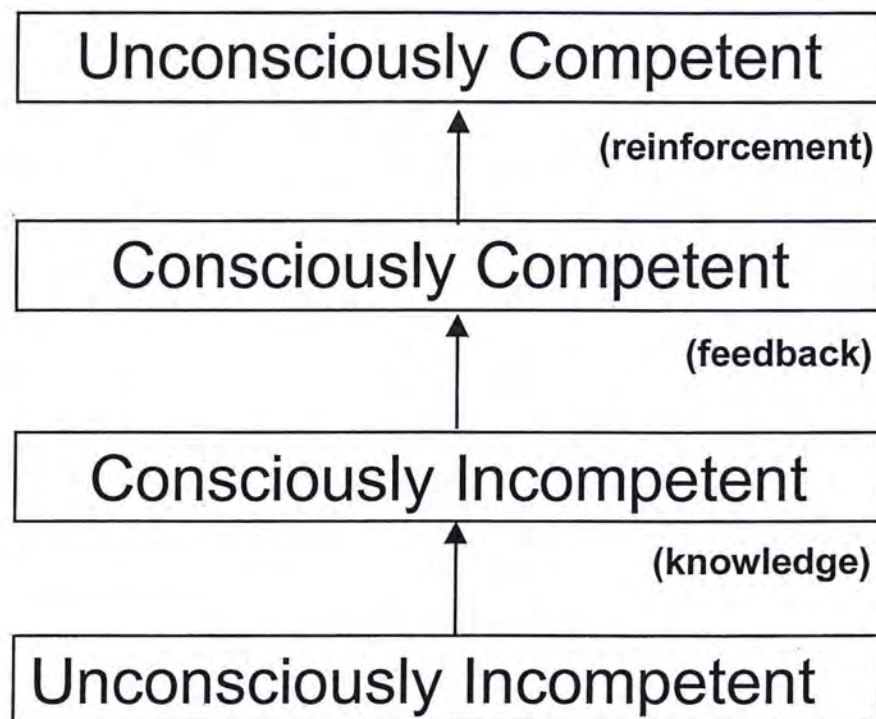
By Focusing on Behaviors, We
Identify Areas for Improvement
Before Injuries Occur.



People are Naturally Reluctant to Admit Personal Responsibility for Their Accidents.

- The other car collided with mine without giving warning of its intentions.
- A pedestrian hit me and went under my car.
- The guy was all over the road. I had to swerve a number of times before I hit him.
- As I approached the intersection, a stop sign suddenly appeared in a place where no stop sign had ever appeared before. I was unable to stop in time to avoid the accident.
- An invisible car came out of nowhere, struck my vehicle, and vanished.
- My car was legally parked as it backed into the other vehicle.
- The pedestrian had no idea which direction to go, so I ran over him.
- The telephone pole was approaching fast. I was attempting to swerve out of its path when it struck my front end.

At-Risk Behaviors Are Not Necessarily the Result of Deliberate Acts.



A Total Safety Culture Requires Continual Attention to Three Areas.



Person Factors Influence Our Willingness and Ability to Actively Care.

- Self-Esteem - “I am valuable.”
- Belongingness - “I belong to a team.”
- Self-effectiveness - “I can do it.”
- Personal Control - “I am in control.”
- Optimism - “I expect the best.”

Active Involvement of Employees is Critical to Achieve a TSC.

- Employees know when and where the at-risk behaviors occur.
- Employees know about unsafe conditions.
- Employees know more about peers' attitudes which may impact safety.
- Employees are in the best position to use the behavior-change tools on a day-to-day basis.
- Understanding the principles and designing the tools creates ownership of the process.
- Employees have the most to gain from safety improvements.

When People Feel Controlled, They Sometimes React To Reassert Their Freedom.



Beneficial Behavior Change Requires an Understanding of the ABC Model.

Activator ⇒ Behavior ⇒ Consequence

Activators:

Safety Meetings

Goal setting

Rules and Regulations

Pledge signing

Policies and Procedures

Incentives/Disincentives

Directive Feedback

Signs

Training

Modeling

Behaviors:

Driving the speed limit

Putting on PPE

Locking out power

Using equipment guards

Giving a safety talk

Cleaning up spills

Coaching others about safe work practices

Consequences:

Self-approval

Reprimand

Peer approval

Penalty

Feedback

Injury

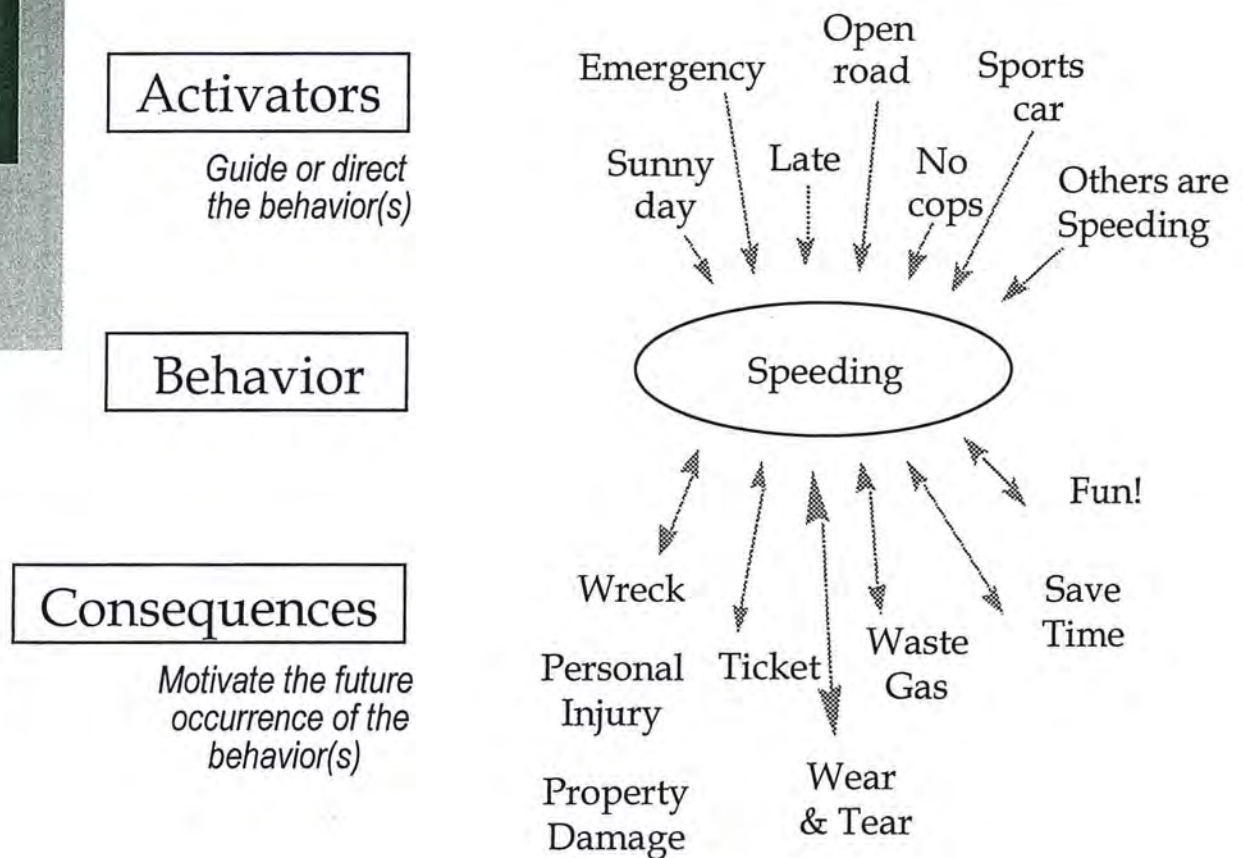
Prize or trinket

Inconvenience

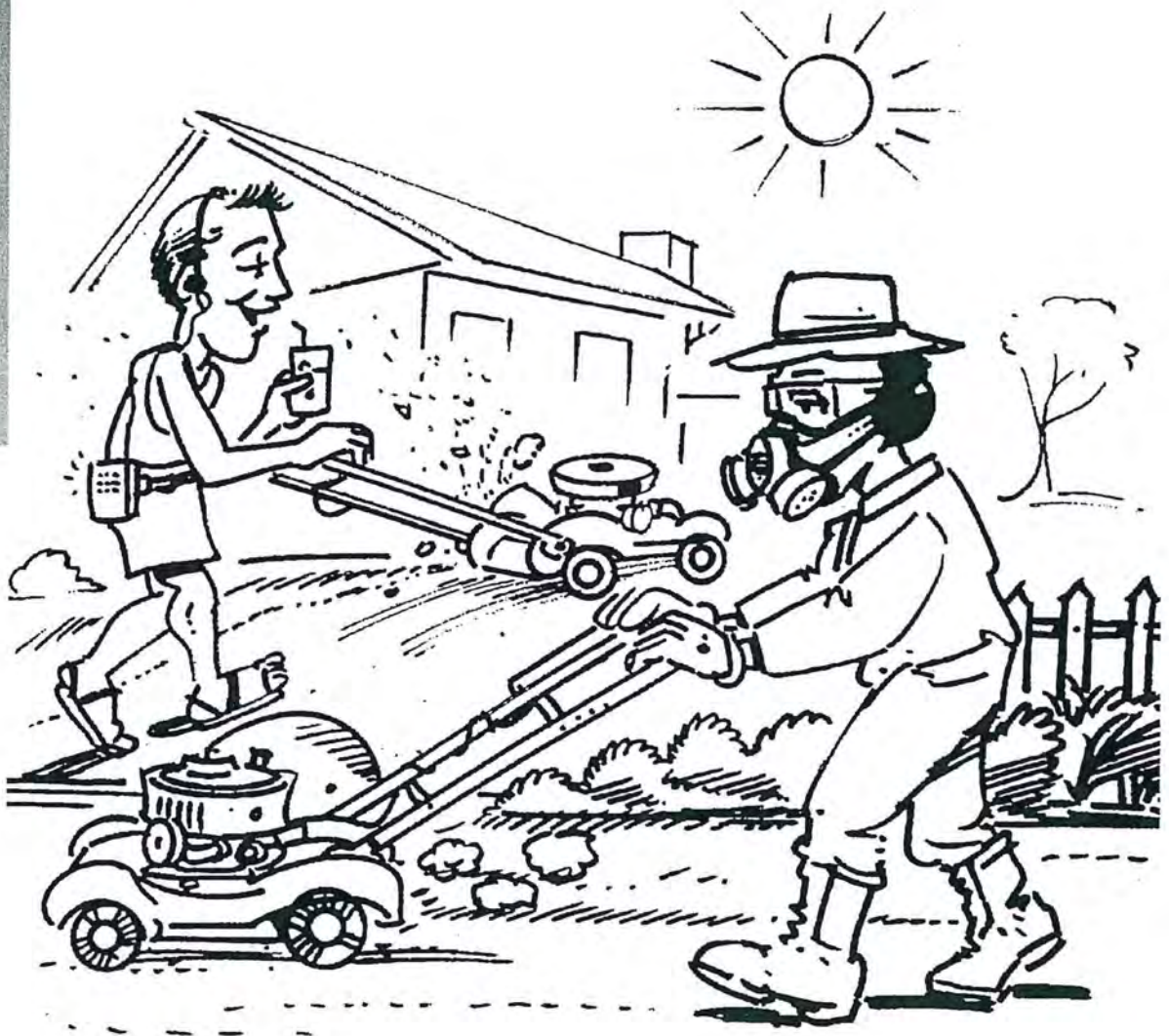
Thank-you

Time savings

The ABC Model Helps Us Explain Why People Speed.



Some Tasks Don't
Have Natural
Rewarding Consequences.



Safety is a Continuous Fight with Human Nature.

- At-risk behaviors are often more comfortable, convenient, and time-efficient than safe behaviors.
- At-risk behaviors rarely result in the sort of consequences (e.g., injury, discipline) sufficient to discourage their occurrence.
- Initial safety awareness and carefulness may be forgotten over time.

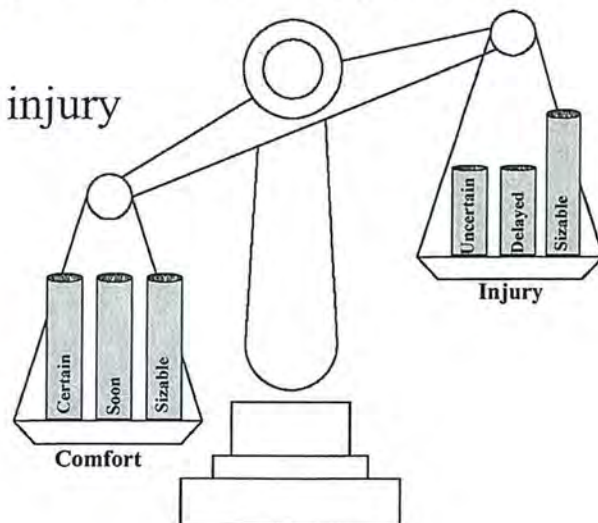
Some Consequences Lead to More Behavior Change Than Others.

The **MOST** effective consequences are:

- **Certain** (There's a high probability you'll receive the consequence.)
- **Soon** (The consequence occurs immediately after your behavior.)
- **Sizable** (The consequence is significant or meaningful to you.)

Risky Behavior: grinding without hearing protection

Consequences: comfort, injury



Exercise: Conducting an ABC Analysis

Directions: Identify an at-risk behavior you see occurring frequently at work. List the activators that encourage or direct the at-risk behavior. Then list the consequences that **promote** and those that **discourage** the behavior. For each consequence listed, indicate whether it is certain (+) or uncertain (-), soon (+) or delayed (-), and sizable (+) or negligible (-). Does this analysis help explain why people perform at-risk behaviors?

At-Risk Behavior: _____

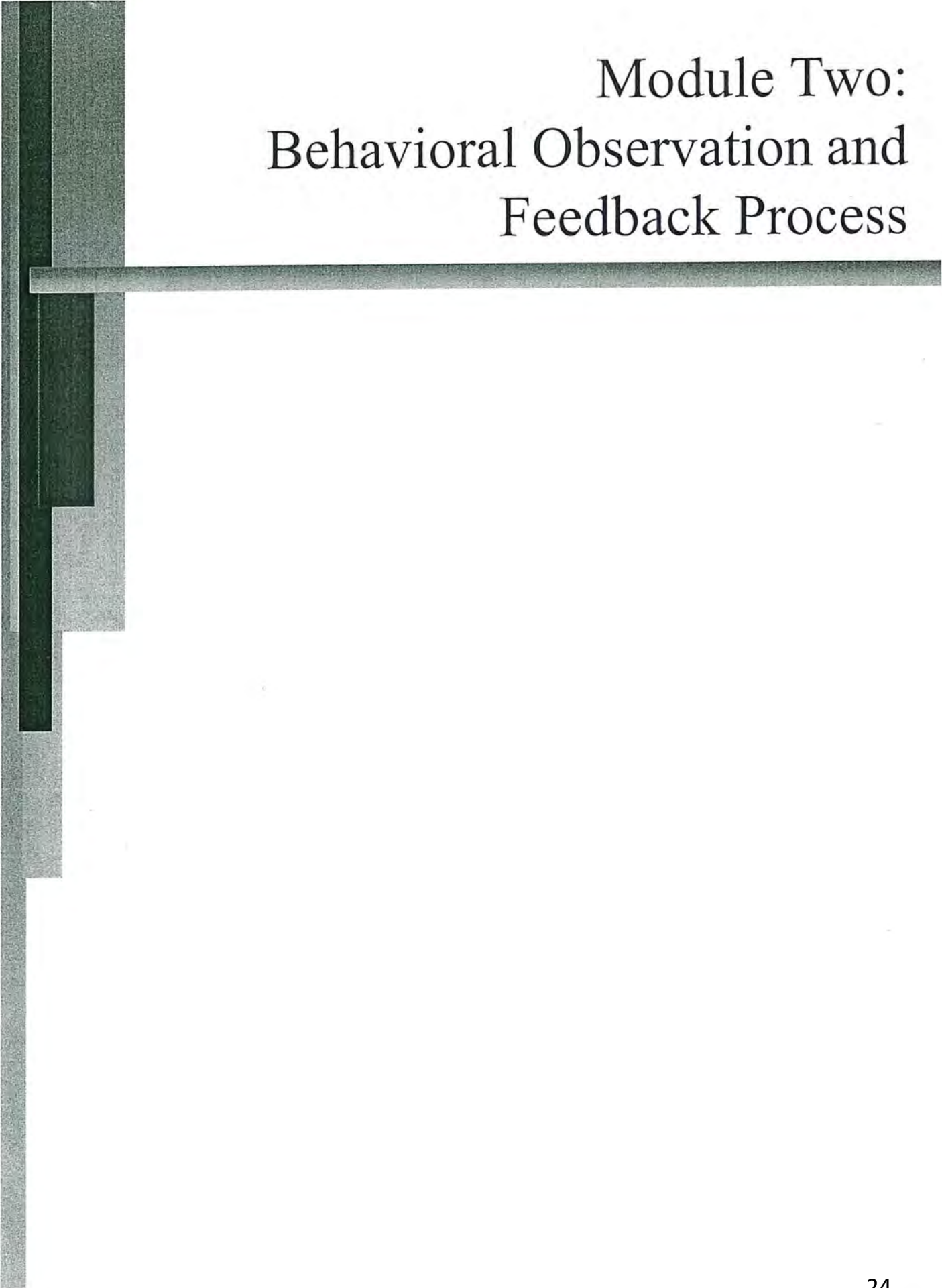
List activators that direct the at-risk behavior.

What are the consequences that promote the at-risk behavior?	Is the consequence Certain (+) Uncertain (-)	If the consequence occurs, is it	
		Soon (+) Delayed (-)	Sizable (+) Negligible (-)
1)			
2)			
3)			

What are the consequences that discourage the at-risk behavior?	Is the consequence Certain (+) Uncertain (-)	If the consequence occurs, is it	
		Soon (+) Delayed (-)	Sizable (+) Negligible (-)
1)			
2)			
3)			

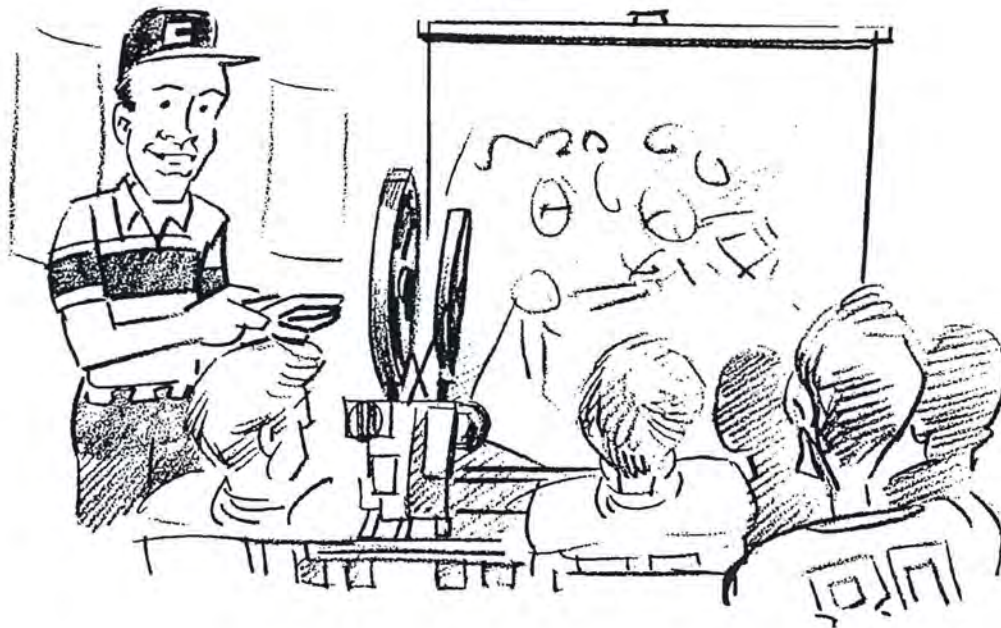
Principles of a Total Safety Culture: Main Points

- In a Total Safety Culture, individuals go “beyond the call of duty” for the safety of others (i.e., Actively Care).
- A systems approach to achieve a Total Safety Culture encompasses three areas impacting safety: environment, behavior, and person factors.
- Focusing on behavior works to improve safety because most workplace injuries result, in part, from behavior and because we can observe, measure, and change behavior.
- Person factors (e.g., self-esteem, belongingness, self-effectiveness, optimism, personal control) also affect safety because they heavily influence behavior.
- All employees learn the principles behind a Total Safety Culture so they will understand and participate in behavior- and person-based interventions.
- Motivation is needed in addition to direction to encourage long-term behavior change.
- Activators occur before behavior and direct it. Consequences follow and motivate behavior.
- Effective consequences are certain, soon, and sizable.
- Both positive and negative consequences can be effective but positive ones enhance positive attitudes and result in long-term behavior change.
- The ABC Analysis is a useful tool to analyze why people perform at-risk behaviors.



Module Two: Behavioral Observation and Feedback Process

Coaches Observe Then Review Accomplishments and Mistakes.



An Observation and Feedback Process Influences Safety-Related Behaviors.

- Employees routinely observe one another while working.
- A checklist guides the observer to focus on critical safety-related behaviors.
- Immediately afterwards, the observer provides feedback to the observee, noting both safe and at-risk behaviors.
- The observation checklists are collected and compiled. The collective data is graphically portrayed.
- The resulting information is periodically reviewed with all employees.
- The information is analyzed to identify areas for follow-up action.
- Targeted areas are pursued using a problem-solving process (DO IT).

Observers Need a Checklist of Critical Behaviors to Guide Their Observations.

Observer: _____

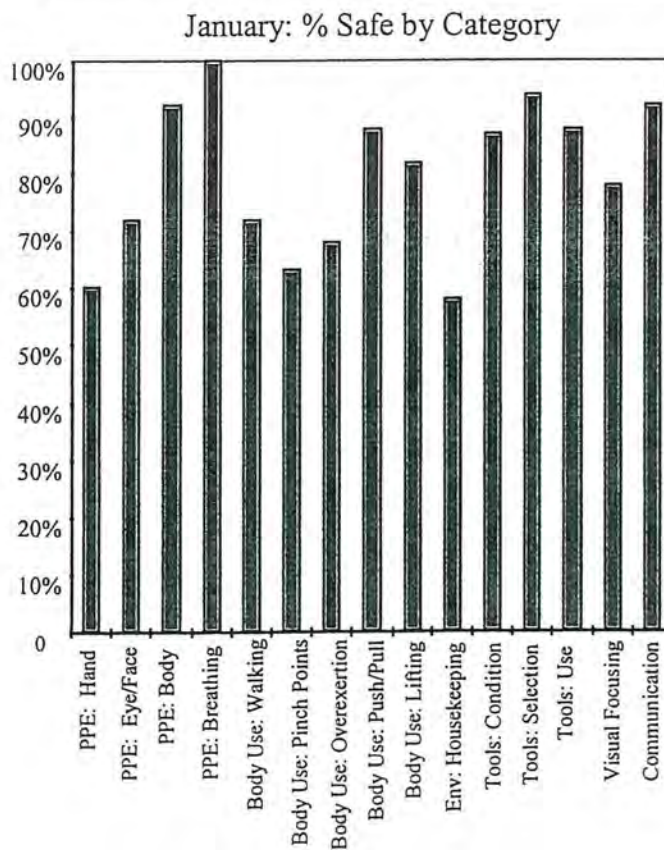
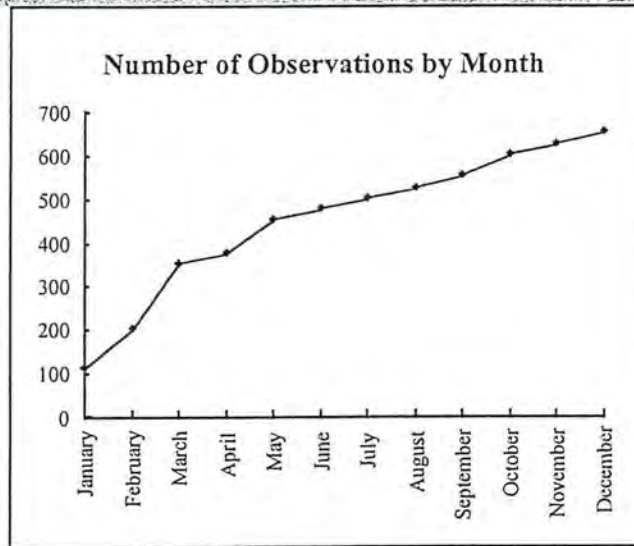
Date: _____

Department: _____

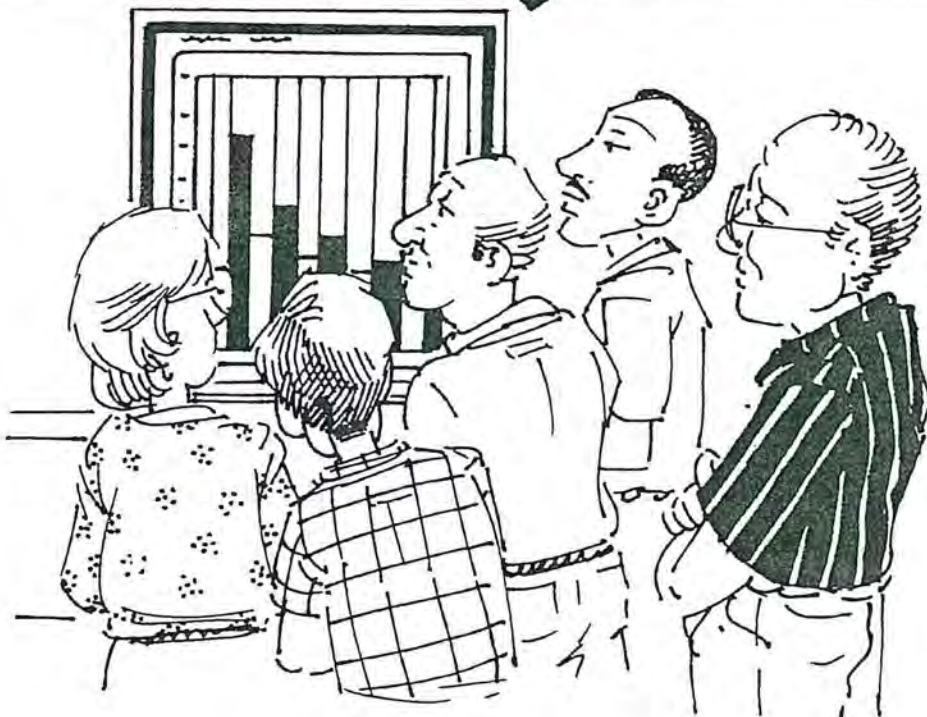
Time: _____


Operating Procedures	Safe	At-Risk	Comments
PPE Using personal protective equipment (e.g., eye glasses, hearing protection, gloves, hard hat), safety harness, respirators.			
Housekeeping Keeping safe high walls and clean roads. Work area maintained appropriately (e.g., trash and scrap picked up, no spills, walkways unobstructed, materials and tools organized).			
Mobile Equipment Operation Looking when backing up, reasonable speed, seat belt.			
Body Positioning/Protecting Positioning/protecting body parts (e.g., avoiding line of fire, avoiding pinch points, using equipment guards).			
Locking out Equipment Securing screen decks, conveyor belts, pumps, etc. Working on haul truck, raised hydraulic systems, screen houses.			
Communication Verbal or nonverbal interaction that affects safety.			
Following Procedures (e.g., following lockout/tagout procedures)			

The Data Collected is Graphically Portrayed.



Both Individual and Group Feedback Follow Observations.





The Design of an Observation and Feedback Process Follows Five Steps.

1. Select the behaviors to observe.
2. Develop the checklist.
3. Develop guidelines for using the checklist.
4. Determine how the data will be processed and shared.
5. Determine the process for following-up on targeted areas.

Exercise: Using a General Behavioral Observation Checklist

Directions: First select two different jobs, then for each category to the left, list specific work-related behaviors in the right hand columns. See the example shown.

Example

Behavior Category	Specific Behaviors Job 1: Operator	Specific Behaviors Job 2: Lab Tech
PPE	-Wearing safety shoes -Wearing hearing protection	- Wearing rubber gloves - Wearing goggles

Behavior Categories	Specific Behaviors (Job 1: _____)	Specific Behaviors (Job 2: _____)
PPE		
Body Positioning		
Housekeeping		
Lifting or Moving Objects		
Using Tools and Equipment		

A Full Blown Process May Not Be Practical at First.

- There is no “best” approach.
- A subset of employees may serve as observers.
- A small number of behavioral categories may be included.
- Little or no demographic information is collected.
- Feedback charts may be unsophisticated (KISS principle).

Focus on Different Aspects as the Process Grows.

- Initially, focus on building trust and increasing participation.
- *You can't trust the data until the people collecting it trust the process.*
- As trust increases and observation skills are developed, the data becomes more useful.
- Use the data to focus improvement activities and to demonstrate the value of the process.
- Continually emphasize the value of the behavior-focused interaction (formal and informal) between employees.


An Observation and Feedback Process is a Key Tool for Achieving a TSC.

- Systematically focuses attention on safe and at-risk behaviors.
- Gives individuals “permission” to provide feedback to one another.
- Serves as a means to recognize safe work behavior and safety achievements.
- Focuses on *process* measures, rather than traditional safety *outcome* measures.
- Allows employees to make significant contributions toward safety.
- Fosters open communication between employees about safety issues.
- Serves as a constant reminder of workplace safety.

A Successful Observation and Feedback Process Requires Effort from Everyone.

- Employees
 - design and participate in the behavioral observation and feedback process.
 - design, implement, and evaluate specific behavior-change interventions.
- Site Leaders
 - promote and support the employee-driven process by providing coordination, encouragement, and recognition.
 - ensure other safety management systems help rather than hinder the safety improvement efforts.
 - ensure their individual practices facilitate a positive culture change.

Therefore, everyone needs to learn the principles behind a TSC as well as the strategies for achieving a TSC.



Behavioral Observation and Feedback Process: Main Points

- A behavior observation and feedback process is a structured process to encourage peer safety coaching.
- A behavior observation and feedback process should be tailored to fit the culture and needs of an organization (e.g., who will be the observers, how often will they observe).
- Data collected during observations is shared with the work team, but individual data cannot be identified.
- Coaches give feedback whenever there is an opportunity; not just as part of an observation and feedback process.



Module Three: Observation Skills for Coaches

Determine What, When, and How to Observe.

- Select a variety of tasks to observe:
 - inherently high-risk
 - infrequently performed
 - require a coordinated effort of many
 - performed by a single individual
 - you are very familiar with
 - you are not very familiar with
 - may not be observed often
 - individuals who may not be observed often
- Choose a good time for the observation.
 - Does not inconvenience the observee
 - Does not interfere with your or your team's other responsibilities
- Determine if the observation will focus on one or several persons.
- Observe for an appropriate length of time.

Set the Right Example As You Observe.

- Before you observe:
 - Review the behavioral definitions.
 - Introduce yourself and ask permission (if appropriate).
 - Remind observee the purpose of the process.
 - Remind the observee that names will not be recorded and that you will review your data from the observation with him/her.
 - Show the observation card (if appropriate).
- Set a safe example yourself while observing.
 - wear required PPE
 - position yourself out of the way of others and any danger
 - minimize distractions to others

Ask Observee's Permission When Needed.

- Observing a single person for a work cycle or task:
 - Prior permission or on-the-spot permission should be granted.
 - More important in the beginning.
- Observing multiple persons for very brief periods of time:
 - Permission may not be required; if it is, prior permission works best.
 - Permission probably won't be needed as process matures.

Follow These Guidelines for Scoring Safe and At-Risk Behaviors.

- Leave categories blank if the behaviors are not observed.
- If unsure, mark the behavior, but indicate your uncertainty in your comments.
- Record repeated occurrences of a behavior.
 - If one employee is wearing 4 pieces of PPE correctly, mark 4 safe behaviors.
 - If two employees are wearing appropriate eye protection, mark 2 safe behaviors.
 - If an employee lifts 5 times, 3 of which are performed safely, and 2 of which are performed at-risk, mark 3 safe and 2 at-risk.
- Develop a sampling procedure for continuously performed behaviors.
 - For example, indicate speed limit compliance each time you pass a speed limit sign.

Record Each Behavior and Provide Written Comments.

Date: March 16

Task: Replacing Screen on Screen Deck

Observer: Joe Smith

Behaviors	Safe	At-Risk	Comments
PPE			Should use clear safety glasses in dark screen area, falling rocks could hurt eyes.
Pacing of work			Not waiting for help putting screen in place created a possible muscle injury.
Body positioning			Body in way of falling nut when cutting screen bolts, clothes could catch fire.
Tools and equipment			Used screwdriver to pry screen in place, could have used pry bar to prevent injury with broken screwdriver.
Follow Procedures			
Lockout/Tagout			
Totals	19	6	

Written Comments Are Essential to Good Feedback and Problem-Solving.

- Written comments provide detail to:
 - allow the observer to better describe what was observed.
 - allow the Implementation Team and/or work groups to problem-solve.
- Write brief comments as you observe.
 - Comments should explain “what” was observed, and possibly “why.”
 - All at-risk behaviors *should* have comments.
 - Particularly safe behaviors *should* have comments.
 - Acknowledge all positive behavior change.
- Add comments afterwards.
 - Comments should help explain “why” a behavior occurred.
 - Record what the observee tells you.
 - Record what you discover together.
 - Elaborate on your earlier comments.

Quality Comments Are a Vital Part of the Observation Process.

- Vague comments give little information.
 - Wrong tool used
 - Unsafe loader operation
 - Person in dangerous position
- More detail is better.
 - Used cheater bar instead of correct size wrench.
 - Not looking behind when reversing.
 - Person standing too close to high wall.
- Add even more detail during feedback.
 - Used cheater bar instead of wrench. *Wrench was too small and tool crib was out of larger wrenches.*
 - Not looking behind when reversing, *almost hit pickup truck passing behind.*
 - Person standing too close to high wall, *about 3 feet from edge.*

Video Exercise (cont.): Detailed Checklist

List the safe and at-risk behaviors identified by the class. Watch the video again, indicating each of the behaviors you are now able to find.

	Specific Behaviors	Safe	At-risk	Comments
PPE	• • • • •			
Body Positioning & Protecting	• • • • • •			
Communication	• • • • •			
Visual Focusing	• • • • •			
Pacing of Work	• • • • •			
Tool & Equipment Use	• • • • •			
Housekeeping	• • • • •			

The Video Exercise Illustrates Several Important Points.

- Even when individuals know they're being observed, they still perform behaviors which may put them at-risk for an injury.
- We are more systematic and thorough when we use a checklist.
- As observers, we notice only a fraction of the safe and at-risk behaviors performed.
- Different observers notice different behaviors.
- "Safe" and "At-risk" are often subjective.
- We tend to notice at-risk behaviors more readily than we do safe behaviors.
- We can easily identify many safe and at-risk behaviors, even in jobs we don't know well.
- We improve observation skills with practice - if we get feedback from other observers and/or the observee.

Becoming a Skilled Observer Takes Training and Practice.

■ Why?

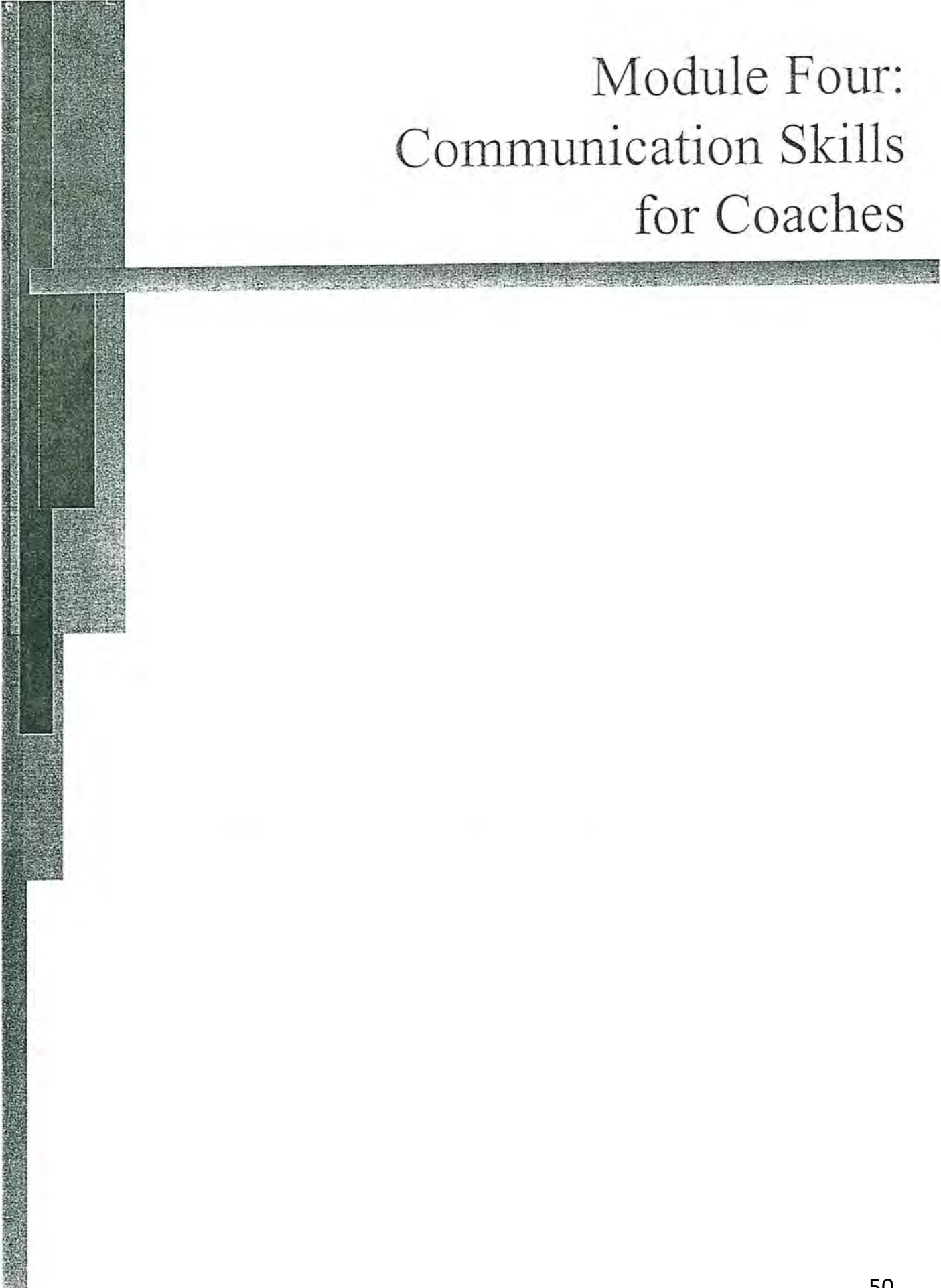
- Behaviors happen quickly.
- Details often go unnoticed.
- You can't anticipate everything.
- It's an unfamiliar skill for most.
- All observers tend to be biased.

■ So...

- Know the checklist.
- Know relevant examples of the behavioral categories on the checklist.
- Use the checklist as a guide, but look for other behaviors too.
- Practice with your peers.
- Focus on one to three behavioral categories in detail for a period of time, then add additional categories.
- Strive to always be objective.

Observation Skills for Coaches: Main Points

- Integrate observations into the workplace so they don't inconvenience or distract the observee nor interfere with your individual or team's other responsibilities.
- Set the right example as you observe by making contact and asking permission (where appropriate) as well as wearing the required PPE and positioning yourself out of danger.
- When scoring safe and at-risk behaviors on the checklist, be sure to record repeated occurrences of the behaviors.
- Always provide quality written comments in order to provide good one-on-one feedback and to help work groups in problem solving.
- To become a skilled observer, know the checklist, relevant examples in each category, and practice with your peers.



Module Four: Communication Skills for Coaches

The Observer's Purpose Influences How Feedback is Given.

- The observer's purpose includes:
 - Identifying and reinforcing safe behaviors observed.
 - Identifying opportunities for injury due to at-risk behavior.
 - Communicating the risk to the observee.
 - Helping to identify a safer alternative.

- The observer's purpose does not include:
 - Enforcing safety rules.
 - Forcing people to change.
 - Gossiping about how others do a task.
 - Reporting others to management for unsafe work practices.
 - Collecting data for promotions, raises, or layoffs.

Coaches Must Overcome Barriers to Giving Feedback.

- Experience
 - *I've never given peer feedback before.*
- Perceived authority
 - *It's not my job to give peers feedback.*
- Knowledge
 - *I don't know enough about that job to give feedback.*
- Confidence
 - *I'm not sure I can give appropriate feedback.*
- Misunderstanding
 - *I'll be accused of having a hidden agenda.*

There Are Barriers to Receiving Feedback.

- Peer feedback regarding safety is new—It won't be for long.
- People expect criticism—Don't give it to them.
- People may fear the data will be used against them—Reassure them and then show them that it will not.
- Corrective feedback can threaten one's self-esteem—Try to build self-esteem.
- Remember, even when people want to change, change may occur slowly.
- Don't take it personally.

Technique Can Help You Deal With Resistance to Coaching.

- Explain the purpose and confidentiality of the process.
- Ask why they're hesitant to participate and what would alleviate their concerns.
- Offer alternatives:
 - Let them observe you.
 - Offer to give them the completed checklist to turn in (if they choose).
 - Ask if a different observer or different time would be preferable.
- If they still say no, thank them and suggest they contact you if they change their mind, then leave.
- Wait before asking the person again. Encourage others to wait also.
- Consider approaching the person's work group to review the process and its purpose.

Your Approach Can Influence the Listener's Reaction.

- Emphasize that most behaviors were safe.
- Express concern for listener's safety.
- Be friendly and positive.
- Be respectful (acknowledge listener's skill, knowledge, and experience). Don't criticize.
- Talk with, not at, people; don't lecture or argue.
- Focus on risk potential, not safety rules.
- Take time to step through entire checklist.
- Allow time for and encourage discussion.
- Maintain confidentiality.
- Refer to yourself or the entire work group as examples.



Effective Safety Coaches Practice Certain Skills.

Care

- show that you care
- set a caring example

Observe

- define target behaviors
- record behaviors

Analyze

- identify current consequences
- identify potential consequences

Communicate

- listen actively
- speak persuasively

Help

- recognize continuous improvement
- teach and encourage the process

Consider Your Biases When Giving Feedback.

- We sometimes form strong opinions about groups (group bias).
 - *You mechanics are always taking shortcuts.*
- When observing those you like, you'll be more lenient (halo effect).
- When observing those you dislike, you'll be less lenient (pitchfork effect).
- For others, we tend to blame internal factors (person bias).
 - *You got hurt because you're risky.*
- For ourselves, we tend to blame external factors (environment bias).
 - *I got hurt because of production pressure.*
- We tend to focus on at-risk behaviors and ignore safe behaviors.

Follow These Guidelines When Giving Rewarding Feedback.

- Give it one-on-one.
- Give it as soon as possible.
- Specify the behavior you're rewarding.
- Give sincere and personal praise.
 - *I appreciate your safe behavior.*
 - *You're setting a good example for me.*
- Indicate how safe behavior builds a better safety culture.
- Give the receiver a chance to respond.
- Reaffirm approval and offer encouragement.
 - Thanks again. Keep up the good work.

Follow These Guidelines When Giving Correcting Feedback.

- Give it one-on-one.
- Give it as soon as possible.
- Specify the behavior you're correcting.
- Focus on the behavior, not the individual.
- Show sincere concern for others' welfare.
- Don't criticize.
- Give the receiver a chance to respond.
- Ask for potential solution and/or suggest desirable behavior.
- Focus on the importance of setting examples for others and building an injury-free culture.
- Request commitment for behavior change.
- Don't nag; allow time to change behavior. Give praise when change occurs.

Receiving Correcting Feedback Can Be Uncomfortable.

- System factors are encouraging the at-risk behavior.
- A newer employee is giving the feedback.
- Everyone in the group has been doing it this way for years.
- We disagree on the safe way to do the task.
- The coach is guilty of performing the at-risk behavior himself.

Unsolicited requests for change can be stressful.

Special Techniques Can Help Lower Resistance to Correcting Feedback.

- Take time to understand the context before attempting to diagnose a problem.
- Ask for permission to give feedback.
- Use 'I' statements.
 - ☹ *You are being risky.*
 - ☺ *I think that behavior may be risky.*
- State your opinions as opinions, not facts.
 - ☹ *You'll get hurt lifting two boxes at once.*
 - ☺ *I think you may be lifting more weight than is safe.*

Special Techniques Can Help Lower Resistance to Correcting Feedback (cont.).

- Let others finish their sentences.
- Avoid sarcasm or inappropriate humor.
- Avoid using absolutes such as *must*, *never*, and *always*.
 - ☹ *You always ignore the safeguard on that machine.*
 - ☺ *I noticed just now you were working on that machine without a safeguard. Why?*
- Avoid labeling or attributing person factors; focus on the behavior.
 - ☹ *You are irresponsible for not using your PPE.*
 - ☺ *I see you're working without PPE. Why?*
- Choose your words carefully.

Choose Your Words Carefully When Giving Correcting Feedback.

- Use *safe* and *at-risk* instead of *right* and *wrong*.
 - ☹ *You took that sample wrong.*
 - ☺ *I thought you may have been at-risk when you took that sample.*
- Use *at-risk* instead of *unsafe*.
 - ☹ *I believe you were operating that grinder unsafely.*
 - ☺ *I believe you may have been at-risk when operating that grinder.*
- Use *corrective* instead of *negative feedback*. Talk about *areas of concern*, or *opportunities for injuries*.
 - ☹ *Now, let me go over the negative feedback or the bad stuff.*
 - ☺ *Next, I'd like to discuss areas of concern.*
- Use *I had a question about ...* or *I was concerned about...* instead of *I wrote you up for...* or *I had to mark you down for...*

Here are Examples of Correcting Feedback for Common Situations.

- The person acknowledges the risky behavior, but says he was rushed and didn't have enough time.
 - ☹ *Well, you're just gonna have to slow down.*
 - ☺ *You're safety is worth an extra few seconds.*

- An experienced employee is offended by a newer employee giving feedback.
 - ☹ *I don't care how long you've been here.*
 - ☺ *I realize you've got a lot of experience. I didn't mean to come across as telling you how to do your job. I just don't want to see you get hurt.*

- An employee claims everyone else does the risky behavior.
 - ☹ *If everyone else jumped off a cliff, would you?*
 - ☺ *I realize a lot of us do that, but we've got to remind each other to always work safely.*

Here are Examples of Correcting Feedback for Common Situations (cont.).

- The person doesn't admit they're doing anything wrong or putting themselves at risk.
 - ☹ *If you would just open your eyes, you would see the risk.*
 - ☺ *Since we can't agree on the safe way, let's discuss it with the group to arrive at a standard.*
- The person questions your sincerity by pointing out you have done the same behavior in the past.
 - ☹ *Don't try and change the subject.*
 - ☺ *I know I've done this before, but I'm trying to change. Will you remind me in the future?*
- The person gets angry for no apparent reason when approached for feedback.
 - ☹ *Hey, don't blow a fuse.*
 - ☺ *Is there anything wrong?*

Follow These Guidelines for Receiving Feedback.

Rewarding or Correcting Feedback:

- If vague, ask for specifics.
- Actively listen to what is said and why.
- If feedback is not behavior-focused, seek clarification.
- Thank the person.
- Think before you act. Consider the speaker's emotional state and purpose.

Correcting Feedback Only:

- Be objective/not defensive. Remain calm.
- Be open and receptive. Don't confuse correcting feedback with criticism.
- Avoid taking a position. Accept feedback without retaliation.
- Collaborate on potential solutions.
- Reach agreement on actions to be taken.

Additional Communication Skills Aid Giving and Receiving Feedback.

- Active Listening
 - allow speaker to finish
 - maintain eye contact
 - ask open-ended questions to clarify meaning
 - paraphrase but don't parrot
- Non-Verbal Communication
 - facial expressions
 - eye contact
 - personal space
 - vocal tone
 - touch

Exercise:

Feedback Demonstration

Giving feedback is not easy, especially if it is a new experience. Both the sender and receiver of feedback often feel awkward even if the feedback is rewarding. In fact, accepting rewarding feedback or compliments is more difficult for some people than receiving correcting feedback. One-on-one feedback is a valuable intervention to reward or correct behavior, and it is only possible to achieve in an actively caring environment. The more you practice giving and receiving feedback, the easier it will become.

Develop a scenario in your group involving one-on-one feedback. You will need to identify a sender (or coach), a receiver, and an evaluator. Determine the type of scenario from the list below.

A. Rewarding Feedback B. Correcting Feedback

- | | |
|--------------------------------|--------------------------------|
| 1. Given Well, Received Well | 1. Given Well, Received Well |
| 2. Given Well, Received Poorly | 2. Given Well, Received Poorly |
| 3. Given Poorly, Received Well | 3. Given Poorly, Received Well |

Feedback Evaluation Checklist

Evaluate each demonstration according to the following criteria:

Behavior	Satisfac- tory	Needs Improv- ment	Comments
Delivered one-on-one			
Seems sincere			
Behavior specific			
Emphasizes safe behavior(s)			
Expresses concern for welfare			
Focuses on behaviors, not person			
Respectful			
Encourages discussion			
Listens attentively			
Offers suggestions appropriately			
Uses appropriate body language			
Maintains emotional control			
Other:			
Other:			
Other:			

Exercise: Developing Strategies for Feedback

Listed below are several situations in which effective feedback may be difficult to give or receive. For each situation described, identify several strategies which may be effective.

1. A coworker is performing an at-risk behavior. S/he is more skilled at the overall task being performed than you are.

2. Your supervisor is performing an at-risk behavior.

3. A coworker is performing a behavior which you think is at-risk, but you're not certain.

4. A coworker is performing an at-risk behavior. The behavior is one you use to perform frequently yourself.

5. A coworker gives you corrective feedback about an at-risk behavior, but you disagree that the behavior is at-risk.

Exercise: Developing Strategies for Feedback (cont.)

6. A coworker is performing an at-risk behavior. The behavior is one which you've given him/her feedback about previously.

7. A coworker is performing a behavior safely. The behavior is one you've previously given him/her corrective feedback about.

8. A coworker is performing an at-risk behavior. S/he is surrounded by others and it would be difficult to interrupt him/her at that time.

9. A coworker is performing an at-risk behavior. Upon giving feedback, the coworker disagrees with your judgment and reacts defensively.

10. Someone gives you corrective feedback about an at-risk behavior, but the feedback comes across as very critical.

Communication Skills for Coaches: Main Points

- Appropriate peer feedback should be given often and is a motivating consequence to build a better safety culture.
- Rewarding feedback increases the frequency of desirable behavior while correcting feedback decreases undesirable behavior.
- Appropriate feedback is specific, immediate, supportive, and sincere.
- Effective coaches practice active listening skills (e.g., not interrupting, paraphrasing).
- We are all biased when giving feedback (e.g., lenient to those we like).
- There are common situations where giving correcting feedback will be difficult (e.g., the employee claims everyone else is doing the behavior at-risk).
- A coach's technique can help lower resistance to correcting feedback (e.g., avoid using sarcasm or inappropriate humor).



Module Five: Using Data for Problem Solving

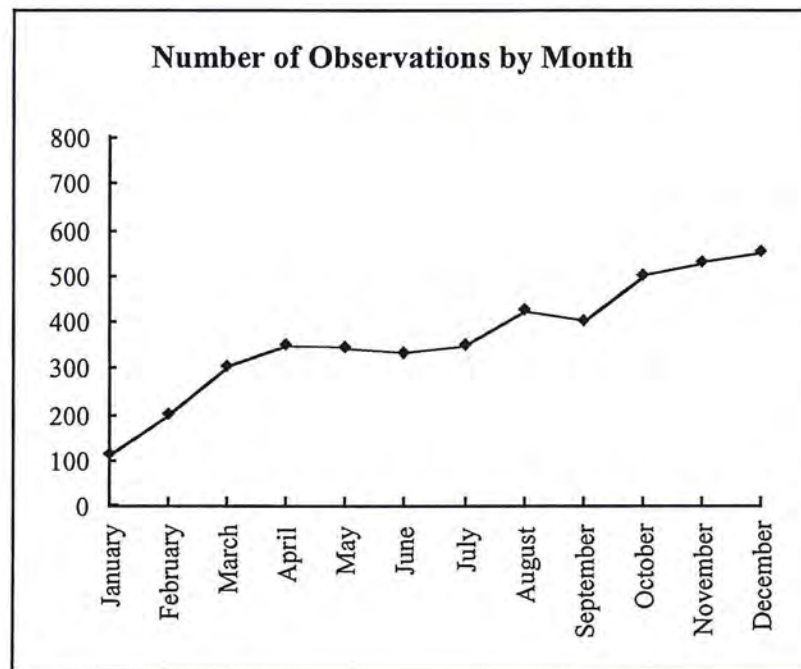
Data From a BOFP is Useful in Several Ways.

- Provides group feedback so employees can see how the site/department/workteam is doing.
- Information is analyzed to identify areas for follow-up action.
- Helps the organization focus on the safety process.

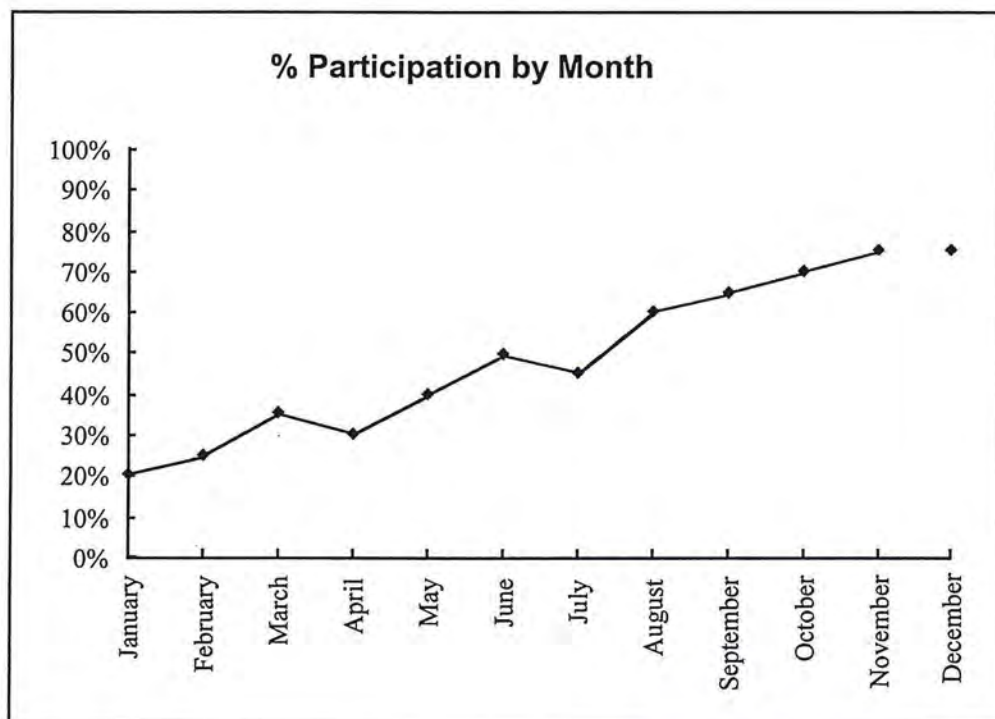
An Observation and Feedback Process Influences Safety-Related Behaviors.

- Employees routinely observe one another while working.
- A checklist guides the observer to focus on critical safety-related behaviors.
- Immediately afterwards, the observer provides feedback to the observee, noting both safe and at-risk behaviors.
- The observation checklists are collected and compiled. The collective data is graphically portrayed.
- The resulting information is periodically reviewed with all employees.
- **The information is analyzed to identify areas for follow-up action.**
- Targeted areas are pursued using a problem-solving process (DO IT).

Examine the Data at Many Different Levels.

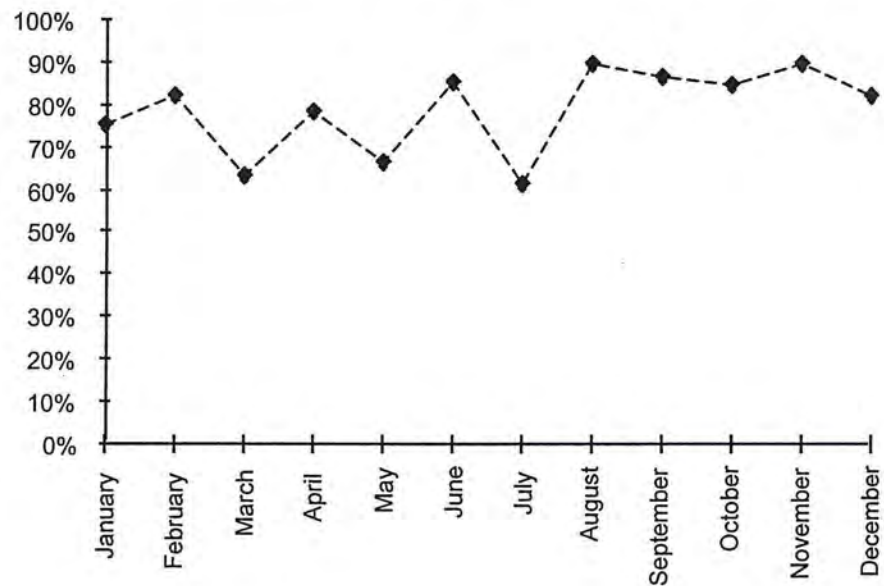


Examine the Data at Many Different Levels (cont.).



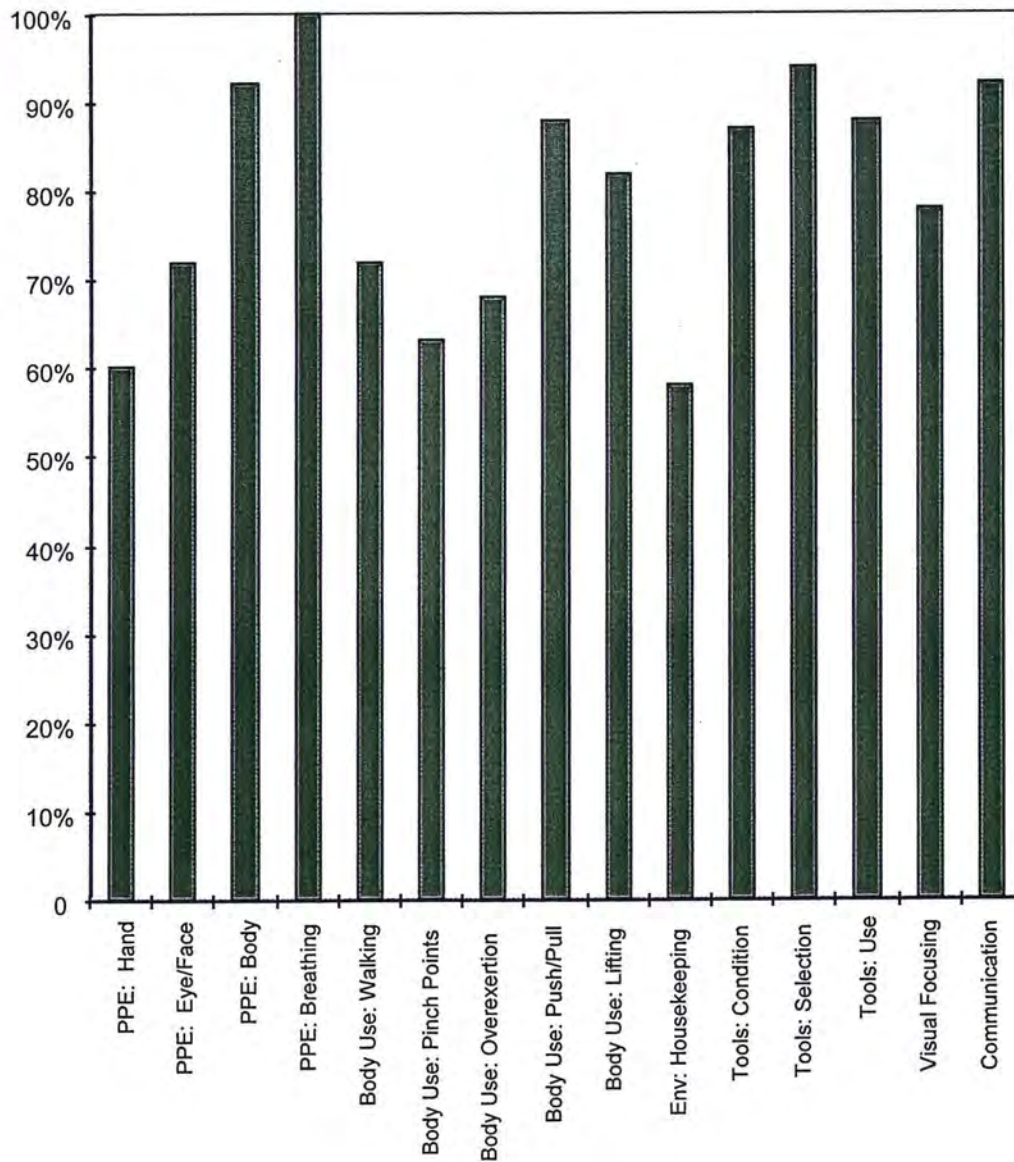
Examine the Data at Many Different Levels (cont.).

Total % Safe by Month



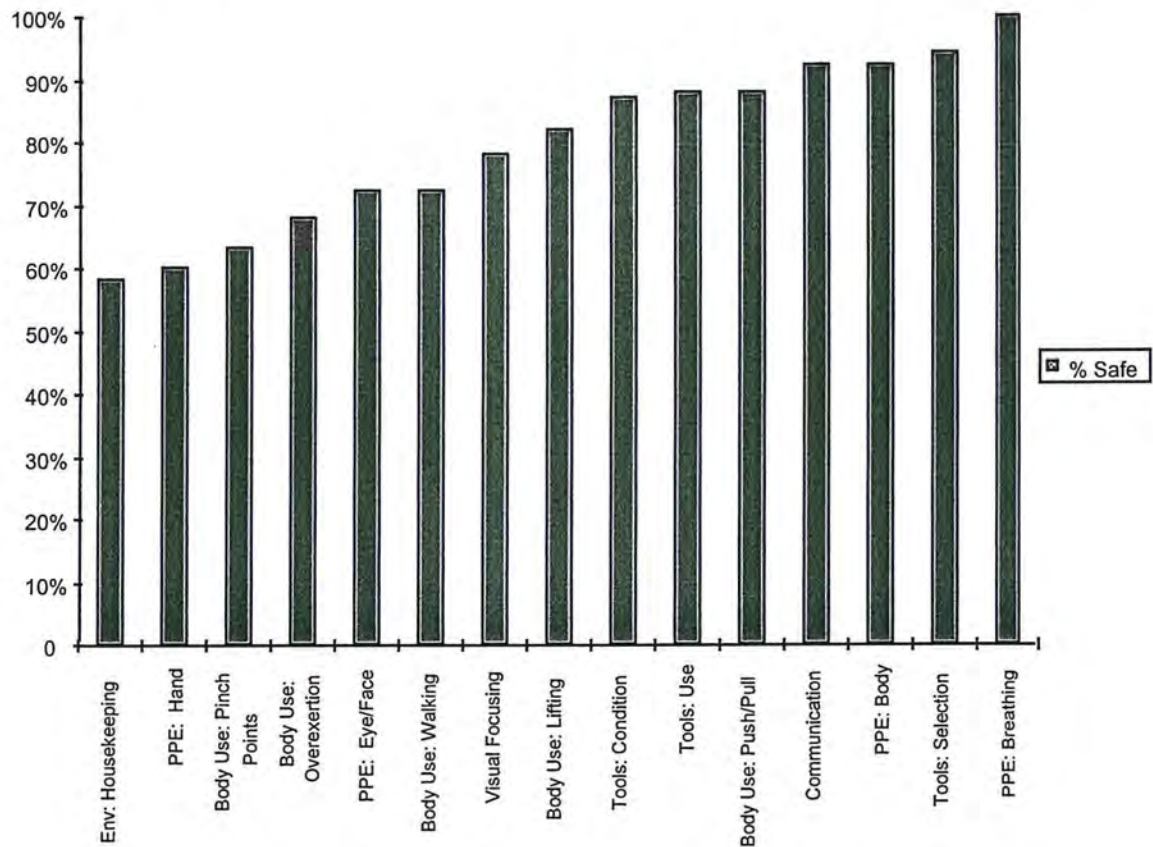
Examine the Data at Many Different Levels (cont.).

January: % Safe by Category

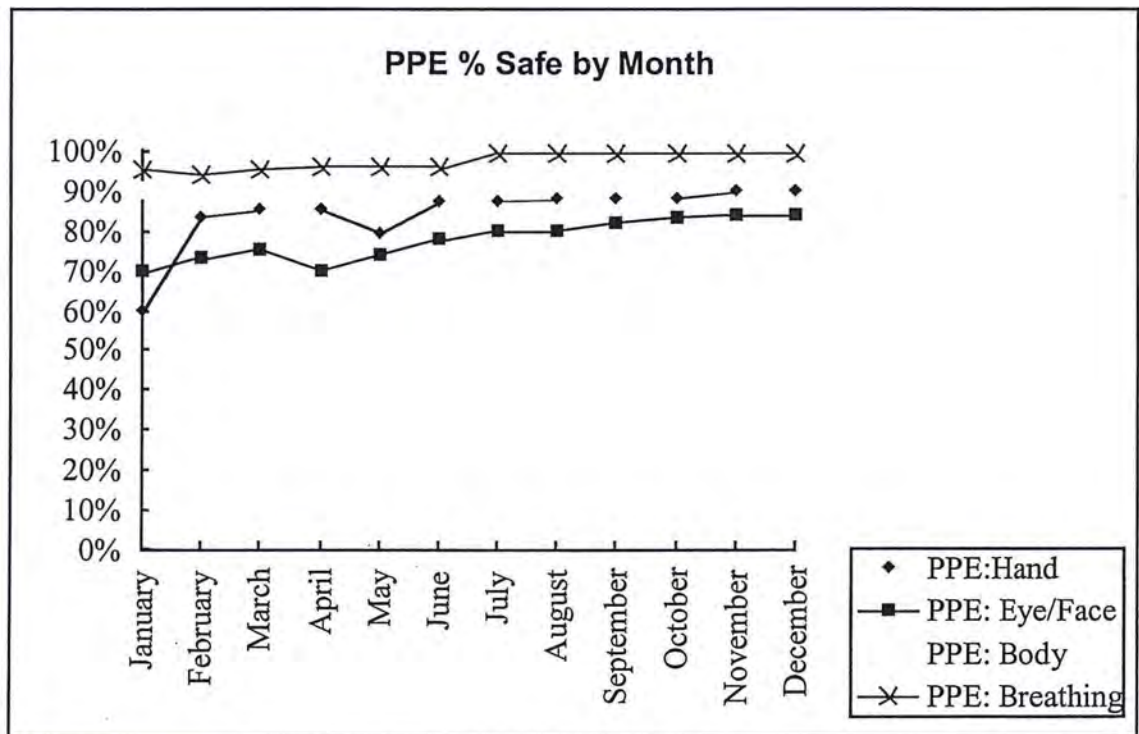


Examine the Data at Many Different Levels (cont.).

Pareto Analysis: January % Safe

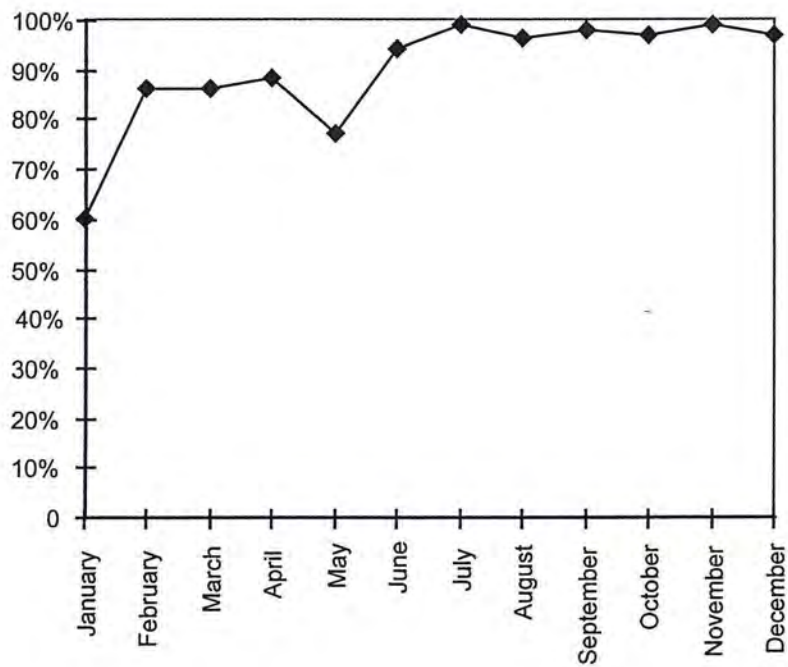


Examine the Data at Many Different Levels (cont.).

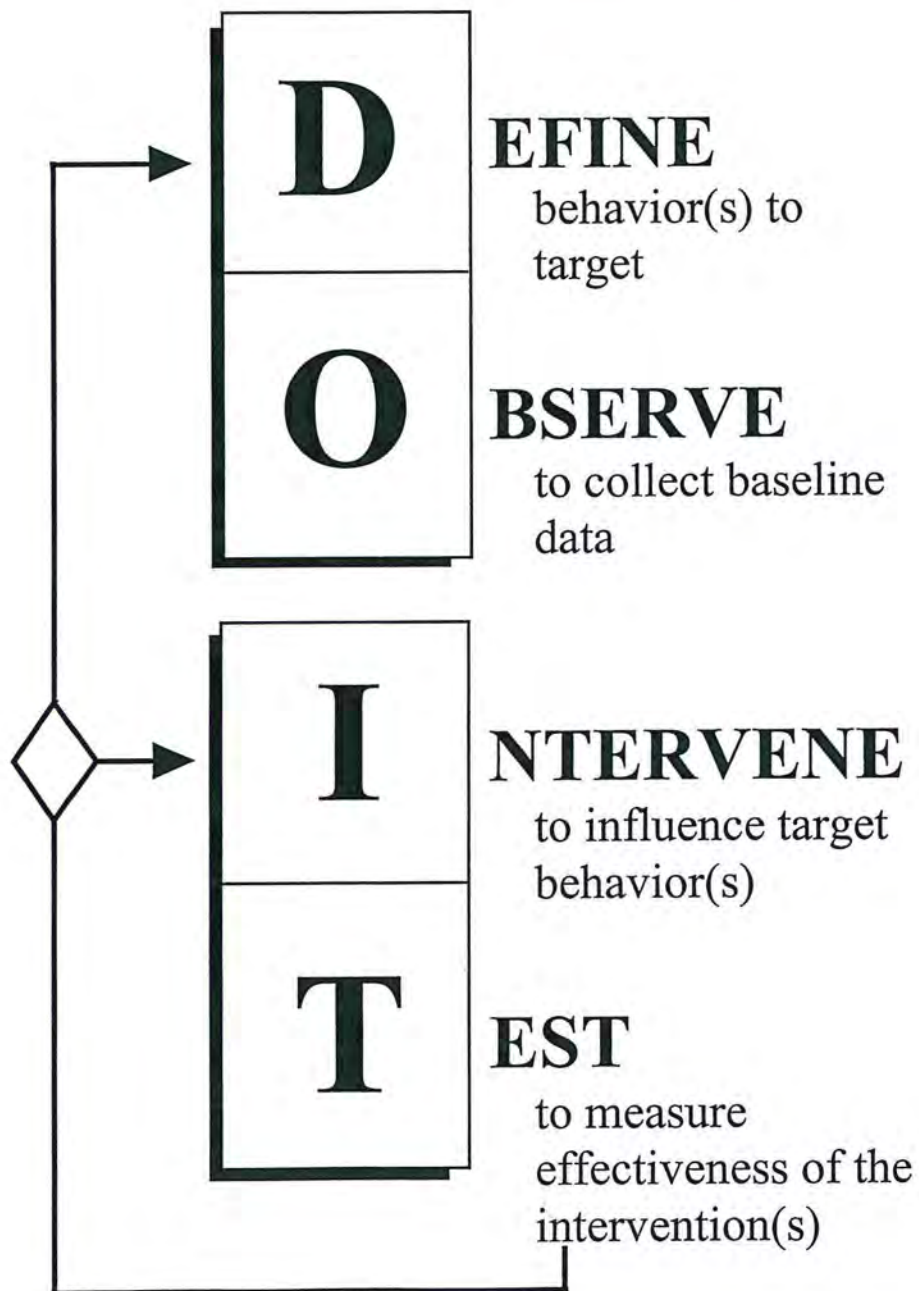


Examine the Data at Many Different Levels (cont.).

Hand PPE: % Safe by Month



Employees Use A Structured Process to Follow-up on Targeted Areas.



Consider this Prioritization When Choosing Interventions.

1. Design to eliminate the hazard. (Put a cover on the manhole.)
2. Remove individuals from the hazard. (Don't require workers to be in the area while the manhole is open.)
3. Guard the hazard. (Place barricades around the open hole preventing individuals from stepping into the hole.)
4. Warn individuals to avoid the hazard. (Post placards alerting people of the presence of an open hole.)
5. Train or instruct individuals to avoid the hazard. (Instruct people to walk around the open hole.)

A Variety of Interventions Can Be Introduced Through DO IT.

- Environmental Changes
 - Guards on equipment
 - Ergonomic design changes
 - New/more reliable equipment
 - Relocating equipment
 - Better fitting/more comfortable PPE
 - Repackaging materials/products
- Education/Training
 - Formal classroom training
 - Talks during safety meetings
 - On-the-job demonstrations
- Signs/Postings
 - Employee designed safety slogans
 - Informational or warning signs
 - Checklists/reminders on equipment or in hazardous areas
- Special Programs
 - Focused observations
 - Thank you cards
 - Goal Setting
 - Safety Incentives with process focus
- System Changes
 - Remove rewards for safety shortcuts
 - Streamline incident reporting/increase communications
 - Evaluate and revise procedures
 - Include safety activities on performance appraisals

Focused Observation and Feedback Processes Target Specific Behaviors.

- *Focused* observation and feedback processes target specific problem areas (identified through the general observation and feedback process or through other sources).
- Different checklists can be designed to target specific sets of behaviors.
 - Category-specific checklist
 - Task-specific checklist
 - Injury-specific checklist
 - Position-specific checklist

Category-Specific Checklist

Category: PPE Use

Behaviors	Safe	At-Risk	Comments
Safety Glasses with Side Shields			
Steel Toe Boots			
Jewelry Compliance: Rings			
Jewelry Compliance: Earrings			
Jewelry Compliance: Necklaces			
Safe Personal Clothing Compliance			
Hearing Protection			
Gloves: C-Cloth, L-Leather, R-Rubber			
Long Hair Secured			
Rubber Boots			
Hard Hat			
Goggles or Face Shield			
Loose Clothing			
Respiratory Protection: D-Dust, FF-Full Face, SA-Supplied Air			
Fall Protection/Full Body Harness & Lanyard			
Safety Belt Used			
Totals			

Task-Specific Checklist

Task: Cleaning Underneath Jaw Crusher

Behaviors	Safe	At-Risk	Comments
Wearing PPE			
- Harness			
- Gloves			
- Foot protection			
- Eye protection			
- Face shield			
- Hearing protection			
Using proper body mechanics			
- Avoiding contact with rotating shaft			
- Bending at knees, not waist			
- Maintaining stable foot position			
Pacing of work			
- Taking breaks every 10 minutes			
- Relieving operator every 30 minutes			
Obtaining proper clearances			
- Notify supervision of slagging schedule			
- Rope-off area to re-route traffic			
- Verbally inform others running crusher			
Avoiding line of fire			
- Working away from mouth of jaw crusher			
Totals			

Injury-Specific Checklist

Injury: Chemical or Thermal Burns

Behaviors	Safe	At-Risk	Comments
Wearing PPE			
- Gloves			
- Face shields/goggles			
- Safety shoes			
- Long-sleeved shirt			
- Apron			
Identifying/barricading hazardous areas			
- Posting caution signs			
- Roping/taping off area			
- Insulating hot pipes			
Shielding leaks and traps			
Securing containers of chemicals			
- Capping containers before transporting them			
- Marking stored containers			
- Checking MSDS before using chemicals			
- Verifying contents match label prior to use			
Using ventilated hoods where needed			
Maintaining housekeeping			
- Properly storing flammable materials			
- Keeping welding area free of debris			
Totals			

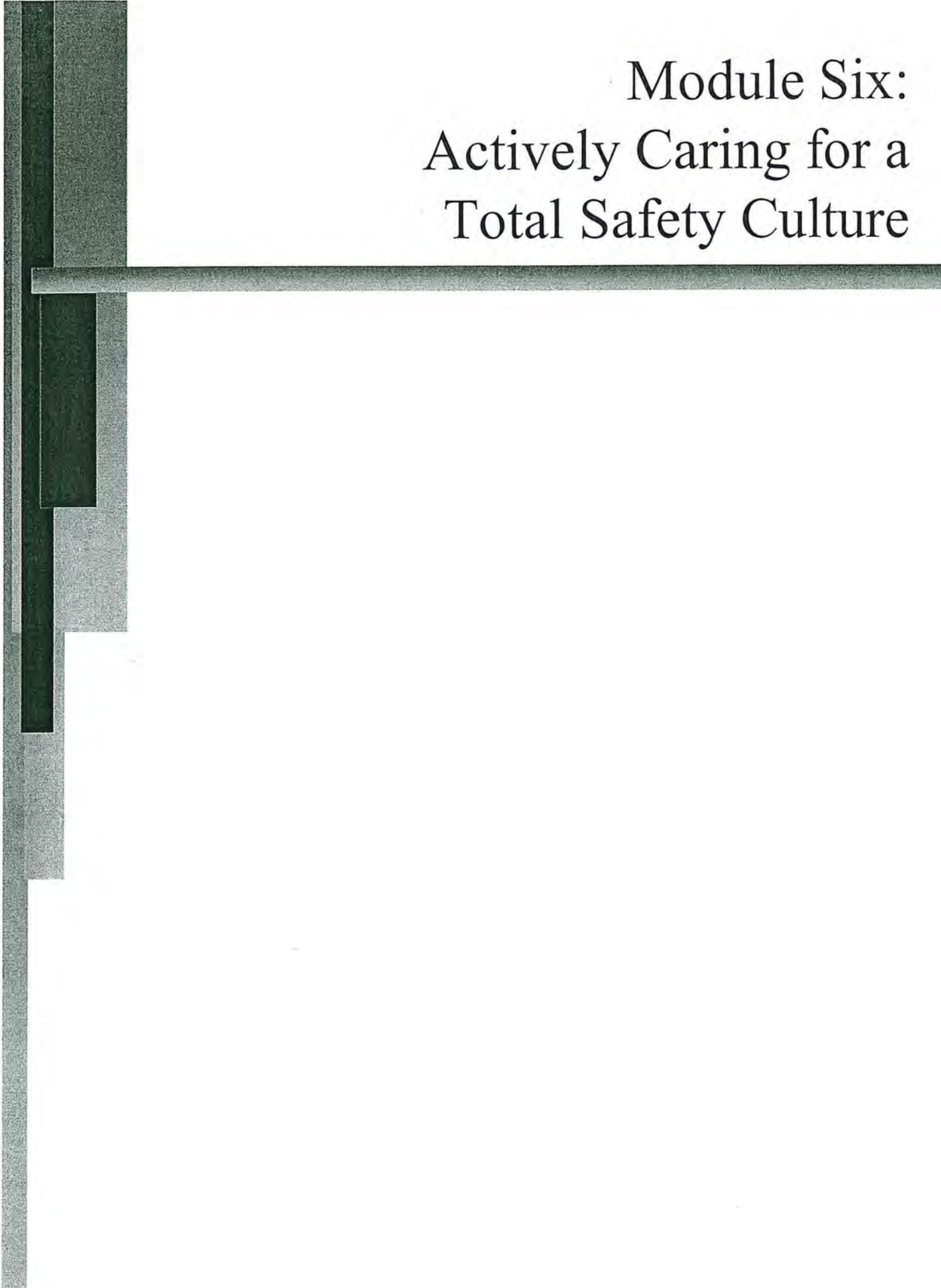
Position-Specific Observation Checklist

Position: Forklift Operator

Behaviors	Safe	At-Risk	Comments
Checking for clear path			
Wearing safety belt			
Lifting load slowly and steadily			
Driving at or below posted speed limit			
Avoiding walkways			
Using horn when crossing aisles and turning corners			
Driving with forks/load 6 inches off ground			
Lowering forks to ground after unloading			
Securing emergency brake after parking			
Totals			

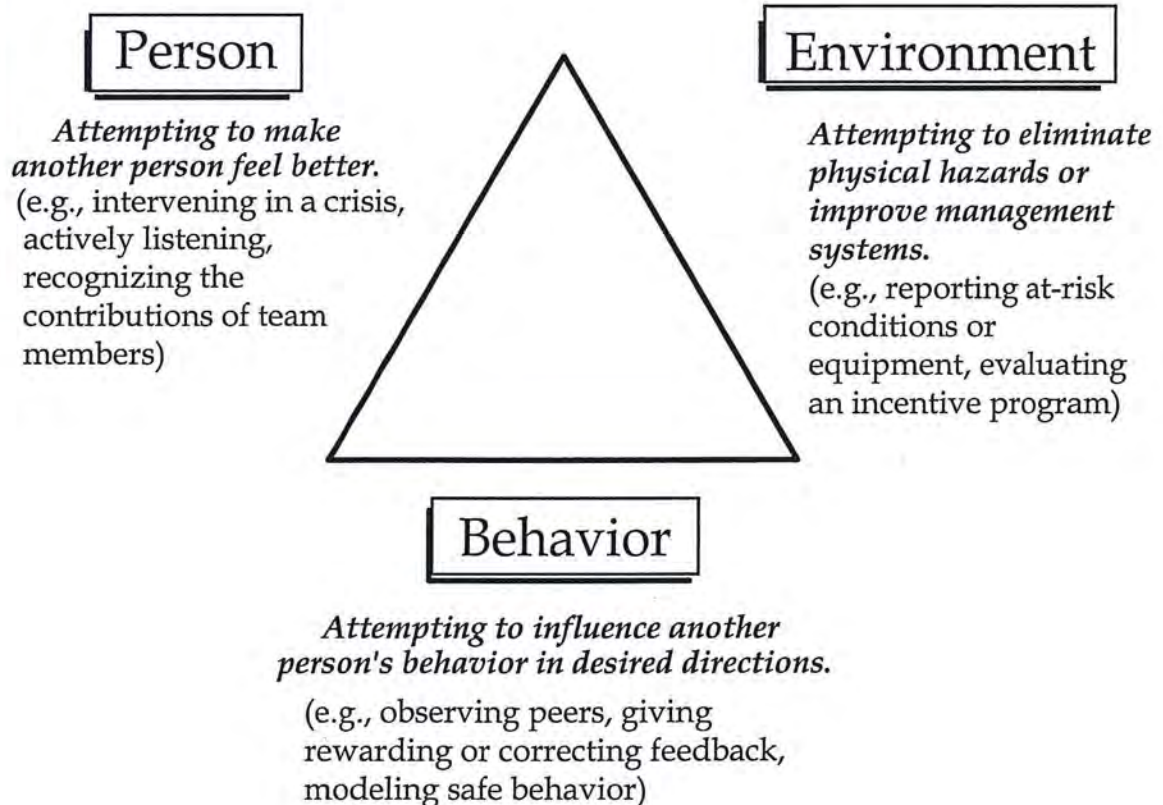
Using Data for Problem Solving: Main Points

- Data may be examined at many different levels such as % participation, # of observations, overall % safe behaviors, % safe PPE, and % safe hand PPE.
- You may analyze data each month and over several months.
- The ABC Analysis is a useful tool to determine effective interventions.
- A focused observation and feedback process is one potential intervention. It involves using different checklists (e.g., task-specific, injury-specific, position-specific, category-specific) to focus on targeted behaviors.
- The DO IT process is a problem solving technique used to follow-up on targeted behaviors.
- Data analysis suggests what interventions to introduce.

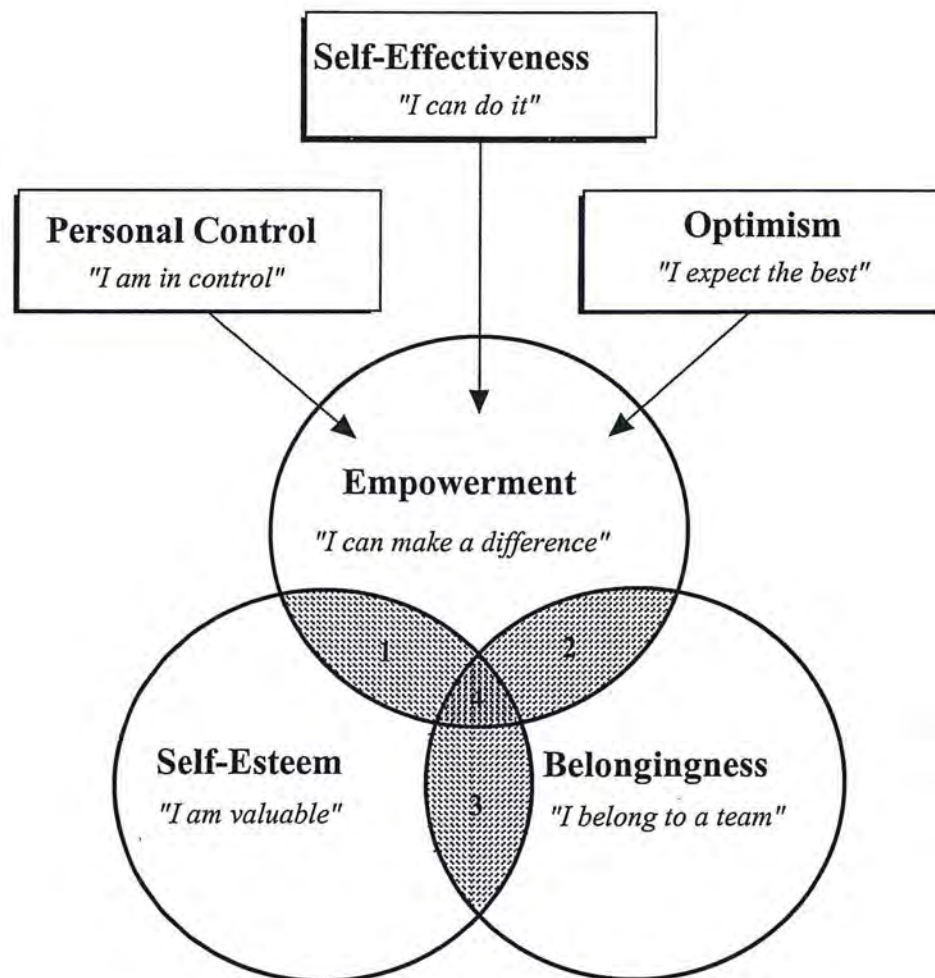


Module Six: Actively Caring for a Total Safety Culture

Actively Caring™ Impacts All Three Sides of the Triangle.



Actively Caring™ is Influenced by Five Person States.



1. I can make *valuable* differences.
2. We can make a *difference* .
3. I am a *valuable team* member.
4. We can make *valuable* differences.

Use Various Strategies for Increasing Actively Caring Person Factors.

- Provide choices [*increase personal control*]
- Give praise [*self-esteem and self-effectiveness*]
- Request help or advice [*self-esteem and belonging*]
- Actively listen [*self-esteem and belonging*]
- Link responsibility with authority [*personal control and optimism*]
- Teach others [*self-esteem and self-effectiveness*]
- Cross-train [*self-effectiveness, personal control, and belonging*]
- Develop team goals [*belonging*]
- Utilize group problem-solving and decision-making [*belonging and personal control*]
- Celebrate safety achievements [*all factors*]

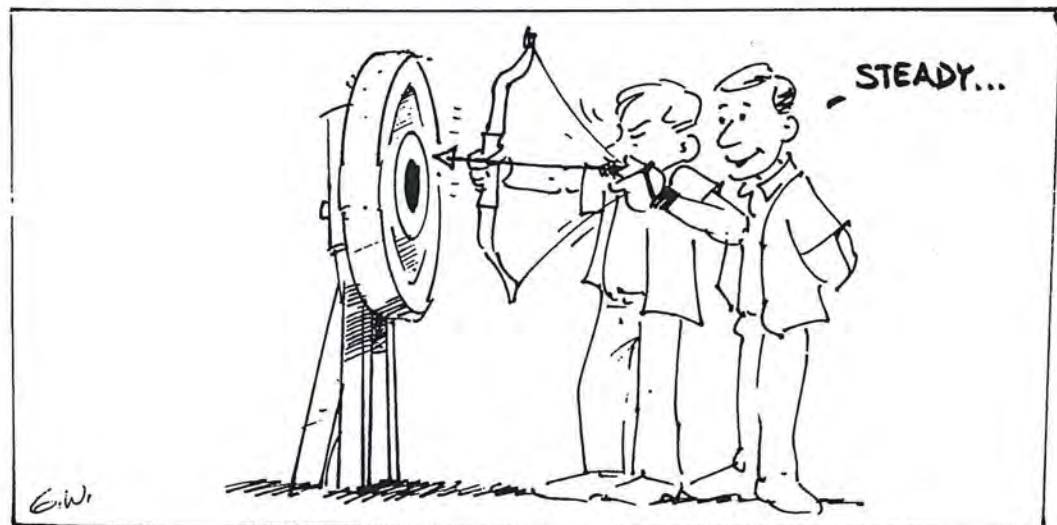
Self-Esteem Is Influenced by Interpersonal Communication.



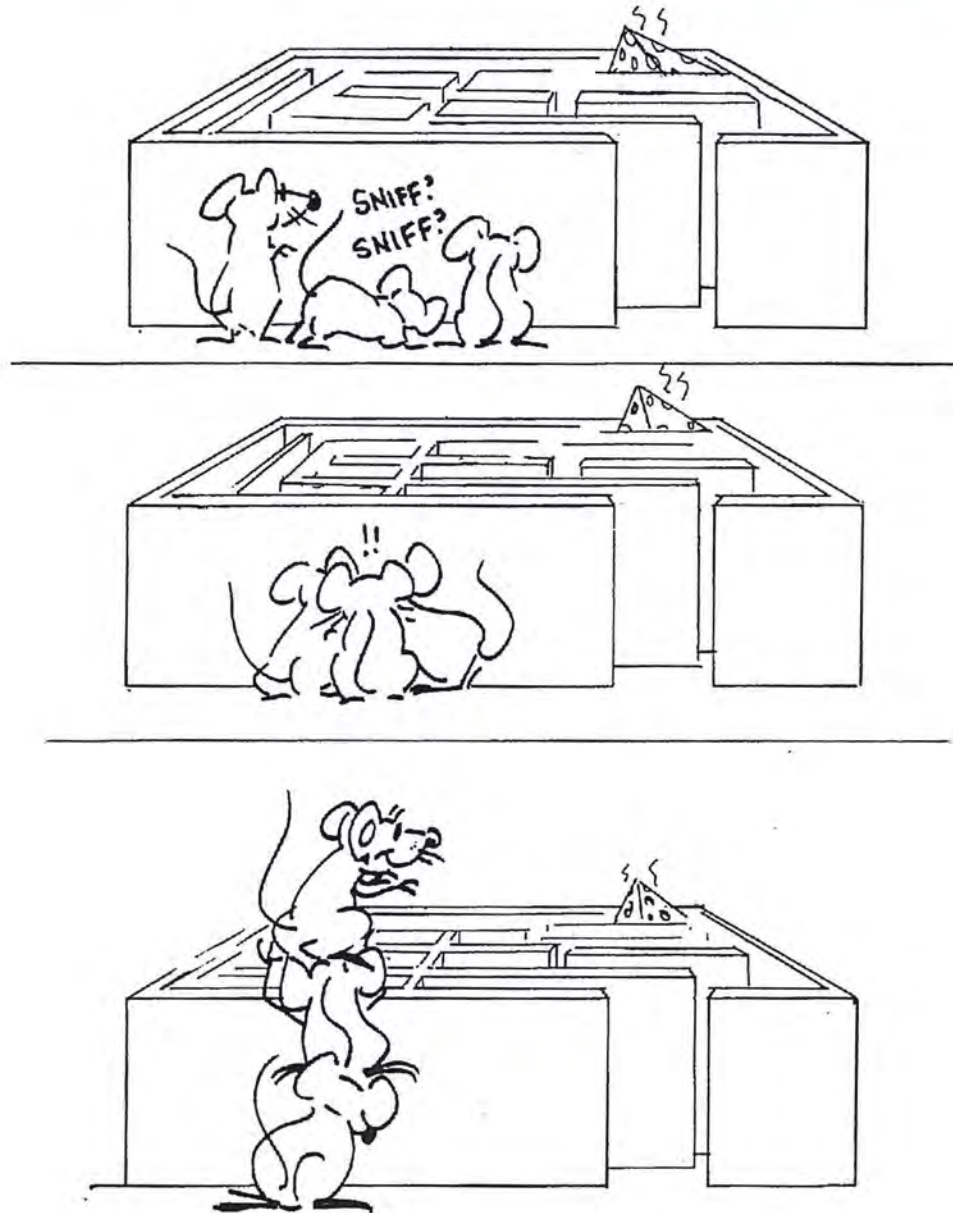
Find the *Silver Lining* to
Build Self-Esteem
and Self-Effectiveness.



Small Steps Reduce Errors and Build Self-Effectiveness.



Working Together for Safety Can Increase Belongingness.



Optimism or Pessimism: It's All In Your Head.



Personal Control is a Matter of Personal Perception.




Actively Caring™ Thank You Cards Reward Safety-Related Behaviors.

C.C. Manufacturing		
Thank You for ACTIVELY CARING ®		
Date: _____		
Please describe specifically the observed ACTIVELY CARING behavior: (see back for examples)		

Observer's Code:		
The first letter of the city where you were born	The first letter of your mother's maiden name	The number of the month you were born
_____	_____	_____
Recipient's Code:		
The first letter of the city where you were born	The first letter of your mother's maiden name	The number of the month you were born
_____	_____	_____

¢	Thank You	Limit: 55 ¢
Observer's Name _____		
Recipient's Name _____		

Front

Examples of ACTIVELY CARING Behaviors:	
<ul style="list-style-type: none"> • Recognizing and correcting an unsafe condition. • Reminding a coworker not to perform an unsafe act. • Removing or cleaning unsafe objects or debris from a work area. • Giving positive feedback to a coworker for working safely. • Reporting a near miss. • Making a task safer. • Other 	
<u>Hoechst Celanese</u>	
	

Elaine George	Dave Salyer
Tom Tillman	Jim Woods
Department 1490	

Back

An Actively Caring™ Thank- You Can Be Rewarding.

S.T.A.R.T.

Safety Through Awareness, Recognition, Teamwork

To: _____

Thank you for Actively Caring for our
Celriver family. Safety starts with YOU!

[Make a difference by depositing this in the collection box.]

(Front)

Hand-in-Hand for Safety We Stand!



(Back)

Follow Seven Guidelines When Receiving Recognition.

- Avoid denial and disclaimer statements.
- Avoid deflecting the credit to others.
- Listen actively with genuine appreciation.
- Relive it later for self-motivation.
- Show sincere appreciation.
- Recognize the person for recognizing you.
- Embrace the Reciprocity Principle.
- Ask for recognition when it is deserved but not forthcoming.

Actively Caring™ Module: Main Points

- The five person factors (self-esteem, self-effectiveness, personal control, optimism, and belonging) give employees the power to intervene (actively care) for the safety of others.
- Providing encouragement (person side), reporting at-risk equipment (environment side), and giving feedback for safety performance (behavior side) are all ways to actively care for peers' safety.
- Actively Caring “thank you” cards can be used as an intervention to promote peer recognition.

Appendix D: Safety Culture Survey



Safety Culture Survey

About the Safety Culture Survey

The Safety Culture Survey is designed to measure how employees feel about safety and related issues at their workplace. Some items might not seem directly relevant to workplace safety. However, research has found that safety attitudes and behaviors are influenced by a variety of non-safety issues.

Your answers to the following statements will remain completely anonymous. All surveys will be sent to Safety Performance Solutions to be analyzed; individual surveys will not be available to company personnel. Only group data is included in survey reports.

INSTRUCTIONS

Please use a #2 pencil to fill in the numbered circle corresponding to your response. Make heavy black marks that completely fill the circle. Completely erase any stray marks or answers you wish to change.

CORRECT MARK



INCORRECT MARKS



The following sections are to gather information about your position within the organization. The survey administrator will instruct you as to how to complete this section.

<u>A.</u>	<u>B.</u>	<u>C.</u>
0	1	1
1	2	2
2	3	3
3	4	4
4		
5		
6		
7		
8		
9		

Each statement has five possible responses. After each statement, fill in the numbered circle that best describes your current attitude. The response you choose doesn't have to describe how you feel all the time, just how you feel most of the time. Be sure to indicate how you *actually* feel, not how you think you *should* feel. There are no "right" or "wrong" answers; this survey only measures your opinions.



Highly Agree
Agree
Neither Agree nor Disagree
Disagree
Highly Disagree

1. New employees receive sufficient safety training before being allowed to work alone. 1 2 3 4 5
2. Reporting minor injuries is usually a waste of time because most can't be prevented anyway. 1 2 3 4 5
3. Employee safety suggestions are listened to and taken seriously. 1 2 3 4 5
4. Employees appreciate receiving feedback from their coworkers about their unsafe behaviors. 1 2 3 4 5
5. Employees do not like it when coworkers bypass safety policy, even when no harm is done. 1 2 3 4 5
6. Employees in my work area caution each other about unsafe behaviors. 1 2 3 4 5
7. Employees receive prompt feedback in response to their safety suggestions. 1 2 3 4 5
8. I am willing to put forth a little extra effort to improve workplace safety. 1 2 3 4 5
9. I feel pressure from my co-workers to "short cut" safe work practices. 1 2 3 4 5
10. Discipline of some sort should be used for serious safety violations. 1 2 3 4 5
11. Safety rules and procedures are regularly reviewed with employees. 1 2 3 4 5
12. Safety meetings are effective at making this a safer place to work. 1 2 3 4 5
13. Safety hazards found during inspections are usually followed-up on quickly. 1 2 3 4 5
14. Besides performing their own jobs safely, employees should do other things to help improve workplace safety. 1 2 3 4 5
15. When an incident or injury is investigated, the results are promptly reported back to involved employees. 1 2 3 4 5
16. I sometimes overlook hazards to get the job done. 1 2 3 4 5
17. The safety team's efforts are effective in improving safety. 1 2 3 4 5
18. The company uses a consistent procedure for dealing with employees who violate safety rules. 1 2 3 4 5
19. The company should be doing more to improve workplace safety. 1 2 3 4 5
20. Coaches discuss safety improvement goals and efforts with employees on a regular basis. 1 2 3 4 5
21. I feel like I belong to my work group. 1 2 3 4 5
22. I observe the work practices of coworkers in order to provide them with safety-related feedback. 1 2 3 4 5
23. My coach is well informed about relevant safety issues. 1 2 3 4 5
24. I enjoy being with my coworkers. 1 2 3 4 5
25. Employees should caution their coworkers when they are observed working unsafely. 1 2 3 4 5
26. I am encouraged to stop a job if a safety hazard is identified. 1 2 3 4 5
27. Production demands do not override leadership's concern for safety. 1 2 3 4 5
28. I avoid trying to learn new things when they look too difficult for me. 1 2 3 4 5
29. Information needed to work safely is made available to all employees. 1 2 3 4 5
30. I believe that stress caused from factors outside of work affects my ability to perform my job safely. 1 2 3 4 5
31. I certainly feel useless at times. 1 2 3 4 5
32. I have received adequate job safety training. 1 2 3 4 5
33. When an employee sees a potential safety hazard, they should correct it themselves if possible. 1 2 3 4 5
34. Employees here often "short cut" safe work practices. 1 2 3 4 5
35. I have been disciplined for having a work injury. 1 2 3 4 5
36. Employees understand the safety rules and procedures for their own jobs. 1 2 3 4 5
37. If anything can go wrong for me, it probably will. 1 2 3 4 5
38. I feel close to my coworkers. 1 2 3 4 5
39. If people follow safe practices, they can avoid many unnecessary injuries. 1 2 3 4 5
40. If the plant maintains its current safety performance, that will be good enough. 1 2 3 4 5
41. In uncertain or difficult times, I usually expect the best to happen. 1 2 3 4 5
42. Incidents and injuries are thoroughly investigated. 1 2 3 4 5
43. Minor injuries often go unreported. 1 2 3 4 5
44. Discipline is not used often enough for dealing with serious safety violations. 1 2 3 4 5
45. Employees are encouraged to correct safety problems themselves wherever possible. 1 2 3 4 5
46. Employees fully understand the potential hazards of the operations they perform. 1 2 3 4 5
47. Employees are provided information on such things as the type, frequency, cause, and cost of accidents. 1 2 3 4 5
48. People can change what might happen tomorrow by what they do today. 1 2 3 4 5
49. Safety audits/inspections are effective in identifying and correcting safety hazards. 1 2 3 4 5
50. Employees should praise each other for working safely. 1 2 3 4 5
51. Employees get sufficient background and reasons behind the plant's safety rules. 1 2 3 4 5

Highly Agree
Agree
Neither Agree nor Disagree
Disagree
Highly Disagree

- 52. I do not seem capable of dealing with most problems that come up in life. ① ② ③ ④ ⑤
- 53. I trust my coworkers. ① ② ③ ④ ⑤
- 54. I feel I have a number of good qualities. ① ② ③ ④ ⑤
- 55. I give up on things before completing them. ① ② ③ ④ ⑤
- 56. I have never been forced to perform a task which I said I thought was unsafe. ① ② ③ ④ ⑤
- 57. My coworkers do many helpful things for each other. ① ② ③ ④ ⑤
- 58. I wish I had more respect for myself. ① ② ③ ④ ⑤
- 59. If I approach my coworkers about their unsafe behaviors, they will react negatively. ① ② ③ ④ ⑤
- 60. Besides working safely myself, I am willing to do other things to help improve workplace safety. ① ② ③ ④ ⑤
- 61. It is the responsibility of each employee to seek out opportunities to prevent injury to others. ① ② ③ ④ ⑤
- 62. When trying to learn something new, I soon give up if I am not initially successful. ① ② ③ ④ ⑤
- 63. Besides working safely myself, I do other things to help improve workplace safety. ① ② ③ ④ ⑤
- 64. When told about safety hazards, my immediate coach is appreciative and tries to correct them. ① ② ③ ④ ⑤
- 65. I don't give safety feedback to my coworkers because I'm not confident I could do it well. ① ② ③ ④ ⑤
- 66. Leadership acknowledge and/or reward employees for safe behaviors. ① ② ③ ④ ⑤
- 67. When employees in my group are cautioned about working unsafely, they begin working more safely. ① ② ③ ④ ⑤
- 68. I am willing to caution my coworkers about working unsafely. ① ② ③ ④ ⑤
- 69. When a safety rule or procedure is issued, I try to follow it as best I can. ① ② ③ ④ ⑤
- 70. The plant has too many rules and regulations governing safety. ① ② ③ ④ ⑤
- 71. I feel I don't have much to be proud of. ① ② ③ ④ ⑤
- 72. If a coworker gets down or depressed, I am willing to try to make that person feel better. ① ② ③ ④ ⑤
- 73. The plant currently spends too much effort on safety. ① ② ③ ④ ⑤
- 74. My coworkers share much in common. ① ② ③ ④ ⑤
- 75. Coaches sometimes encourage employees to overlook hazards to get the job done. ① ② ③ ④ ⑤
- 76. Employees should observe the work practices of their coworkers in order to provide them with safety-related feedback. ① ② ③ ④ ⑤
- 77. Leadership is willing to invest money and effort to improve our safety performance. ① ② ③ ④ ⑤
- 78. I believe that work-related stress affects my ability to perform my job safely. ① ② ③ ④ ⑤
- 79. Leadership is more concerned about keeping the injury statistics low than with truly keeping people safe. ① ② ③ ④ ⑤
- 80. Leadership does not fully understand the real safety issues within the plant. ① ② ③ ④ ⑤
- 81. Our safety award program(s) motivate me to work more safely. ① ② ③ ④ ⑤
- 82. It is the responsibility of each employee to seek out opportunities to prevent injury to him or herself. ① ② ③ ④ ⑤
- 83. Leadership here seems genuinely interested in reducing injuries. ① ② ③ ④ ⑤
- 84. Leadership places most of the blame for an accident on the injured employee. ① ② ③ ④ ⑤
- 85. I am willing to praise my coworkers for working safely. ① ② ③ ④ ⑤
- 86. Whenever someone is injured, it's usually due to something he/she has done or has not done. ① ② ③ ④ ⑤
- 87. When I see a potential safety hazard, I correct it myself if possible. ① ② ③ ④ ⑤
- 88. Things never work out the way I want them to. ① ② ③ ④ ⑤
- 89. The risk level of my job concerns me quite a bit. ① ② ③ ④ ⑤
- 90. Alcohol or drug abuse is a problem in my plant. ① ② ③ ④ ⑤
- 91. An employee who gets injured will likely receive a poorer performance evaluation. ① ② ③ ④ ⑤
- 92. When I see a coworker working unsafely, I caution him/her. ① ② ③ ④ ⑤
- 93. Production demands do not override coaches' concern for safety. ① ② ③ ④ ⑤
- 94. At times, I think I am no good at all. ① ② ③ ④ ⑤
- 95. Compared to other workplaces, I think mine is rather risky. ① ② ③ ④ ⑤
- 96. Compliance with safety rules and regulations needlessly slows down my job. ① ② ③ ④ ⑤
- 97. Employees who work safely have a better chance for promotion than those who don't. ① ② ③ ④ ⑤
- 98. I am willing to observe the work practices of my coworkers in order to provide them with safety-related feedback. ① ② ③ ④ ⑤
- 99. I always look on the bright side of things. ① ② ③ ④ ⑤
- 100. I am able to do things as well as most other people. ① ② ③ ④ ⑤
- 101. Leadership truly wants to know about all incidents and injuries, even if they are minor. ① ② ③ ④ ⑤
- 102. I am directly responsible for my own safety. ① ② ③ ④ ⑤

Highly Agree
Agree
Neither Agree nor Disagree
Disagree
Highly Disagree

- 103. I hardly ever expect things to go my way. ① ② ③ ④ ⑤
- 104. I would feel free to discuss the causes of my injury with the investigation team. ① ② ③ ④ ⑤
- 105. Employees should be given more opportunities to become involved in safety improvement efforts. ① ② ③ ④ ⑤
- 106. I am encouraged to report near misses. ① ② ③ ④ ⑤
- 107. Employees participate in inspections for potential hazards. ① ② ③ ④ ⑤
- 108. When I see a coworker looking down or depressed, I try to make that person feel better. ① ② ③ ④ ⑤
- 109. I have more respect for workers who work safely than for those who do not. ① ② ③ ④ ⑤
- 110. I would be willing to have a coworker observe me while I work in order to give me feedback regarding safe and unsafe behaviors observed. ① ② ③ ④ ⑤
- 111. Employees are routinely given feedback by supervisors regarding their safe and unsafe work behaviors. ① ② ③ ④ ⑤
- 112. Employees in my work group participate in defining safe work practices. ① ② ③ ④ ⑤
- 113. I rarely count on good things happening to me. ① ② ③ ④ ⑤
- 114. If an employee gets down or depressed, that person's coworkers should try to make him/her feel better. ① ② ③ ④ ⑤
- 115. If I received a minor injury on the job, I would report it. ① ② ③ ④ ⑤
- 116. It is common for employees to be disciplined for having a work injury. ① ② ③ ④ ⑤
- 117. Most employees in my group would not feel comfortable if their work practices were observed and recorded by a coworker. ① ② ③ ④ ⑤
- 118. Most incidents that result in injuries are largely preventable. ① ② ③ ④ ⑤
- 119. Most of my coworkers actively support the company's safety programs. ① ② ③ ④ ⑤
- 120. My coworkers are not very close at all. ① ② ③ ④ ⑤
- 121. When I see a potential safety hazard, I am willing to correct it myself if possible. ① ② ③ ④ ⑤
- 122. The company's current safety performance is very good. ① ② ③ ④ ⑤
- 123. Employees in my work group recognize each other for working safely. ① ② ③ ④ ⑤
- 124. At my workplace, work productivity and quality usually have a higher priority than work safety. ① ② ③ ④ ⑤
- 125. When asked to do a new job, I receive adequate training to be able to do it safely. ① ② ③ ④ ⑤
- 126. My supervisor asks me what I need to do my job more safely. ① ② ③ ④ ⑤
- 127. Employees appreciate receiving feedback from their coworkers about their safe behaviors. ① ② ③ ④ ⑤
- 128. Near misses are consistently reported and investigated at our plant. ① ② ③ ④ ⑤
- 129. One of my problems is that I cannot get down to work when I should. ① ② ③ ④ ⑤
- 130. People's injuries result from their own carelessness. ① ② ③ ④ ⑤
- 131. Safety audits/inspections are conducted regularly in my department. ① ② ③ ④ ⑤
- 132. When I see a coworker working safely, I praise him/her. ① ② ③ ④ ⑤

Thank You For Your Time.

Appendix E. Focus Group Questions

FOCUS GROUP QUESTIONS

1. What programs have been used in this organization in an attempt to improve safety?
2. Are any of these programs still in existence?
3. For the programs that are no longer in place, why do you think they failed?
4. How do workers feel about any existing safety programs?
5. How frequently are safety issues discussed in this organization?
6. If you could make any changes in your organization (specific to safety), what would those changes be?
7. Is it common for an employee to be recognized or rewarded for doing their job safely?
8. Are employees ever reprimanded for taking a risk or shortcut while performing their job? How often does this occur?
9. Do hourly employees and management have the same concerns when it comes to safety? If no how are they different? If yes, what are they?
10. How involved are employees in this organization's safety process?
11. Are there ever instances when at-risk behaviors are performed to maintain an image (e.g., not asking for help because it would be a sign of weakness)?
12. Are you willing to provide your coworkers with feedback about their safety-related behaviors? Why or why not?
13. Are you willing to receive feedback from your coworkers about your safety-related behaviors? Why or why not?
14. Would you be willing to observe your coworkers with a critical behavior checklist?
15. Would you be willing to be observed by our coworkers?

Appendix F: Results for Focus Group Questions

FOCUS GROUP RESULTS

Date of Interview: May 19

Number of Participants: 15

Group Composition: All Organizational Levels

1. *What programs have been used in this organization in an attempt to improve safety?*
"Safety Bucks" given quarterly at individual and group level for no injuries. "It took 25 years to win a popcorn maker."
2. *Are any of these programs still in existence?*
Safety bucks is being modified. More focus on process events (e.g., safety meeting attendance).
3. *How do workers feel about any existing safety programs?*
Safety bucks is disliked. Stronger monetary incentives needed.
4. *How frequently are safety issues discussed in this organization?*
Weekly safety meetings lasting 45 minutes.
One 8 hour safety training course is also given once a year.
5. *If you could make any changes in your organization (specific to safety), what would those changes be?*
Buy new equipment (e.g., manlift). Set up the incentive program where employees choose their own safety equipment (e.g., boots, glasses) as their reward.
6. *Is it common for an employee to be recognized or rewarded for doing their job safely?*
Some verbal recognition. Quarterly free lunches if no injuries occur.
7. *Are employees ever reprimanded for taking a risk or shortcut while performing their job? How often does this occur?*
Reprimands are infrequent and involves a "smack on the wrist" with no real punishment.
8. *Do hourly employees and management have the same concerns when it comes to safety? If no how are they different? If yes, what are they?*
Yes: Eliminate injuries.
9. *How involved are employees in this organization's safety process?*
Very involved. Employees frequently fix machinery, look out for others, and discuss issues during safety meetings.
10. *Are there ever instances when at-risk behaviors are performed to maintain an image (e.g., not asking for help because it would be a sign of weakness)?*
Yes. Occurs with 50% of the people.
11. *Are you willing to provide your coworkers with feedback about their safety-related behaviors? Why or why not?*
Yes and it is already occurring frequently.
12. *Are you willing to receive feedback from your coworkers about your safety-related behaviors? Why or why not?*
Yes. This is a tight group and feedback would be handled well.
13. *Would you be willing to observe your coworkers with a critical behavior checklist?*
The majority of people would not*.
14. *Would you be willing to be observed by our coworkers?*
The majority of people would.

Appendix G: Employee Critical Behavior Checklists

Site A & B Safety Performance Checklist

Observer: _____ Plant: Blacksburg/Holston
 Date: _____ Observee: _____
 Time: _____ Reli/Primary
 Number _____

C=Contractor

Safety Performance Measure

SAFE

AT-RISK

PPE

- Glasses
- Hearing
- Hard Hat
- Steel-Toe boots
- Leather for welding

Housekeeping

- Trash
- Dust Build Up
- Extension Cords
- Tripping Hazards

Mobile Equipment

- Left Side
- Loading with(driver in or out of cab)
- Seatbelts
- Speed
- Stop Sign

Maintenance

- Lock-out Tagout
- People around work area
- Inspection of tools

General Safety

- Lifting
- Stairs
- Catwalks

Comments:

Observer:
 Date:
 Time:

Site C & D Safety Performance Checklist

SAFE AT-RISK COMMENTS

PPE

- Glasses
- Hearing Protection
- Hard Hat
- Gloves
- Steel-Toe Boots
- Harness
- Goggles
- Face Shields
- Leather for welding

SAFE	AT-RISK	COMMENTS

Housekeeping

- Clean Trash
- Avoid Tripping Hazards
- Extension Cords
- Fire Hazard
- Material Build up

SAFE	AT-RISK	COMMENTS

Mobile Equipment

- Walk Around Inspections
- Seat-belts
- Back-up Working
- Traffic Pattern
- Speed
- Communication

SAFE	AT-RISK	COMMENTS

Following Procedures

- Inspection of tools
- Lockout-Tagout
- Completing Operator Report
- Safety Harness with Manlift
- Go Through All Steps

SAFE	AT-RISK	COMMENTS

Appendix H: Safety Culture Survey Results for Study 4

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Safety Perception Scale

The Safety Perception Scale assesses employees' perceptions and opinions regarding how strongly they believe they and others within the organization support safety. In particular, it addresses perceived *management* support for safety, *peer* (e.g., coworker) support for safety, and *personal responsibility* for safety. Each sub-scale will be described separately.

Management Support for Safety

The Management Support for Safety Scale assesses whether employees feel the actions and attitudes of management are supportive to building and maintaining a Total Safety Culture. Specific survey items are listed below:

- Management here seems genuinely interested in reducing injuries.
- Management is more concerned about keeping the injury statistics low than with truly keeping people safe.
- At my workplace, work productivity and quality usually have a higher priority than work safety.
- Production demands do not override supervisors' concern for safety.
- Production demands do not override senior management's concern for safety.
- Supervisors sometimes encourage employees to overlook hazards to get the job done.
- I have never been forced to perform a task which I said I thought was unsafe.
- I am encouraged to stop a job if a safety hazard is identified.
- Management is willing to invest money and effort to improve our safety performance.
- When told about safety hazards, my immediate supervisor is appreciative and tries to correct them quickly.
- My immediate supervisor is well informed about relevant safety issues.
- Management does not fully understand the real safety issues within the plant.

The importance of management support to the overall safety culture cannot be over emphasized. Managers must believe employee safety is a paramount concern, one that should never be compromised. They must consistently demonstrate that concern through their own practices, as well as through their formal decisions. Unless employees believe safety is indeed a shared organizational value, they will be less willing to contribute extra effort to safety improvement initiatives, and will be more likely to succumb to the natural and imposed pressure to circumvent safe work practices.

Where response patterns indicate low levels of perceived management support for safety, especially when management's rating of their own support is high, two underlying causes are common. First, the issue may be one of communication rather than of a true lack of management commitment. Second, despite their best intentions, managers may, in fact, be doing things which send contradictory messages.

Because hourly employees are often far removed from the day-to-day decisions being made by management, their visibility of management's consideration of safety issues may be limited. Without effective communications systems in place, many management decisions and actions positively impacting safety are never known or realized by employees. Conversely, the rationale for decisions which may appear to fail to take safety into account is not understood. An extra effort should be made to "publicize" safety initiatives to the workforce. The employees need to be made aware of the improvement efforts being championed, and the rationale behind decisions made, in order for them to fully realize management's commitment to improving safety.

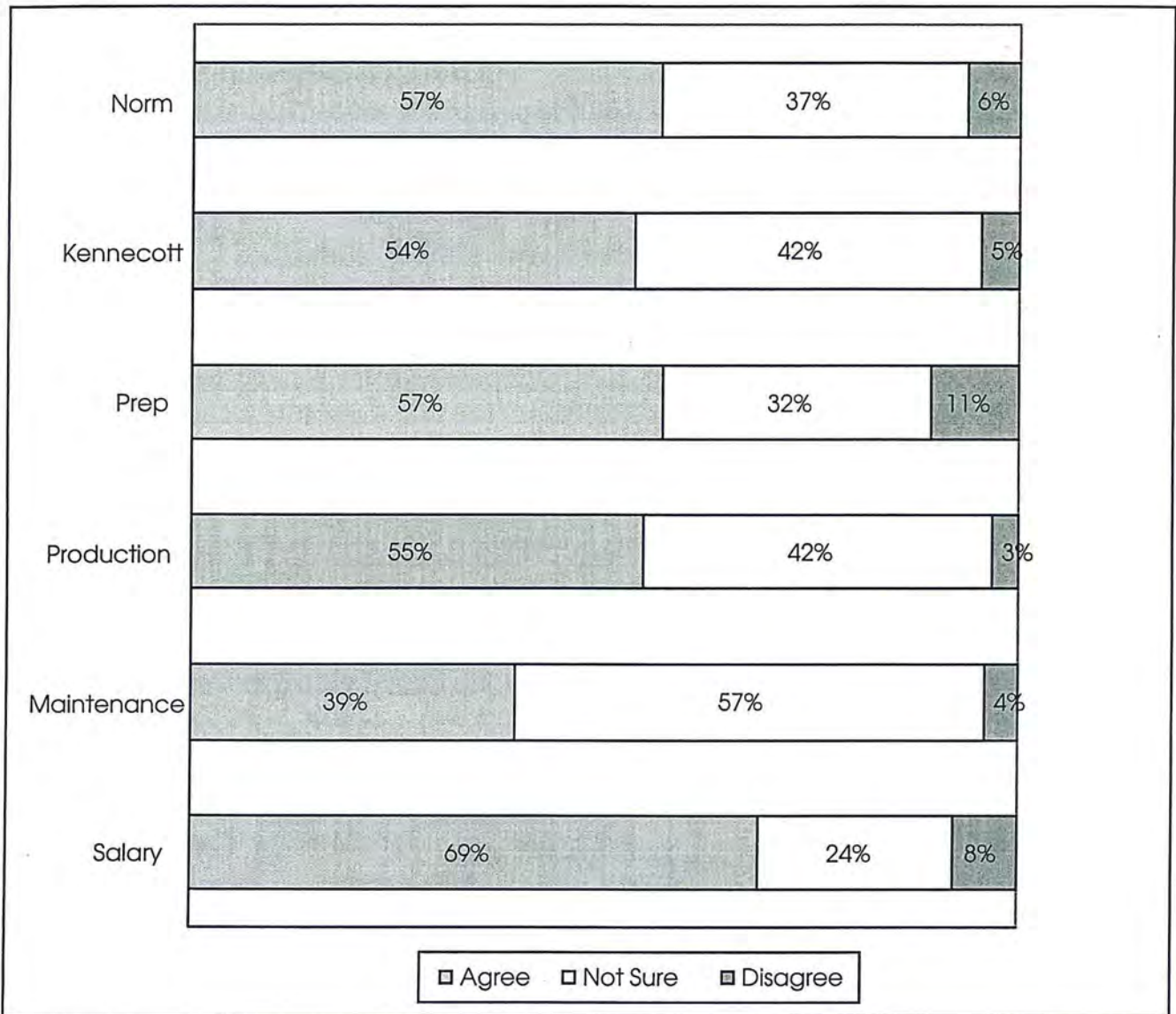
To further increase the visibility of management support among the hourly employees, organizations should emphasize some traditional initiatives and ensure the efforts are communicated and understood by the employees. These may include providing solutions to environmental hazards (see Hazards Identification and Correction sub-scale), redesigning ineffective safety training courses (see Training sub-scale), and giving employees opportunities to express their safety concerns (see Safety Suggestions sub-scale). Of course, anytime employee input is sought, it is essential to have a means in place to provide prompt feedback and follow-up.

In addition to ineffective (or nonexistent) communications systems, the managers themselves may inadvertently contradict their true support for safety through their interpersonal interactions with employees. As one example, a very common mistake managers make failing to coach and correct at-risk work practices they observe. While it may be easier to overlook "small" infractions, the unspoken message sent is that the behavior is acceptable, and in fact, that short-cuts in general are tolerable. Managers need to understand the variety of ways their own behavior may negatively influence others' perceptions of their support for safety and avoid these all-too-common mistakes.

Managers may also send mixed messages through their design of formal management systems. For example, since companies are frequently ranked according to their OSHA recordables and lost-time injuries, managers often emphasize lowering these numbers in their communication to employees, perhaps even offering safety awards to employees for fewer injuries. With such emphasis on the *injury statistics*, employees often indicate they believe management is more concerned about keeping the injury statistics low than with *truly* keeping people safe. Principles of behavioral psychology should be used to design more effective incentive programs which do not undermine the true intent. Other safety management systems (e.g., incident reporting and investigation processes, discipline) should be examined also (see Safety Management Systems Scale).

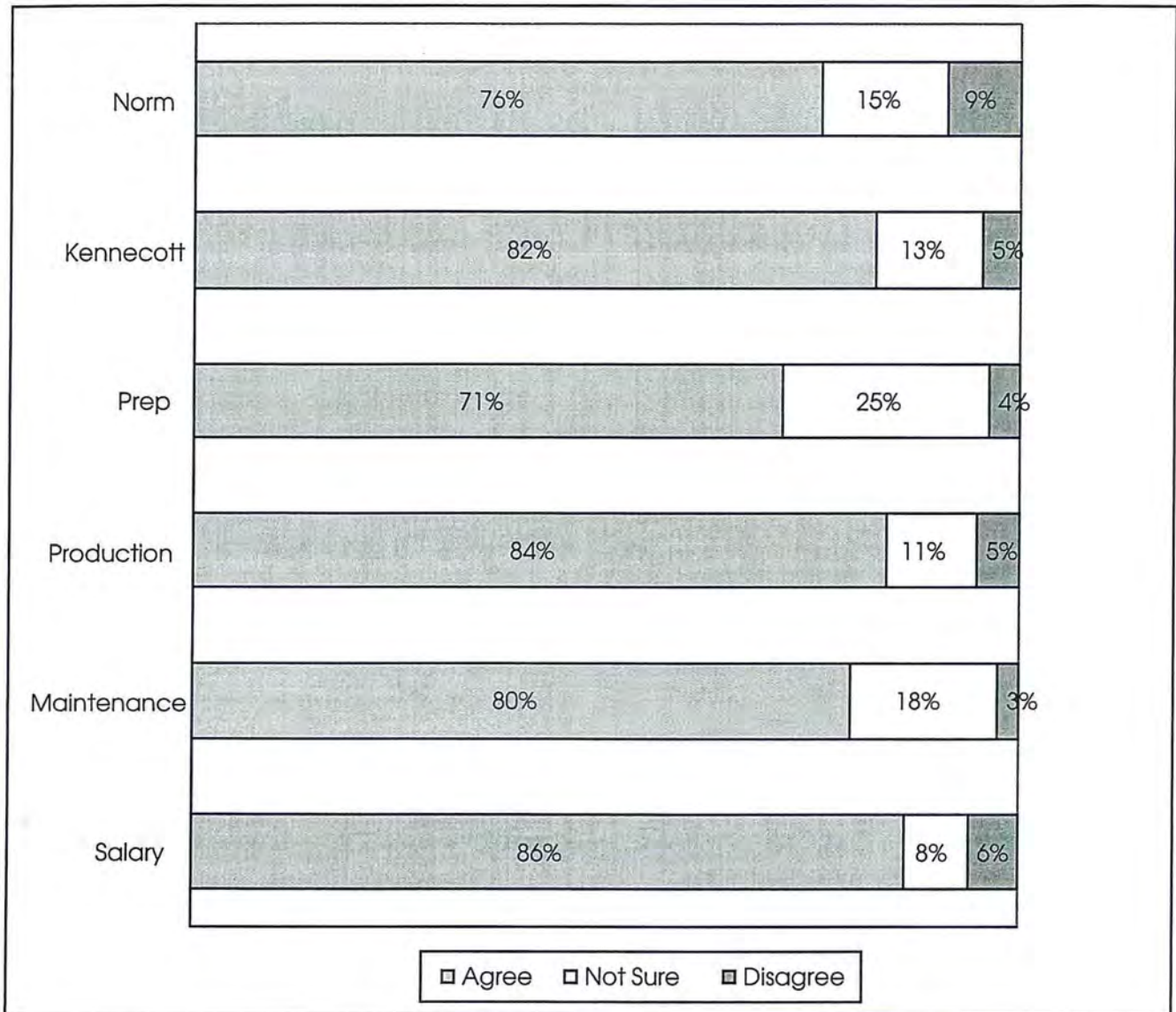
Finally, it should be acknowledged that many hourly employees are simply not in the position to have the systems perspective necessary to understand and appreciate the decisions which may appear not to support safety. Though more effective communication and sound management practices will help, these individuals may never fully appreciate the degree of support their management has for safety.

Overall Management Support for Safety by Position



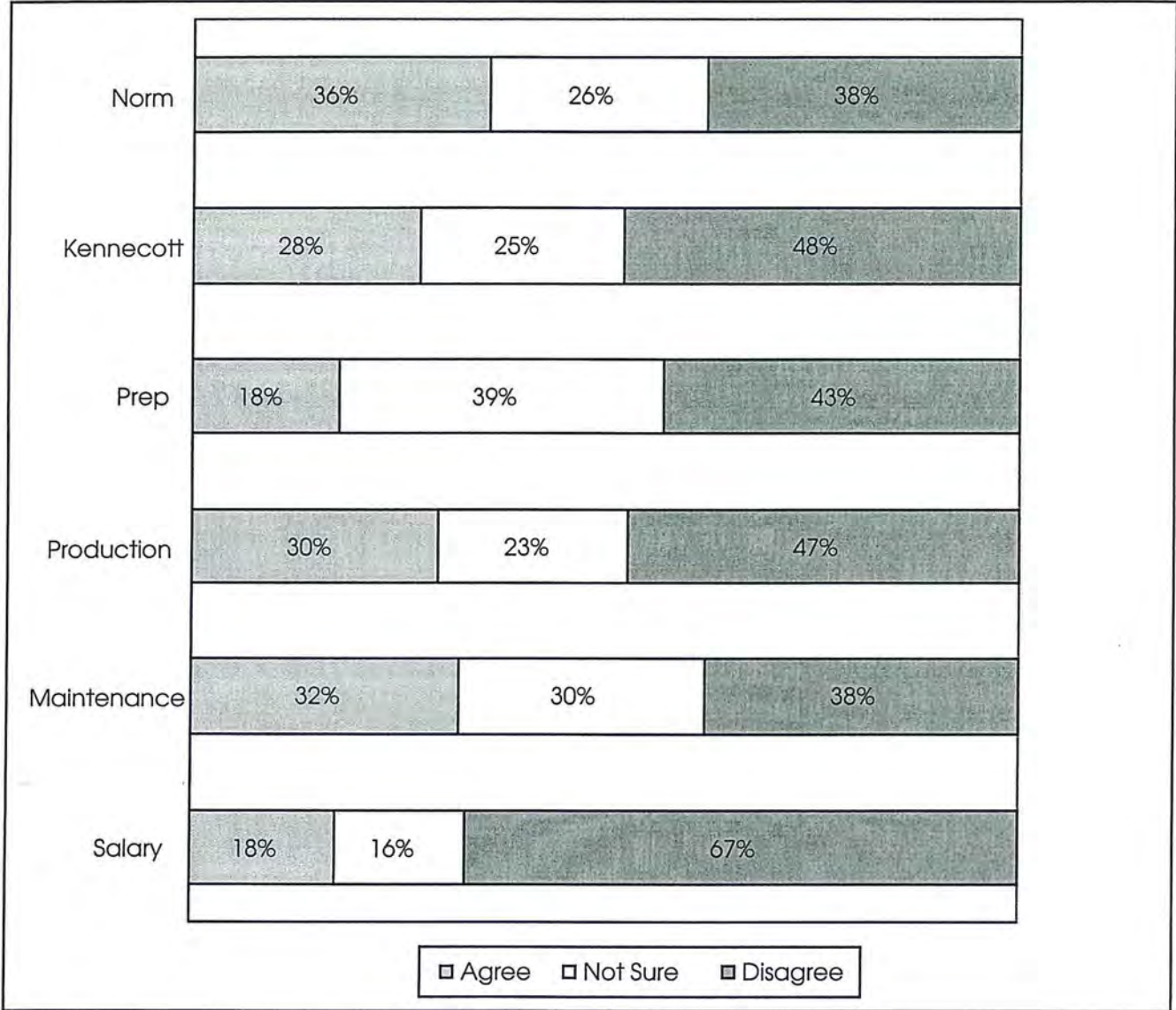
Management Support for Safety by Question

83. Management here seems genuinely interested in reducing injuries.



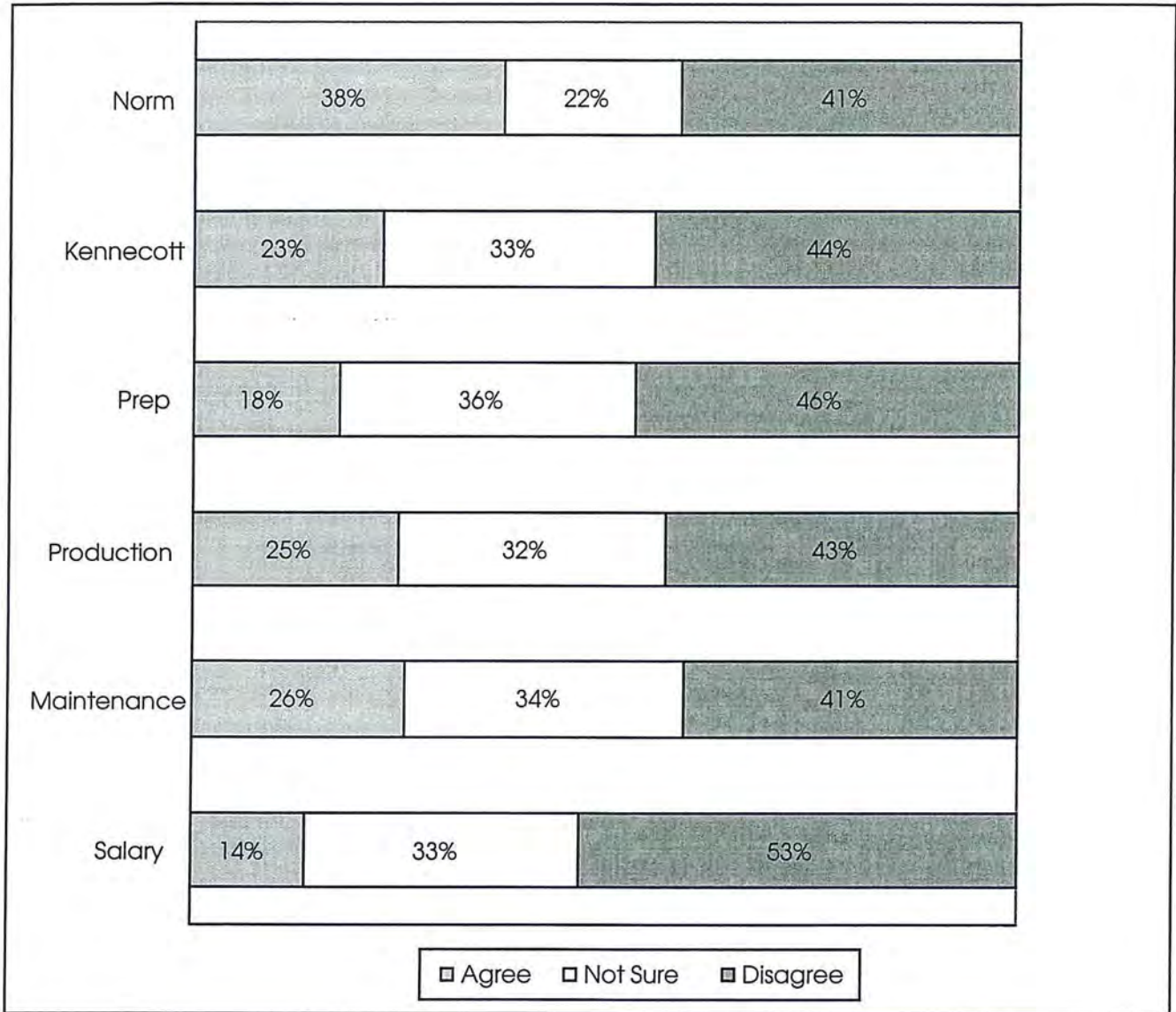
Management Support for Safety by Question (continued)

79. Management is more concerned about keeping the injury statistics low than with truly keeping people safe.



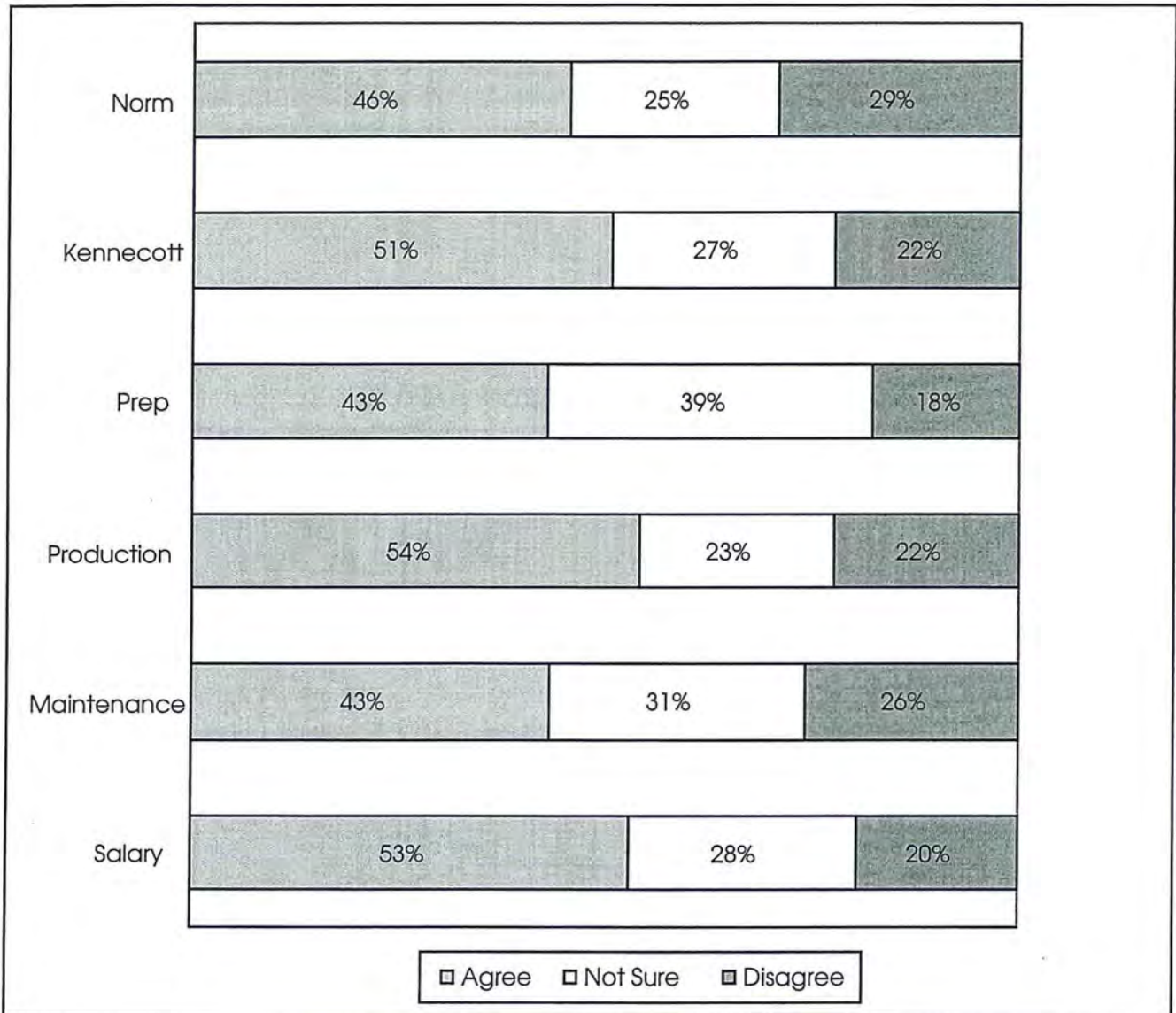
Management Support for Safety by Question (continued)

124. At my workplace, work productivity and quality usually have a higher priority than work safety.



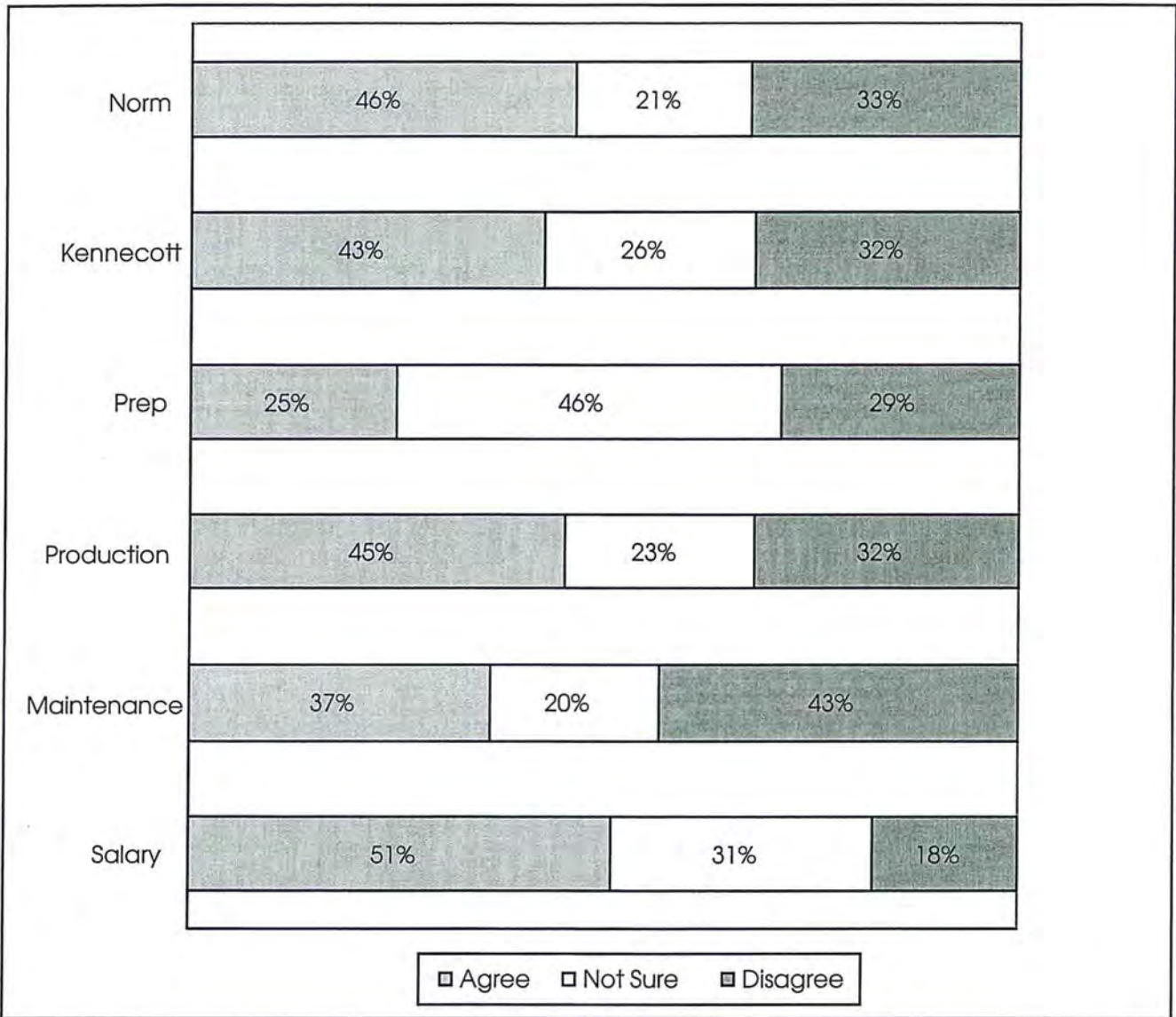
Management Support for Safety by Question (continued)

93. Production demands do not override supervisors' concern for safety.



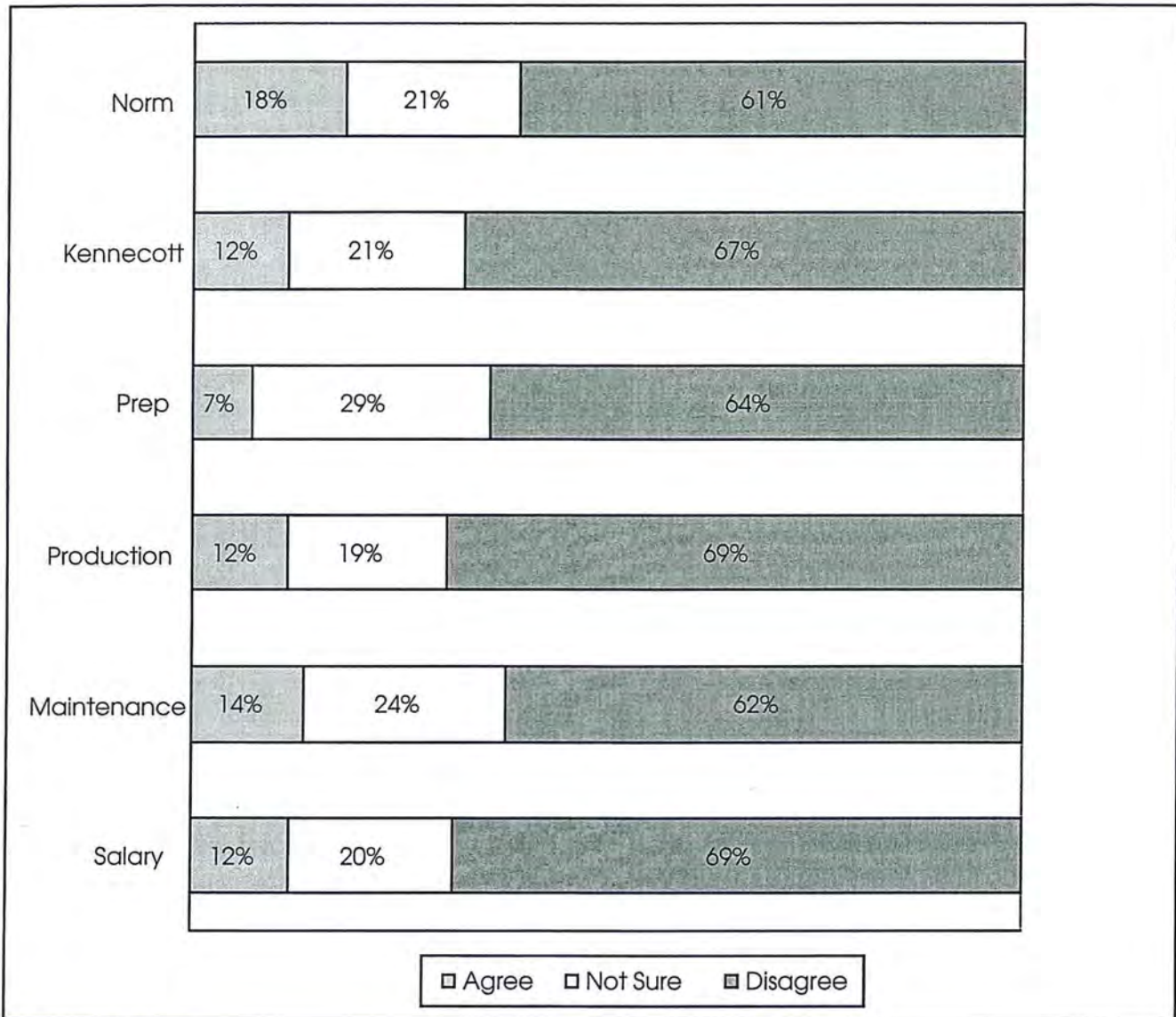
Management Support for Safety by Question (continued)

27. Production demands do not override senior management's concern for safety.



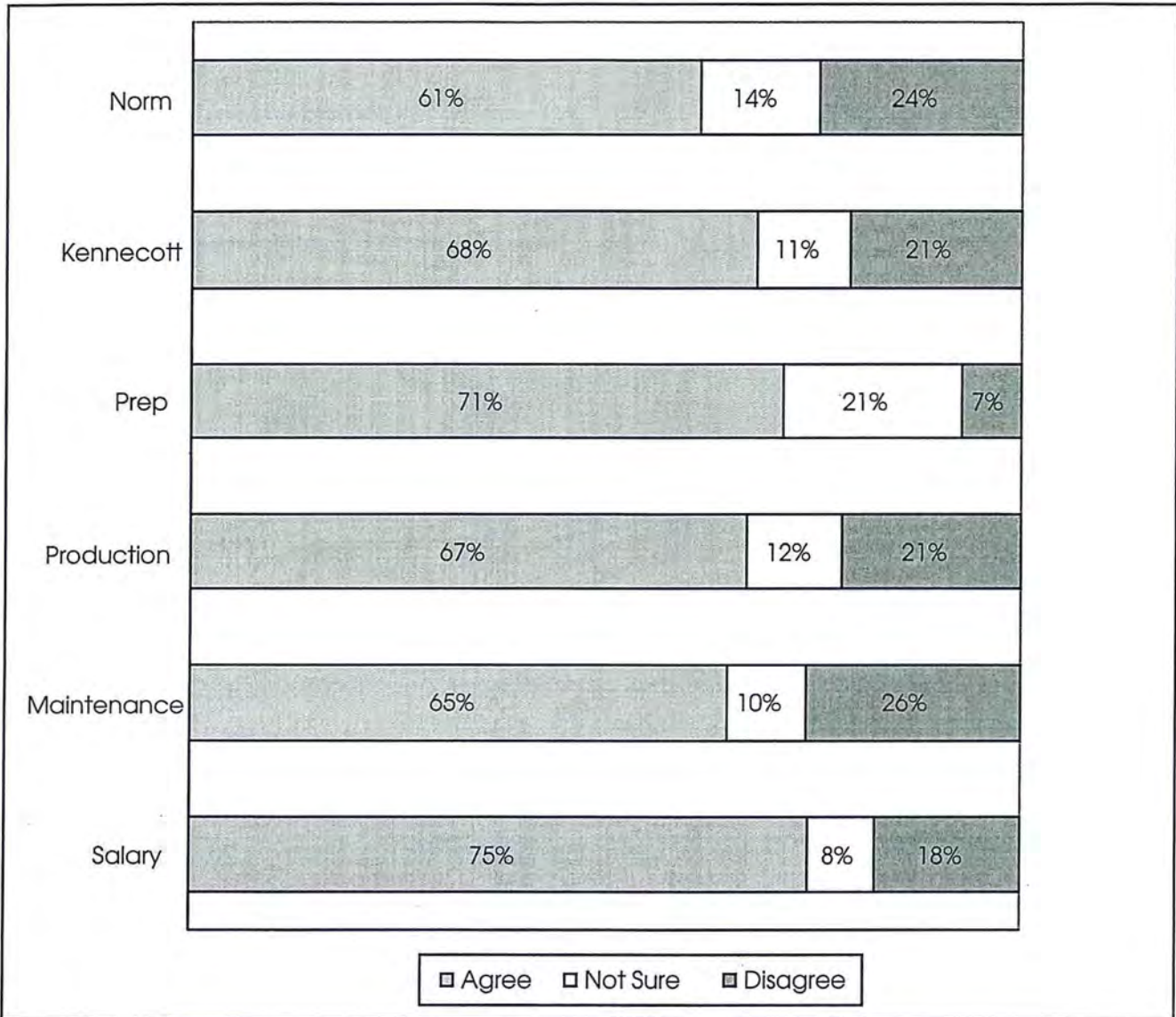
Management Support for Safety by Question (continued)

75. Supervisors sometimes encourage employees to overlook hazards to get the job done.



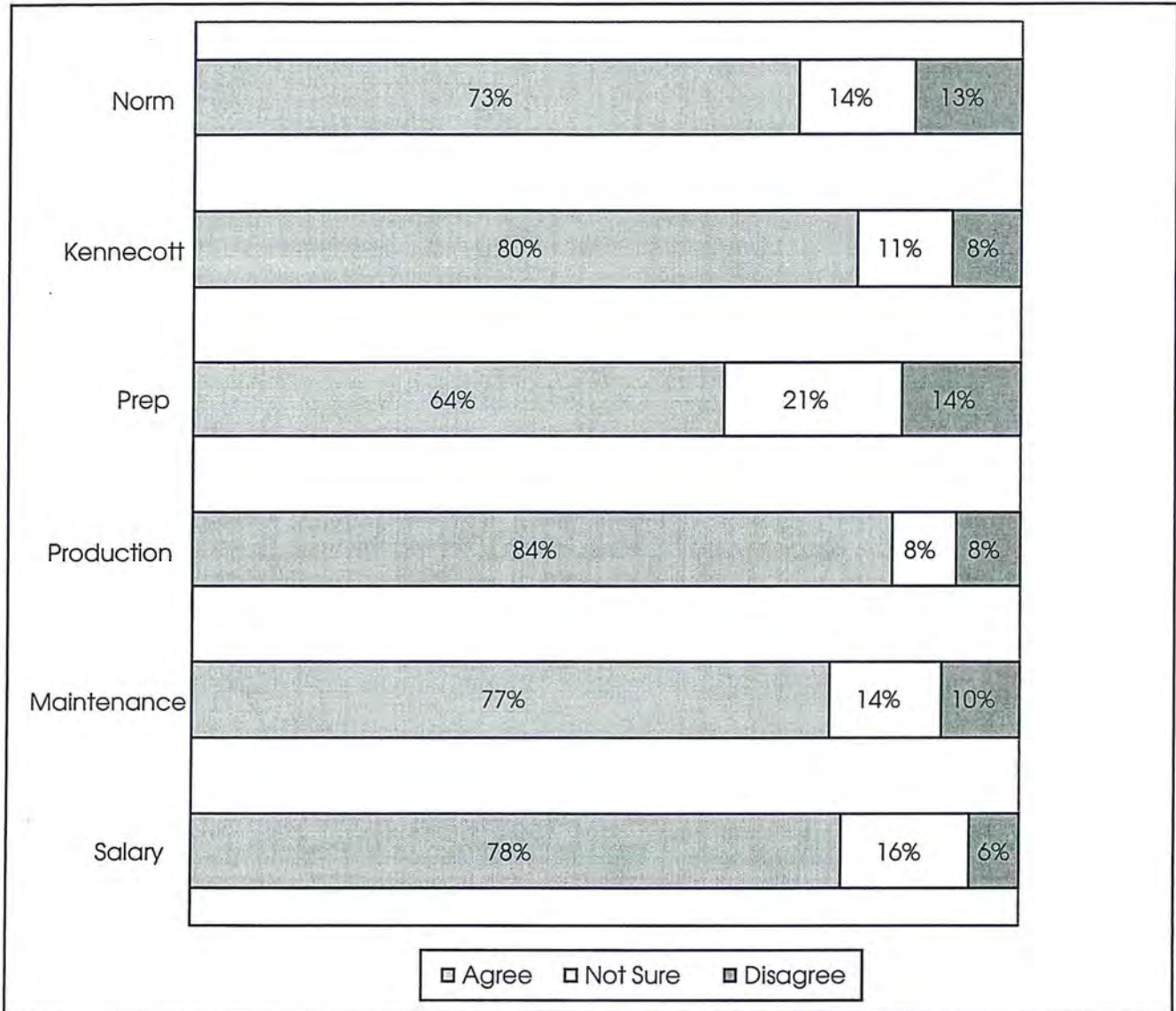
Management Support for Safety by Question (continued)

56. I have never been forced to perform a task which I said I thought was unsafe.



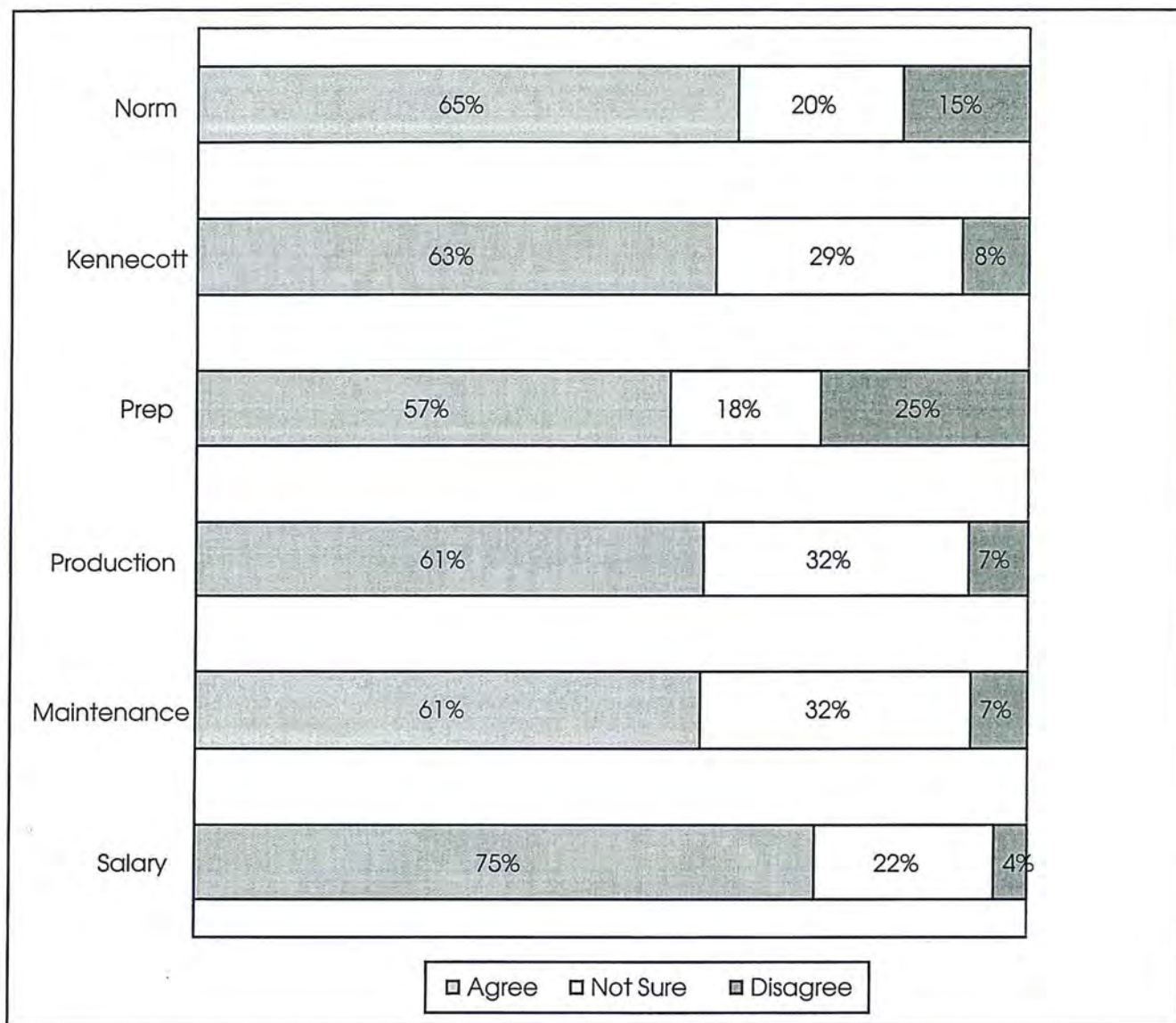
Management Support for Safety by Question (continued)

26. I am encouraged to stop a job if a safety hazard is identified.



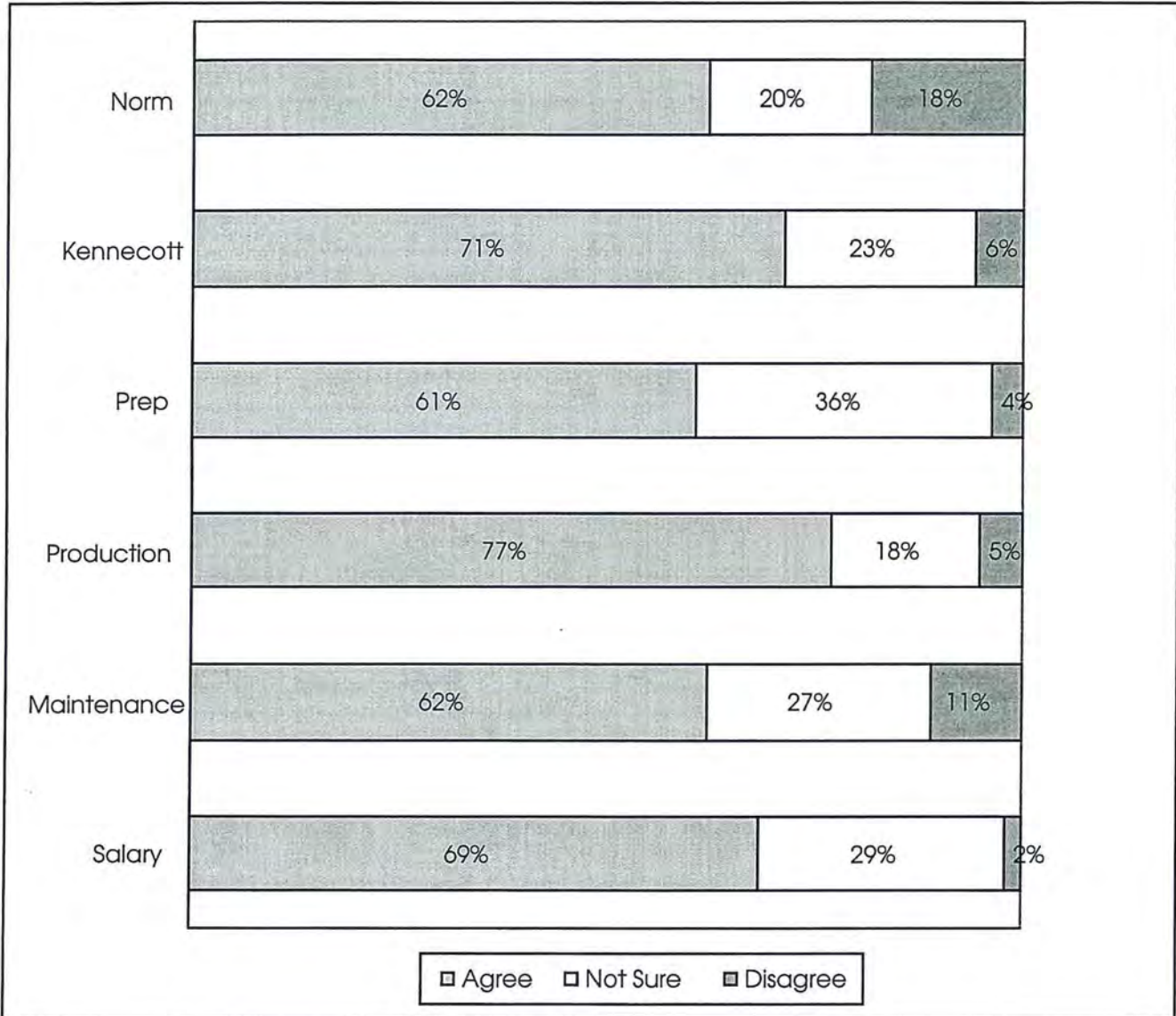
Management Support for Safety by Question (continued)

77. Management is willing to invest money and effort to improve our safety performance.



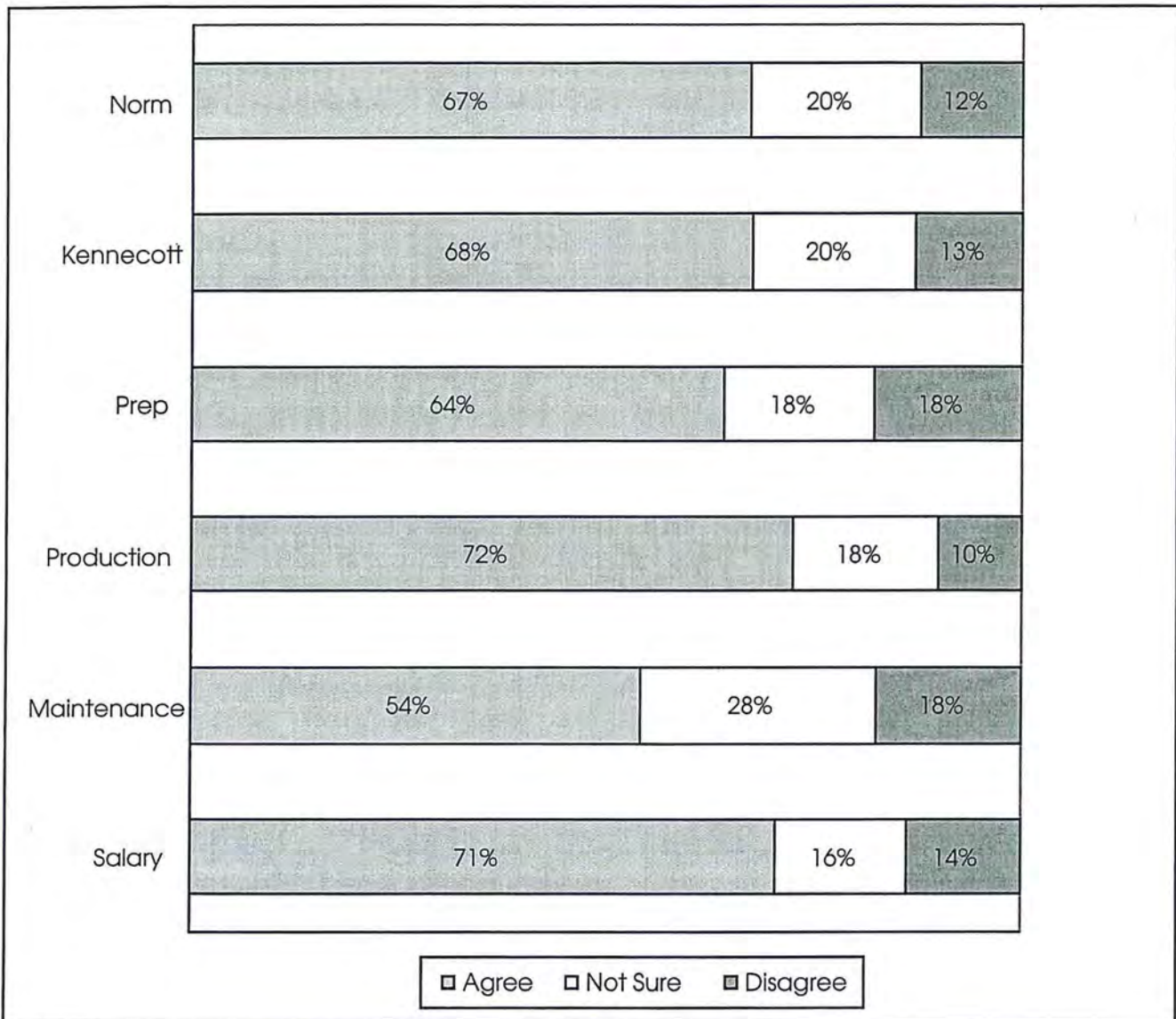
Management Support for Safety by Question (continued)

64. When told about safety hazards, my immediate supervisor is appreciative and tries to correct them quickly.



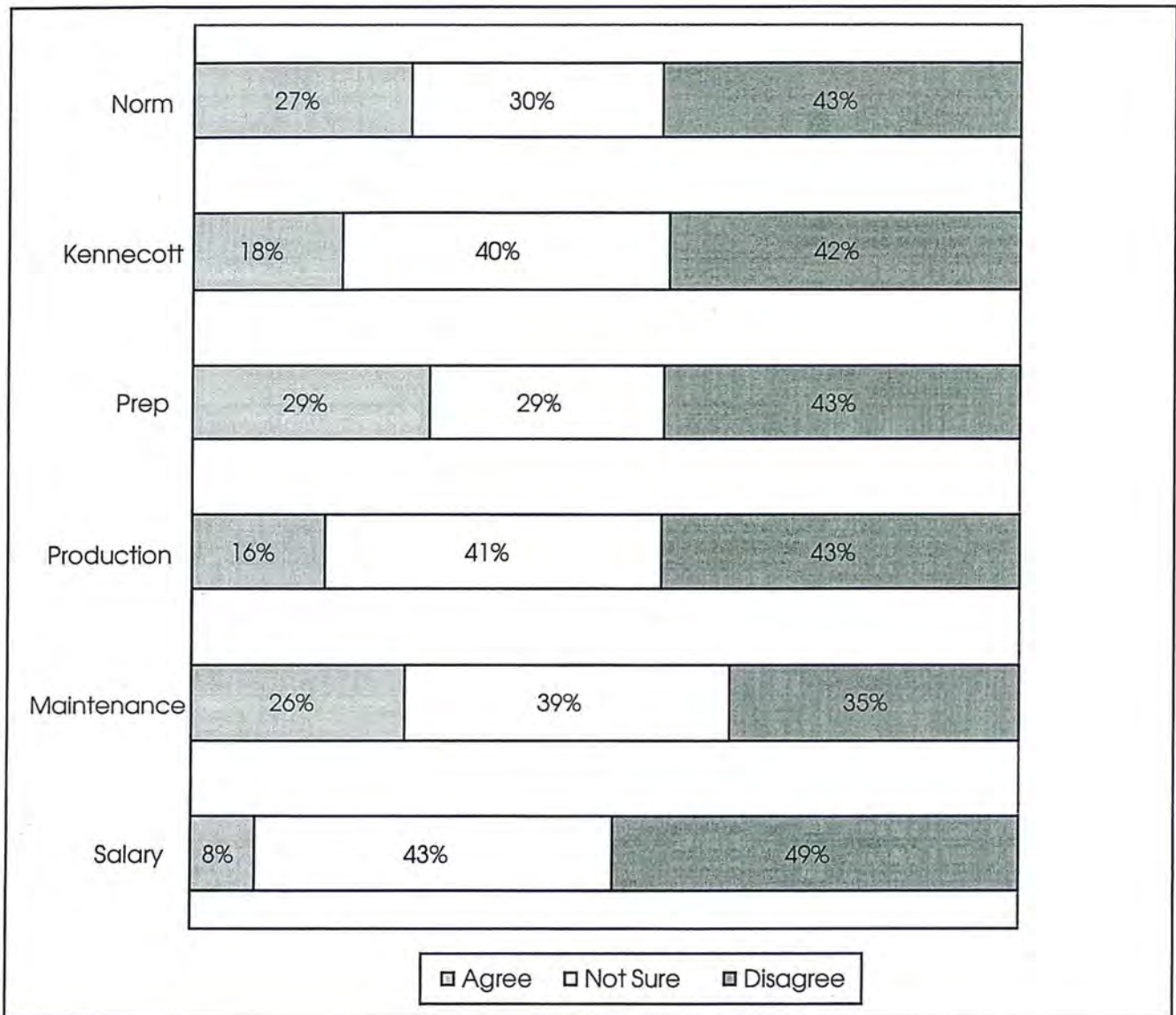
Management Support for Safety by Question (continued)

23. My immediate supervisor is well informed about relevant safety issues.



Management Support for Safety by Question (continued)

80. Management does not fully understand the real safety issues within the plant.



Peer Support for Safety

The Peer Support for Safety Scale assesses employees' perceptions and opinions regarding how strongly they believe their peers (e.g., coworkers) support safety. Specific survey items are listed below:

- Employees in my work area caution each other about unsafe behaviors.
- When employees in my work area are cautioned about working unsafely, they begin working more safely.
- Employees appreciate receiving feedback from their coworkers about their safe behaviors.
- Employees appreciate receiving feedback from their coworkers about their unsafe behaviors.
- If I approach my coworkers about their unsafe behaviors, they will react negatively.
- Employees in my work group recognize each other for working safely.
- I would be willing to have a coworker observe me while I work in order to give me feedback regarding safe and unsafe behaviors observed.
- Most employees in my group would not feel comfortable if their work practices were observed and recorded by a coworker.
- Employees do not like it when coworkers bypass safety policy, even when no harm is done.
- I feel pressure from my coworkers to “short-cut” safe work practices.
- Employees here often “short-cut” safe work practices.
- Most of my coworkers actively support the company’s safety programs.

Achieving a TSC requires active participation by a majority, if not all, employees. Since safe behaviors often require additional time and effort, and don't provide immediate naturally reinforcing consequences, it is imperative for coworkers to provide the necessary support to one another to cultivate and maintain safe work practices.

Low agreement scores to Peer Support for safety often reflect a culture where employees perceive their peers do not support safety to the extent they should. Whether true or not, this negative perception can strongly influence individual behaviors in a pervasive way. When an individual does not feel that his/her coworkers are strong supporters of safety, his own safety-related and Actively Caring behaviors will likely decline. As a result, others will view him as being unsupportive of safety and *that* perception will negatively influence *their* safety-related behaviors.

The importance of strong peer support for safety is based on a concept from social psychology called conformity. Whether easy to accept or not, individuals consciously (or in some cases subconsciously) seek the approval and acceptance of others. Within an organization, even the most conscientious individuals often behave in ways counter to their beliefs in an effort to conform to the peer group's norms. These norms are often demonstrated through modeling and feedback.

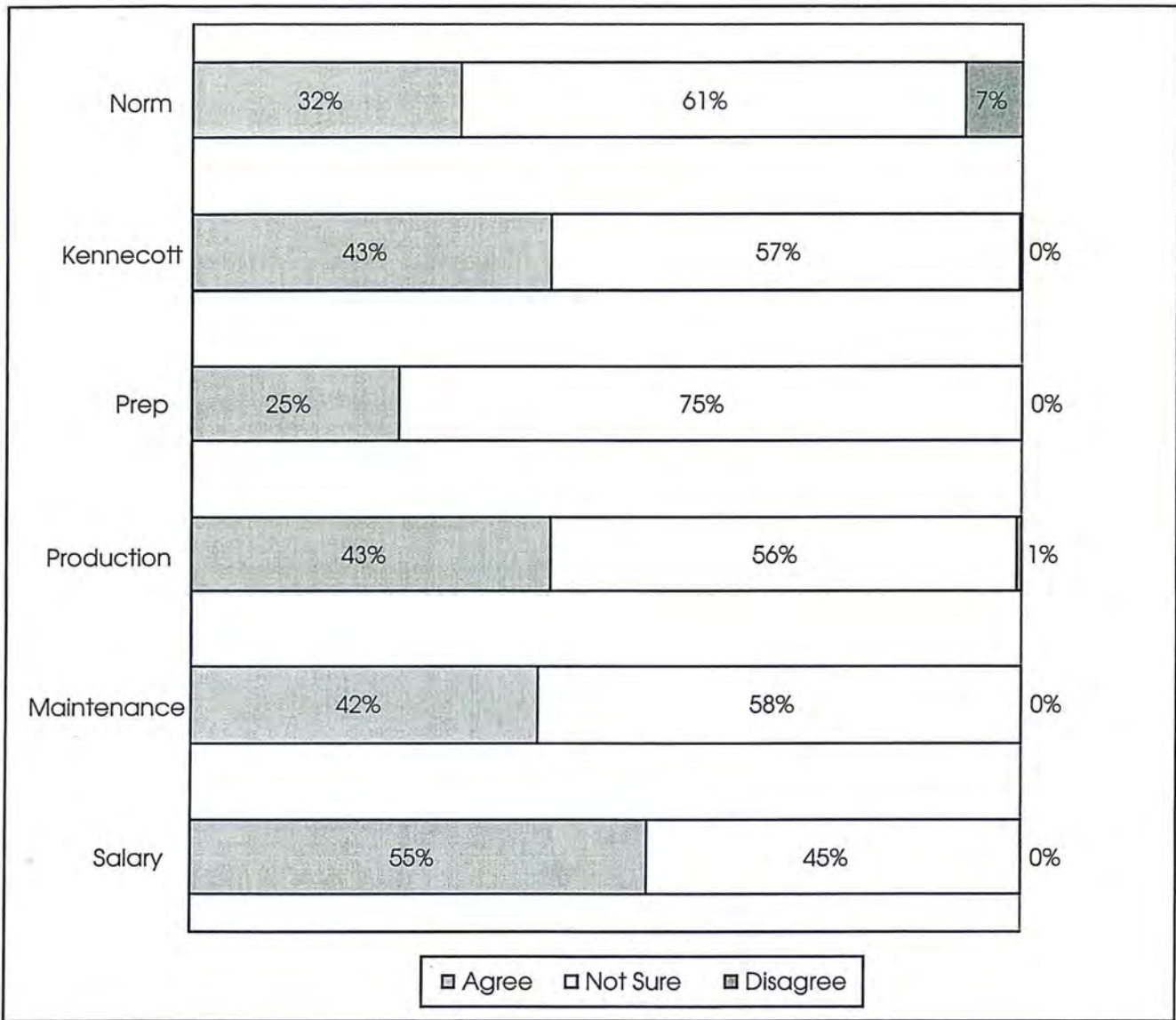
Individuals learn much of what they know by observing and emulating the behavior of others; not just the mechanics of *how* to perform a behavior, but also what the culture has defined to be *acceptable* behavior. Others' behavior--whether safe or unsafe--provides a model for an individual to mimic. Therefore, if safe work practices are the exception rather than the rule,

well-intentioned individuals may elect to forgo safe work practices themselves in an effort to conform to the accepted norm.

In addition to modeling, one-on-one feedback from peers defines what the peer group considers to be acceptable work practices. Where unsafe behavior is the norm, coworkers tend to give feedback to one another to that effect. Through their verbal interactions, they indicate that the unsafe behaviors are “cool” or “macho” or that they are quicker and more efficient, thereby lessening others’ workloads. It takes a strong, self-assured individual to resist such peer pressure. On the other hand, where safe behavior is the norm, employees give each other appropriate feedback (e.g., recognize one another for safe behaviors and provide corrective feedback for unsafe actions). In this situation, employees who perform unsafe behaviors deviate from the standard and run the risk of inviting the disapproval of their peer group.

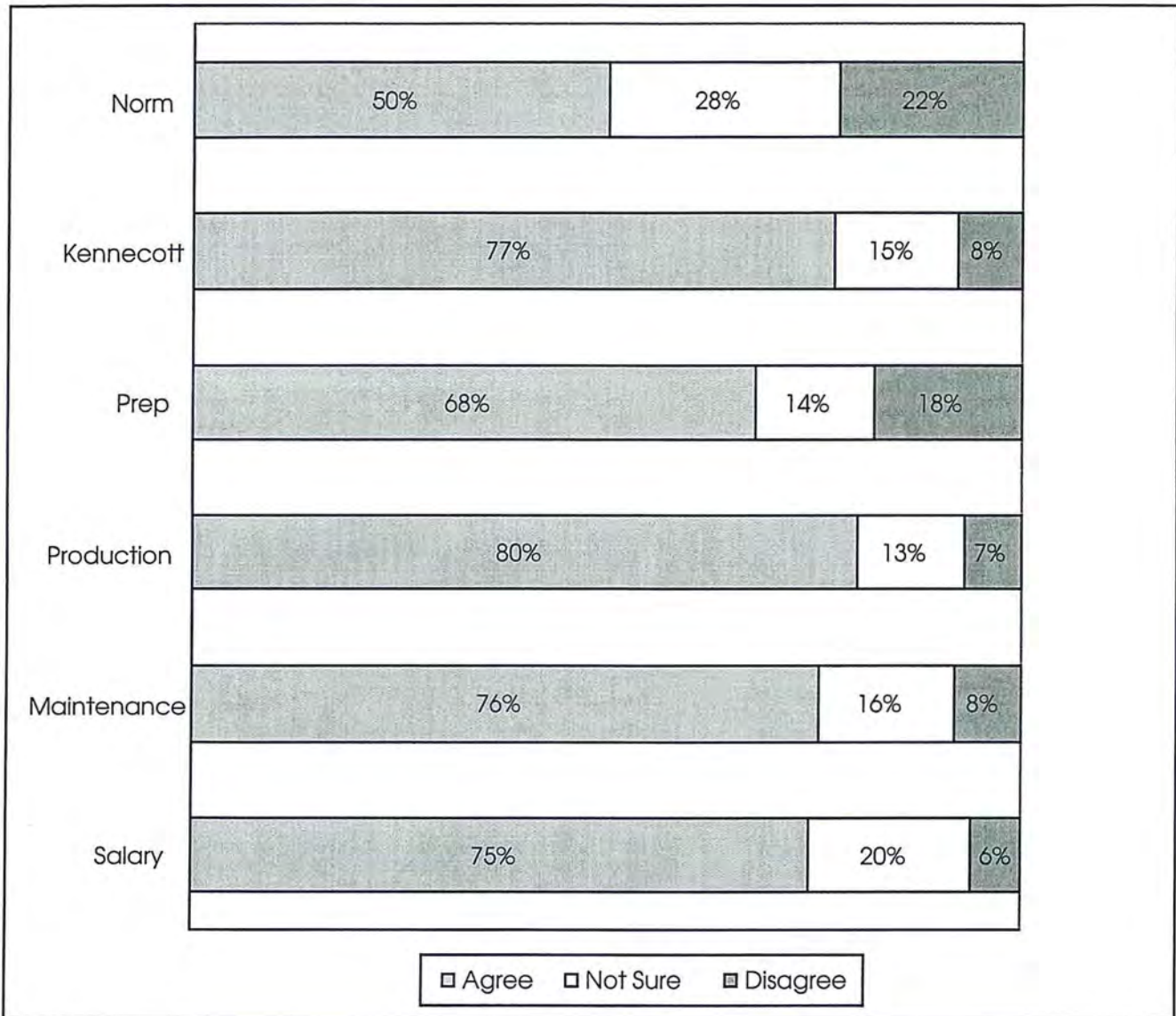
When individuals are given the opportunity to become personally involved in improvement initiatives, a sense of commitment and ownership result. And, this heightened sense of commitment tends to generalize to other similar situations. Therefore, the more personally involved an individual can become in an organization’s safety improvement initiative, the more personally committed to safety in general he will become. The greater the number of individuals an organization recruit as “safety champions”, the greater the number of individuals providing a positive influence on their peers. Formal systems, like a behavioral observation and feedback process, which encourage direct peer interaction and recognition concerning safety can magnify this influence. Individuals’ efforts should, of course, be reinforced through appropriate recognition, including appropriate consideration through the performance evaluation system.

Overall Peer Support for Safety by Position



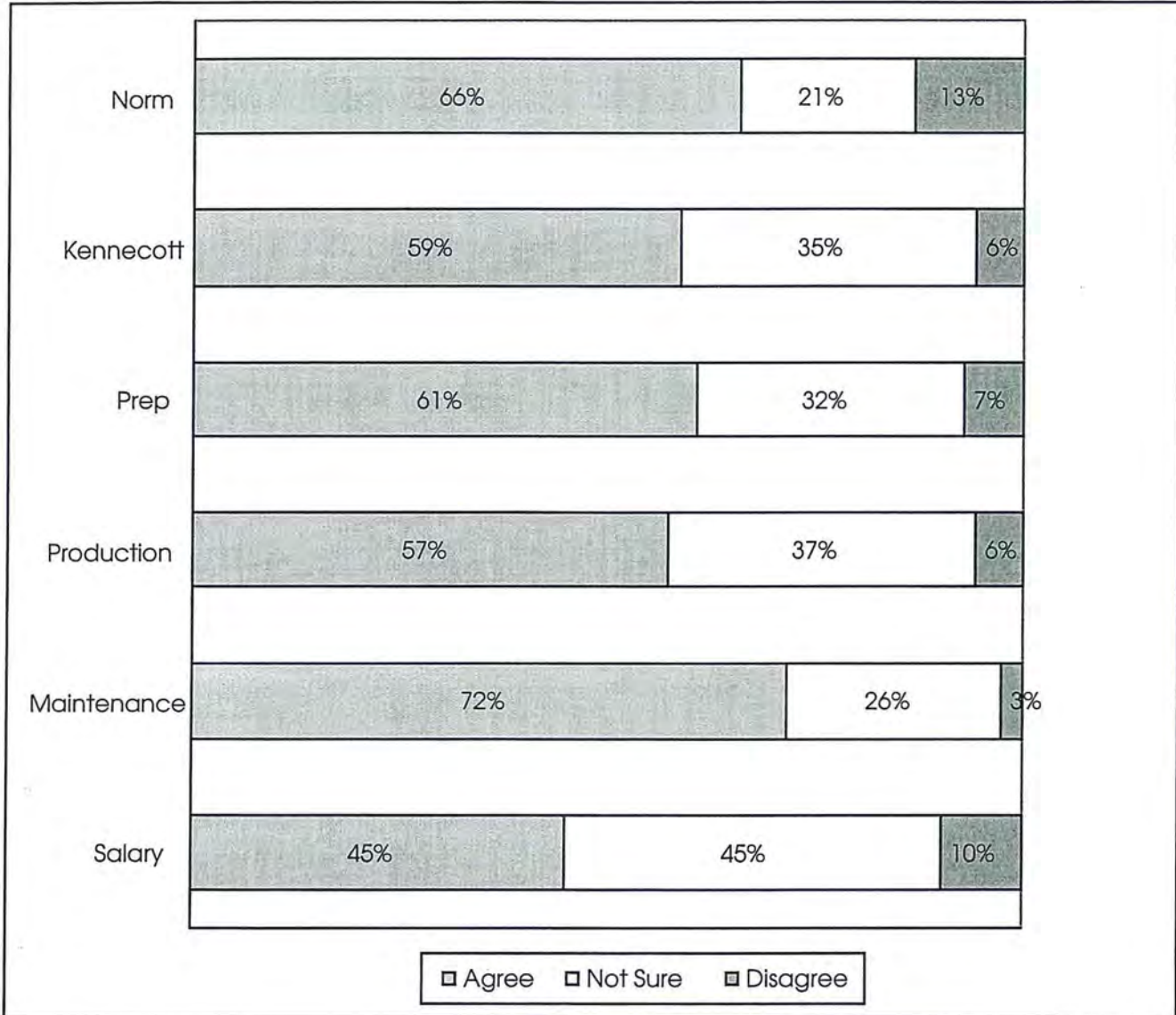
Peer Support for Safety by Question

6. Employees in my work area caution each other about unsafe behaviors.



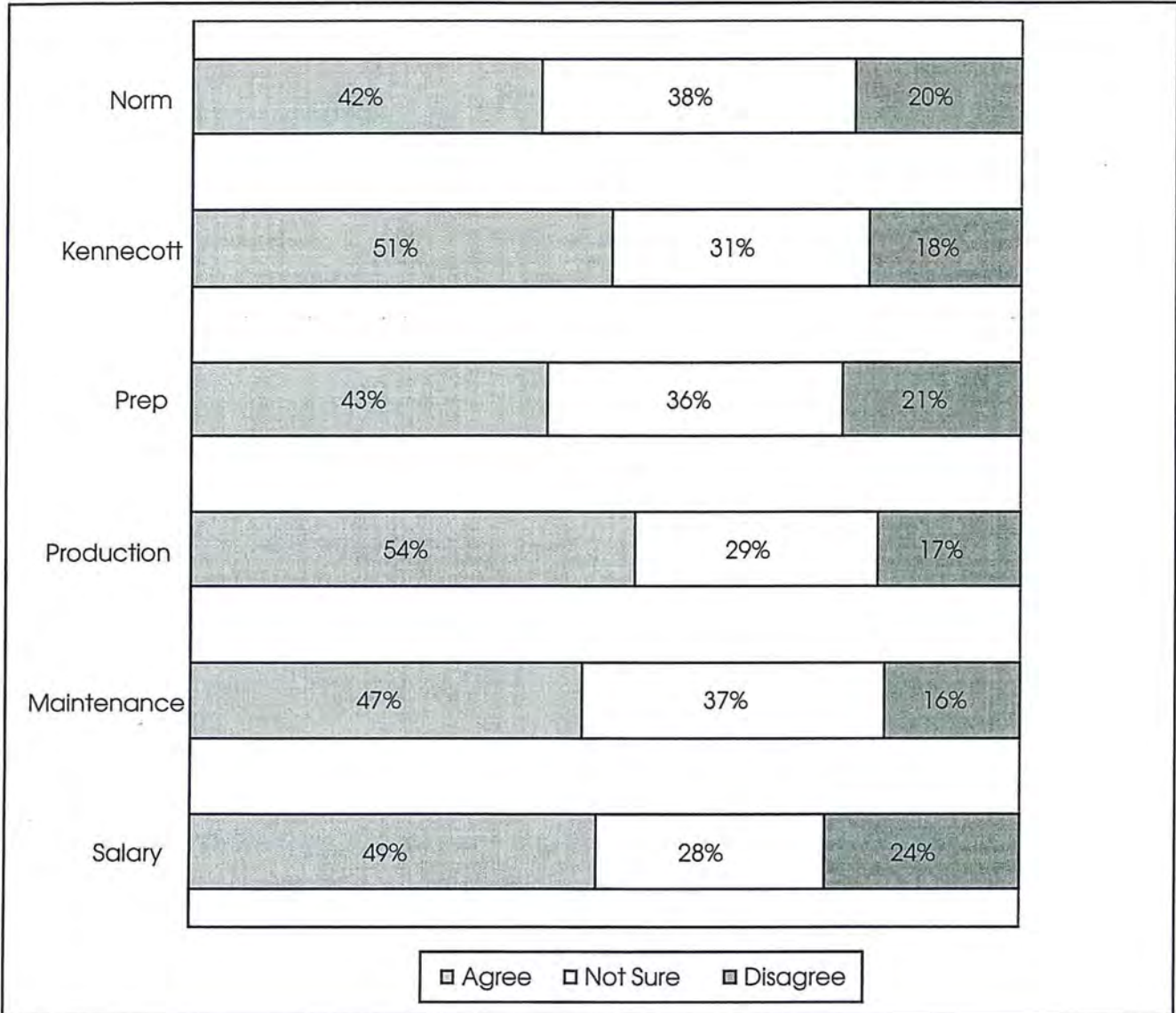
Peer Support for Safety by Question (continued)

67. When employees in my work area are cautioned about working unsafely, they begin working more safely.



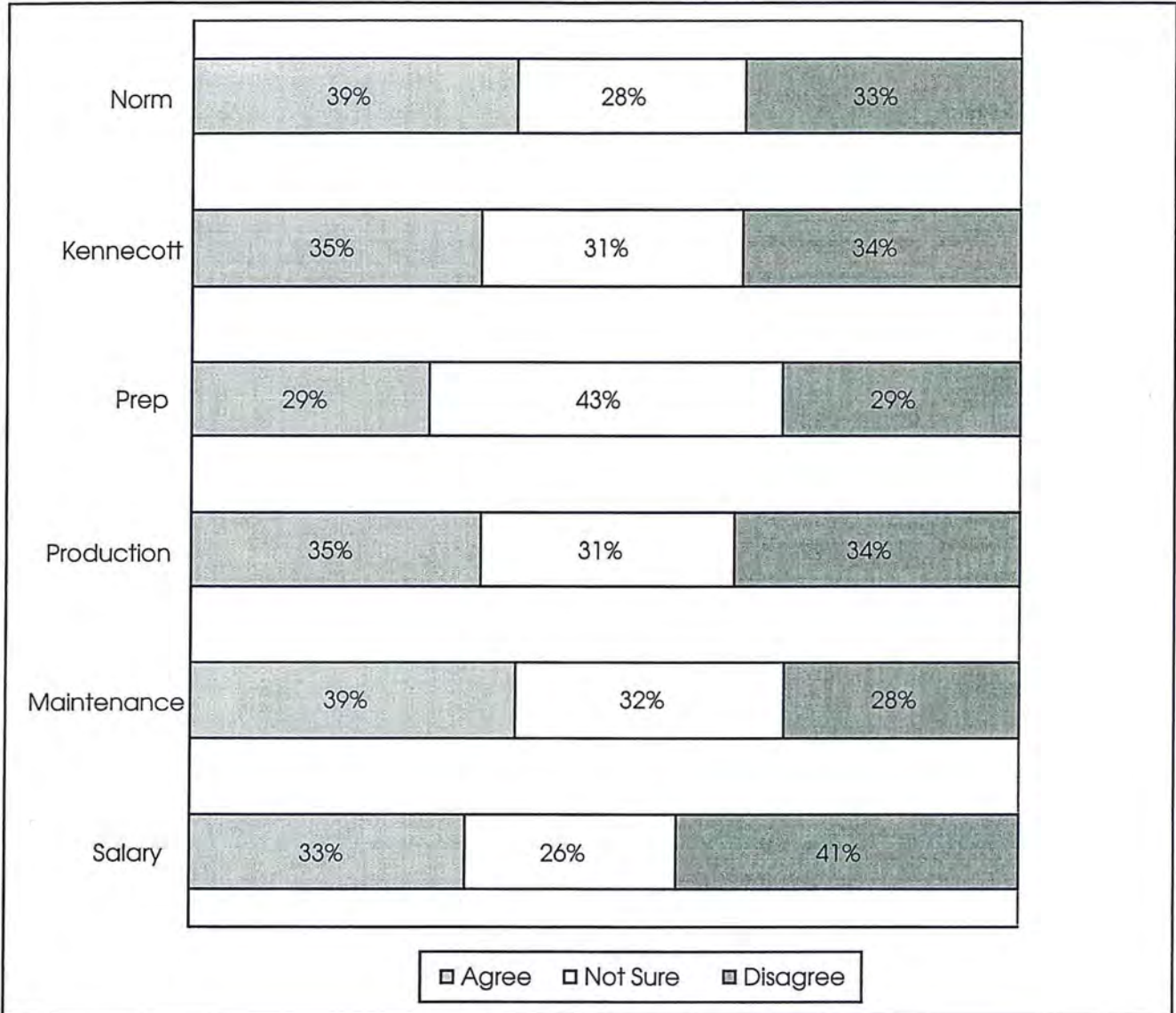
Peer Support for Safety by Question (continued)

127. Employees appreciate receiving feedback from their coworkers about their safe behaviors.



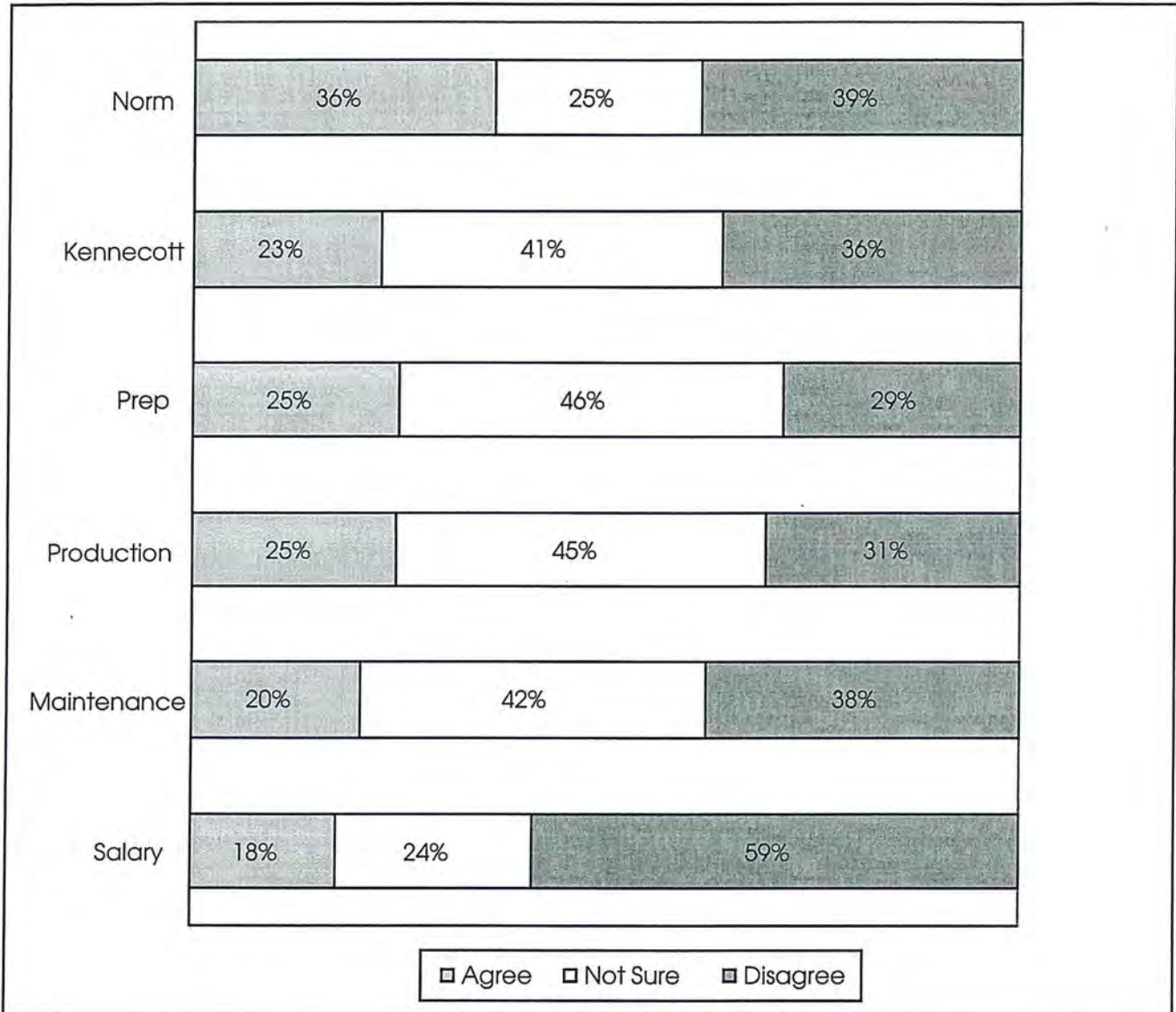
Peer Support for Safety by Question (continued)

4. Employees appreciate receiving feedback from their coworkers about their unsafe behaviors.



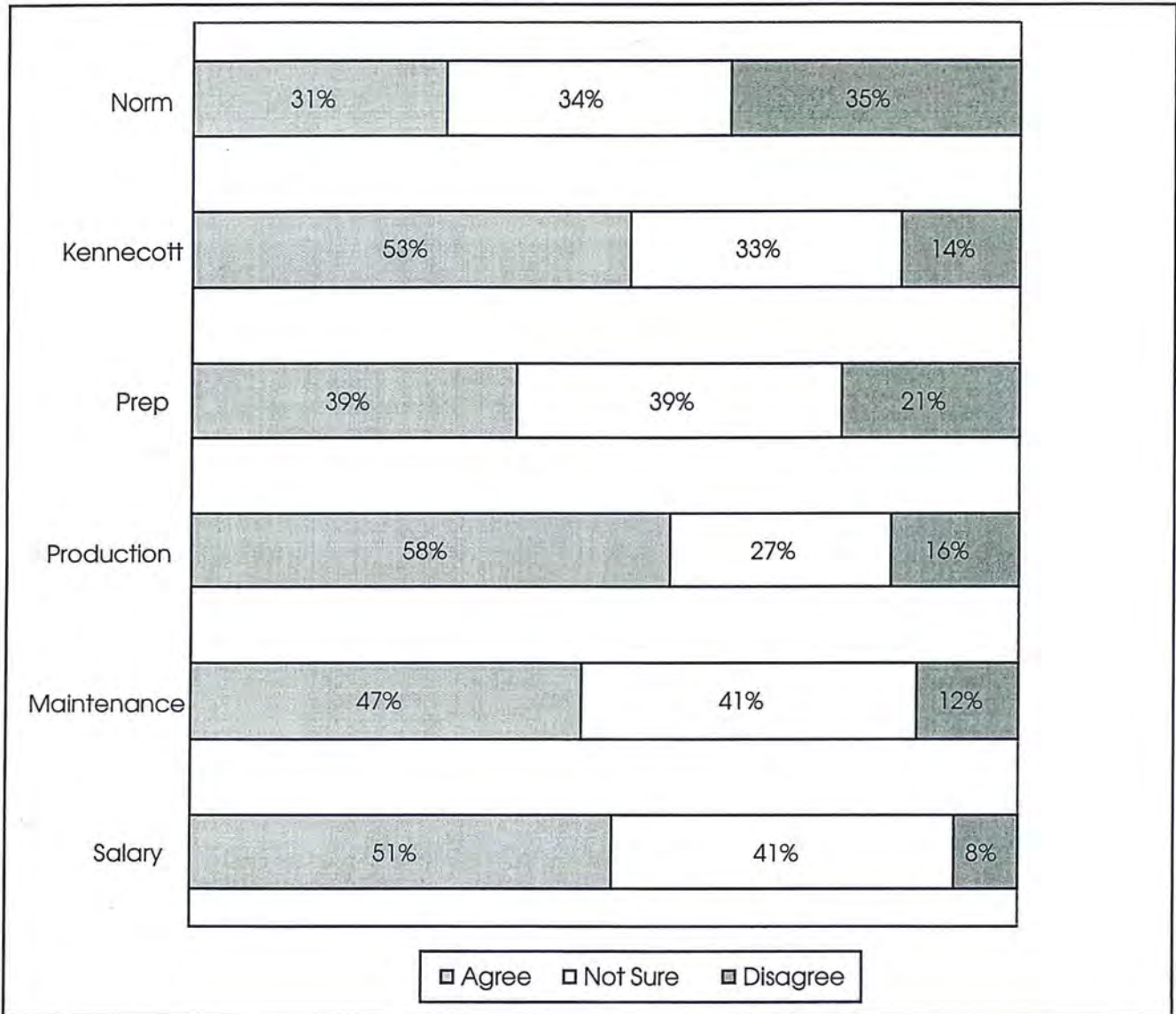
Peer Support for Safety by Question (continued)

59. If I approach my coworkers about their unsafe behaviors, they will react negatively.



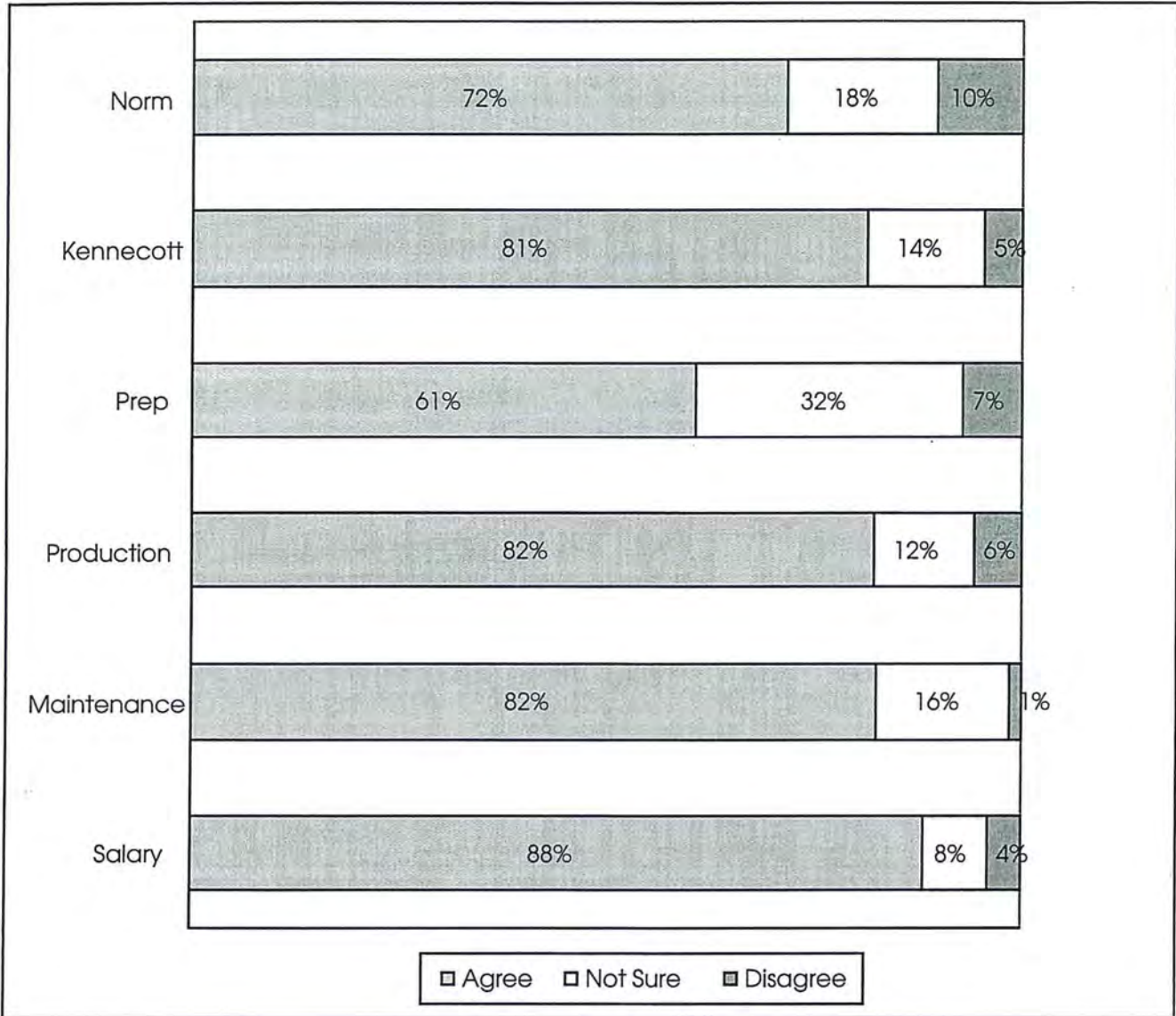
Peer Support for Safety by Question (continued)

123. Employees in my work group recognize each other for working safely.



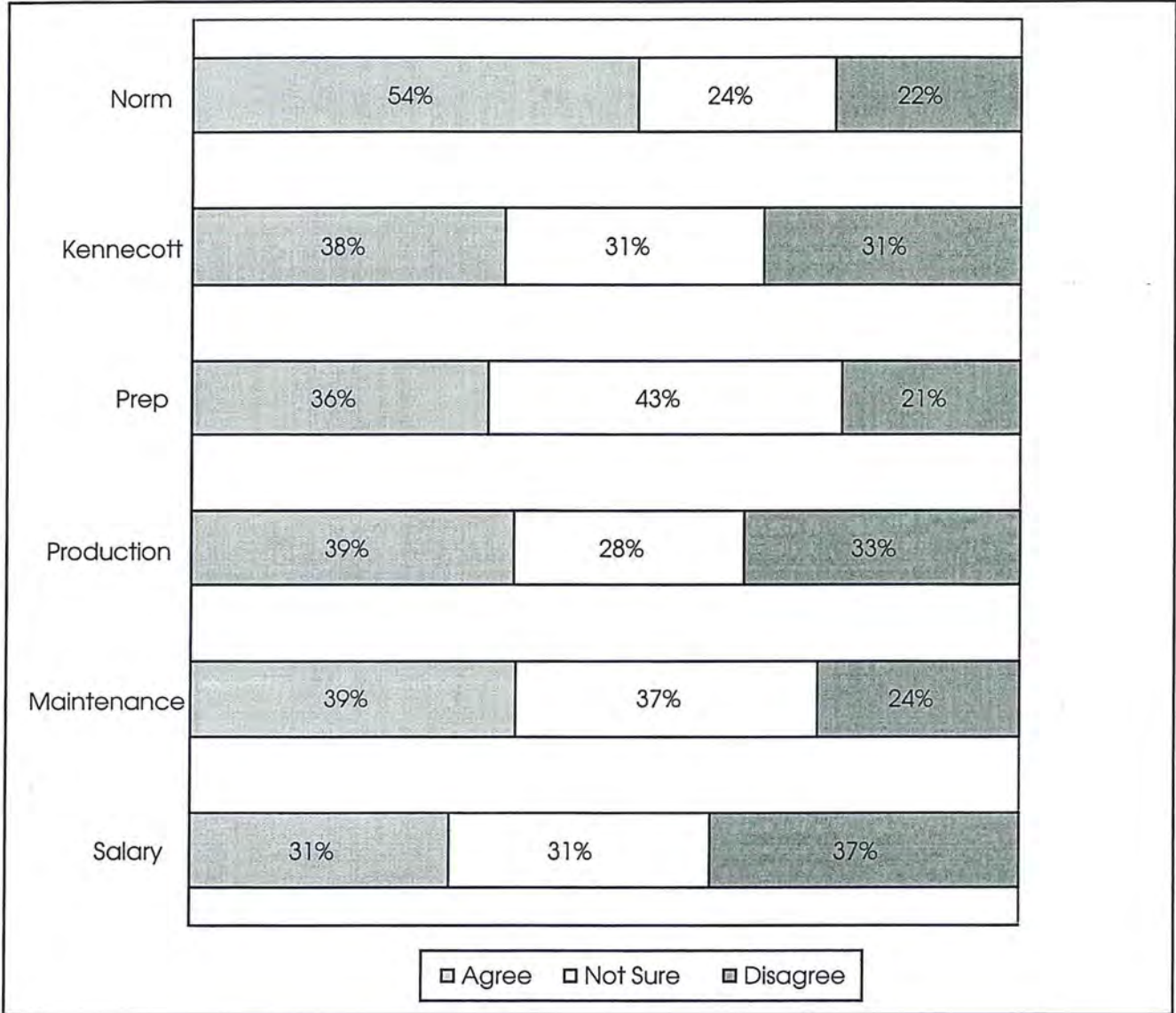
Peer Support for Safety by Question (continued)

110. I would be willing to have a coworker observe me while I work in order to give me feedback regarding safe and unsafe behaviors observed.



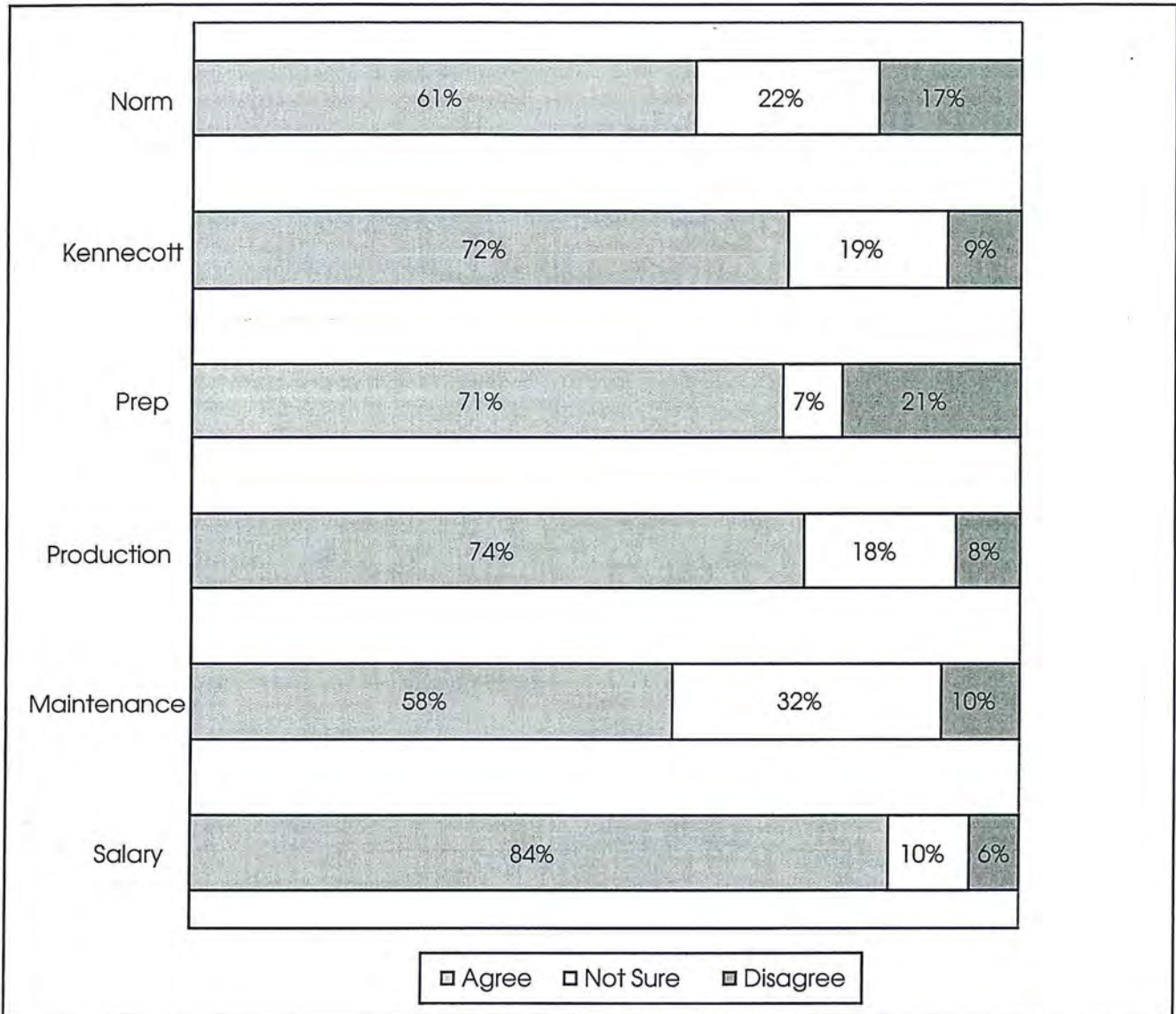
Peer Support for Safety by Question (continued)

117. Most employees in my group would not feel comfortable if their work practices were observed and recorded by a coworker.



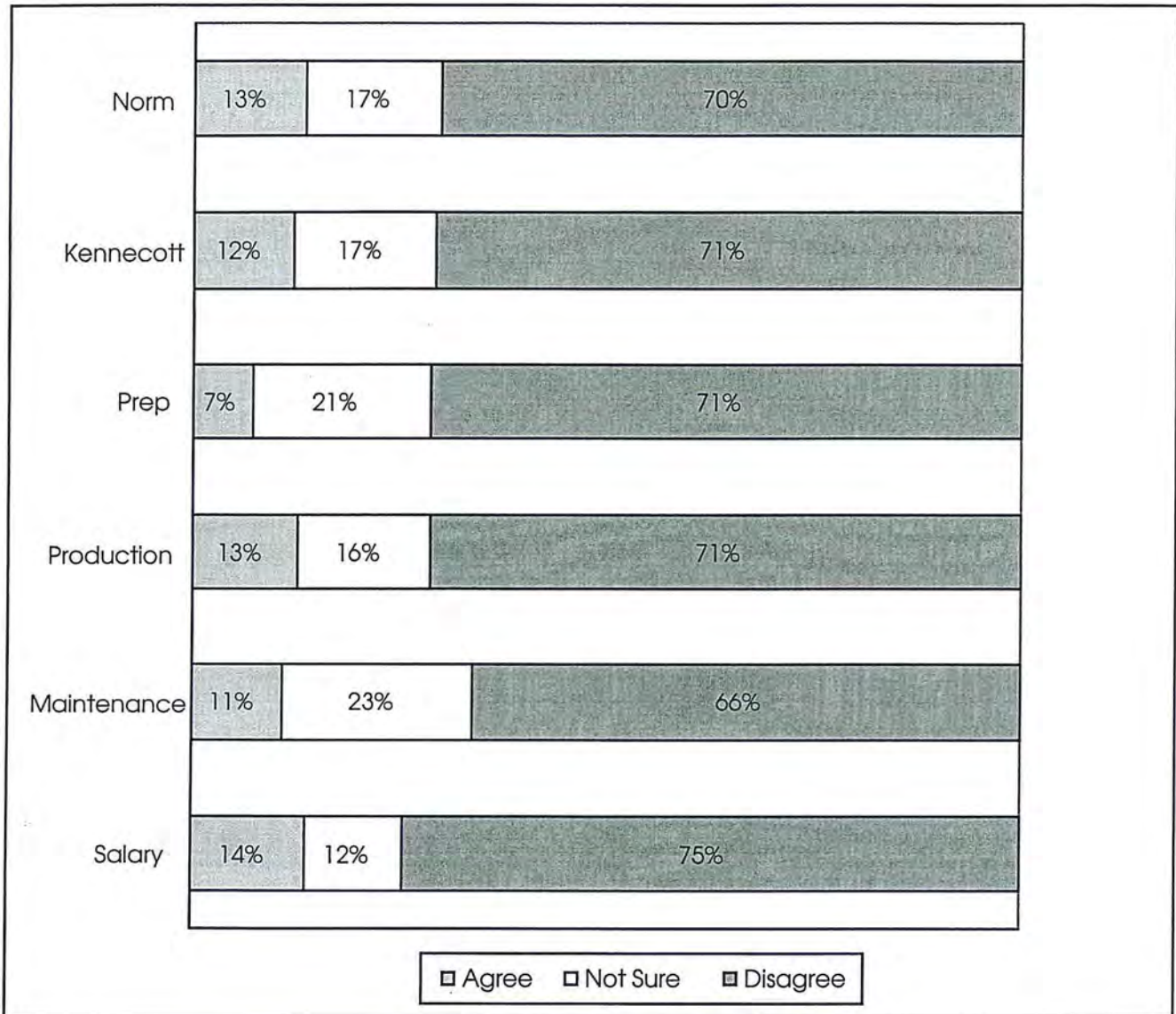
Peer Support for Safety by Question (continued)

5. Employees do not like it when coworkers bypass safety policy, even when no harm is done.



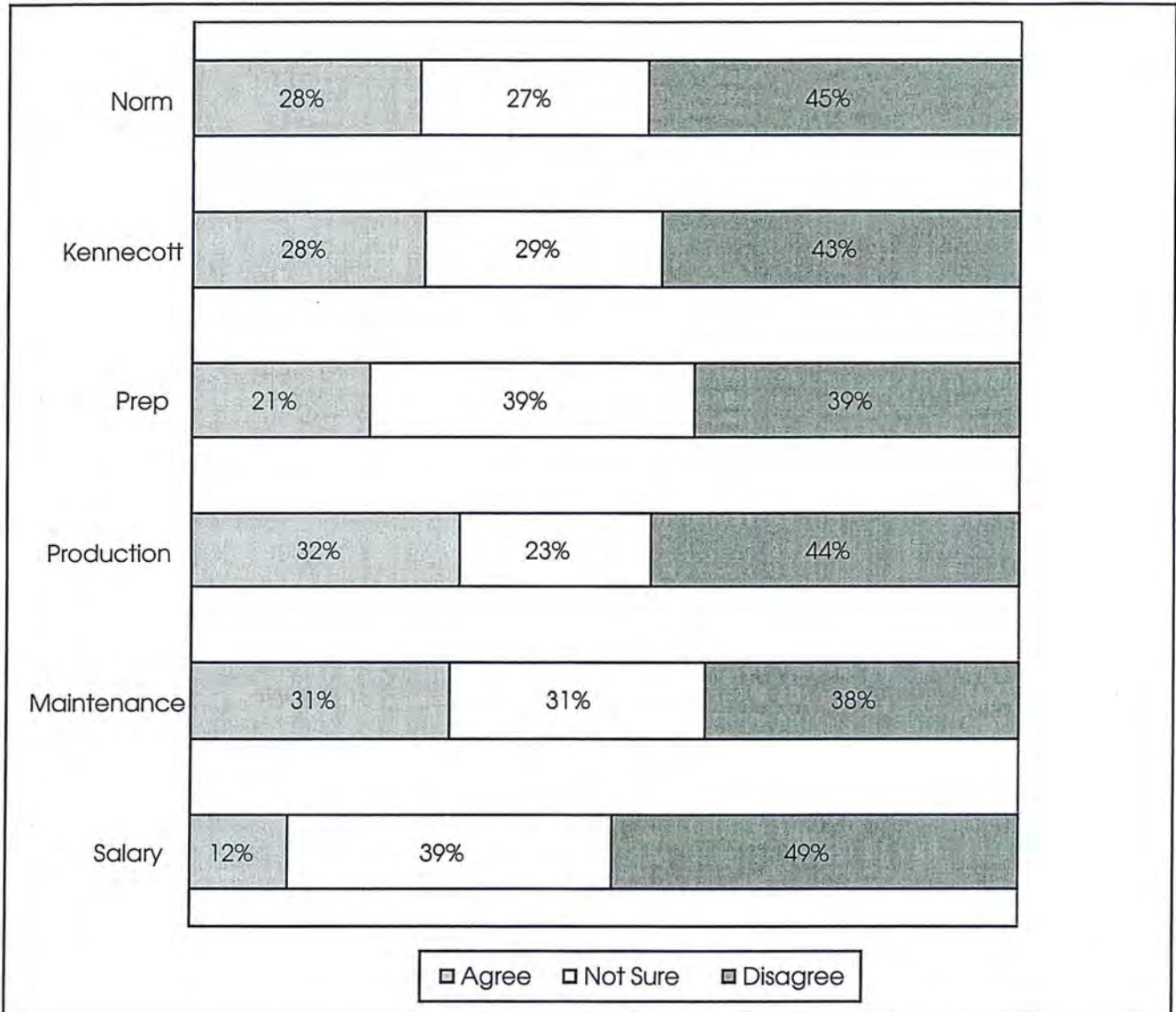
Peer Support for Safety by Question (continued)

9. I feel pressure from my coworkers to “short-cut” safe work practices.



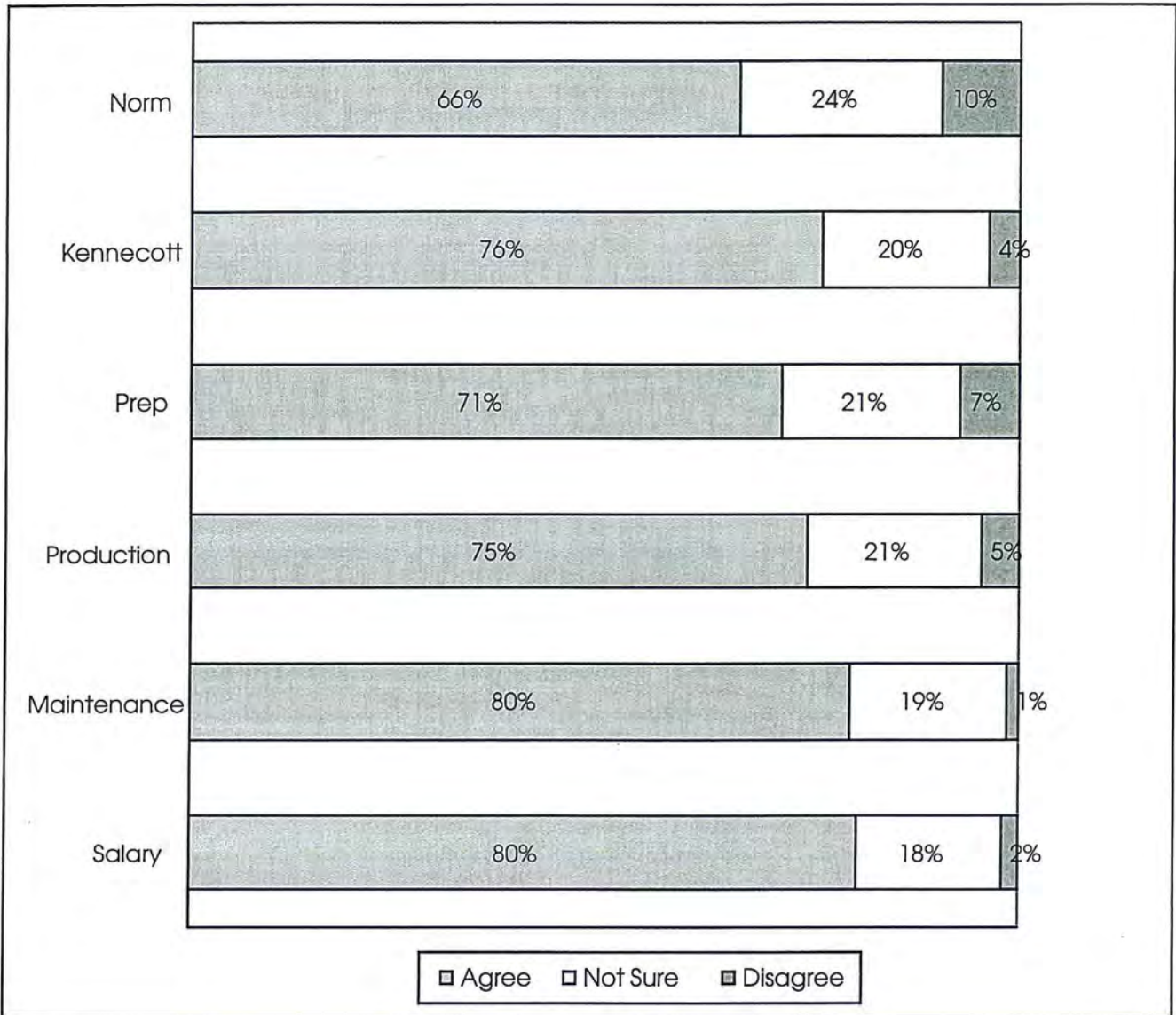
Peer Support for Safety by Question (continued)

34. Employees here often “short-cut” safe work practices.



Peer Support for Safety by Question (continued)

119. Most of my coworkers actively support the company's safety programs.



Personal Responsibility for Safety

The Personal Responsibility for Safety Scale assesses employees' perceptions and opinions regarding how strongly they believe *they* support safety. Specific survey items are listed below:

- It is the responsibility of each employee to seek out opportunities to prevent injury to him- or herself.
- It is the responsibility of each employee to seek out opportunities to prevent injury to others.
- I have more respect for workers who work safely than for those who do not.
- When a safety rule or procedure is issued, I try to follow it as best I can.
- I sometimes overlook hazards to get the job done.
- When I see a potential safety hazard, I personally do something to correct it.
- I am willing to put forth a little extra effort to improve safety at our site.
- Besides performing my own job safely, there is little I can do to improve site safety.

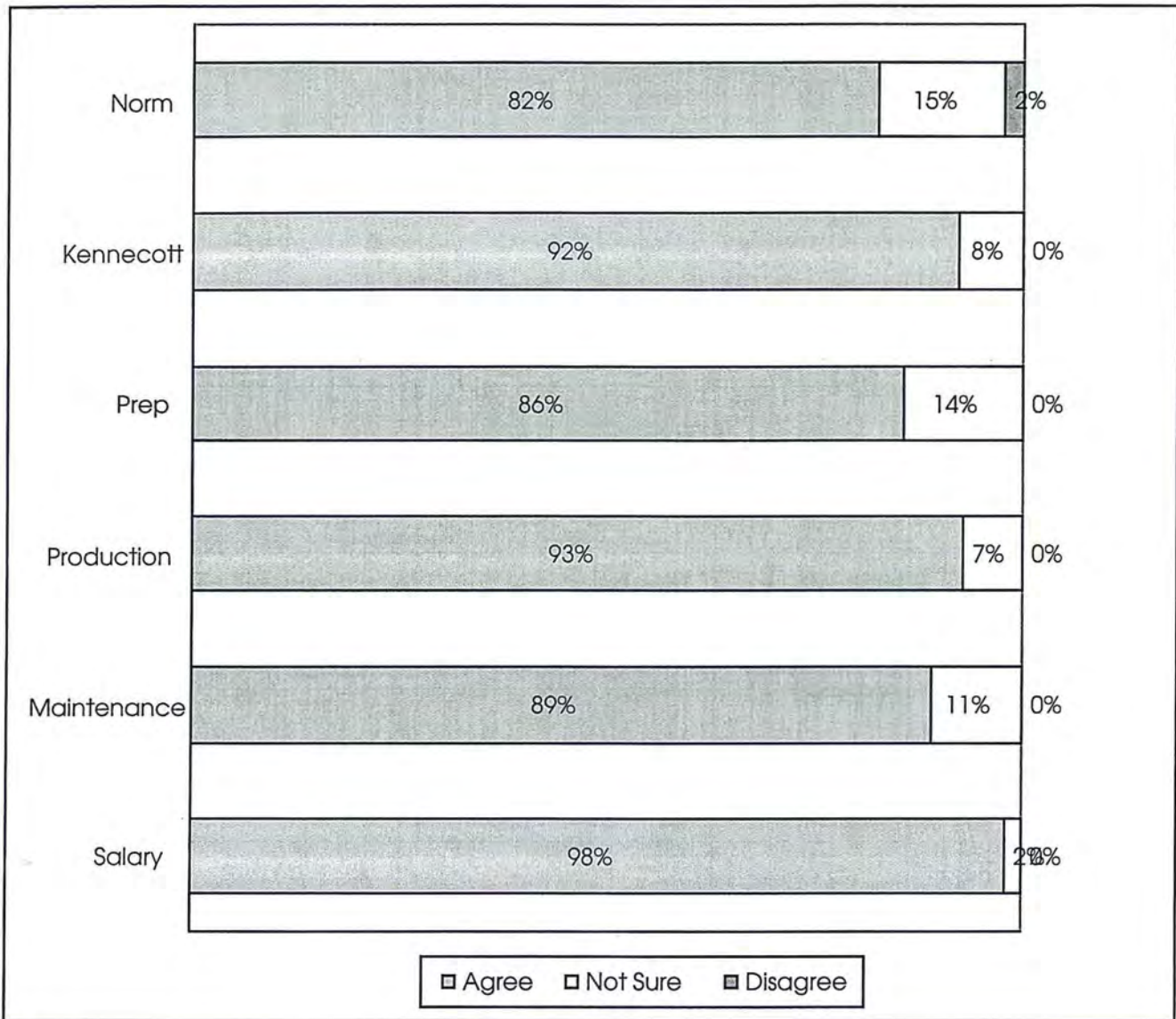
Individuals with a high sense of personal responsibility for their own and others' safety are more willing to get involved in making a difference. These individuals see hazards and assume the obligation to minimize the danger. They are more likely to interact with others to caution them about an at-risk behavior. Though they are not always vocal safety champions, they share common characteristics: they value safety, they prefer not to ignore unsafe conditions or behaviors, and they are willing to urge others to perform safe behaviors through feedback or through the modeling of appropriate behaviors.

In most organizations, high scores are found consistently on the Personal Responsibility for Safety Scale. Contributing to this pattern may be the fact that people tend to evaluate their own behaviors and intentions more leniently than they evaluate those of others. However, most individuals *truly do* feel a strong sense of responsibility for themselves and to some degree for others as well. They may not, however, know how to demonstrate that commitment or be willing to act in a manner that is not supported by the organizational culture.

The results of this sub-scale, when high, provide a good starting point for a discussion not only of the survey findings but of the desire and plan for culture change in general. Personal responsibility is a necessary building block to increasing interdependence in safety through Actively Caring behaviors.

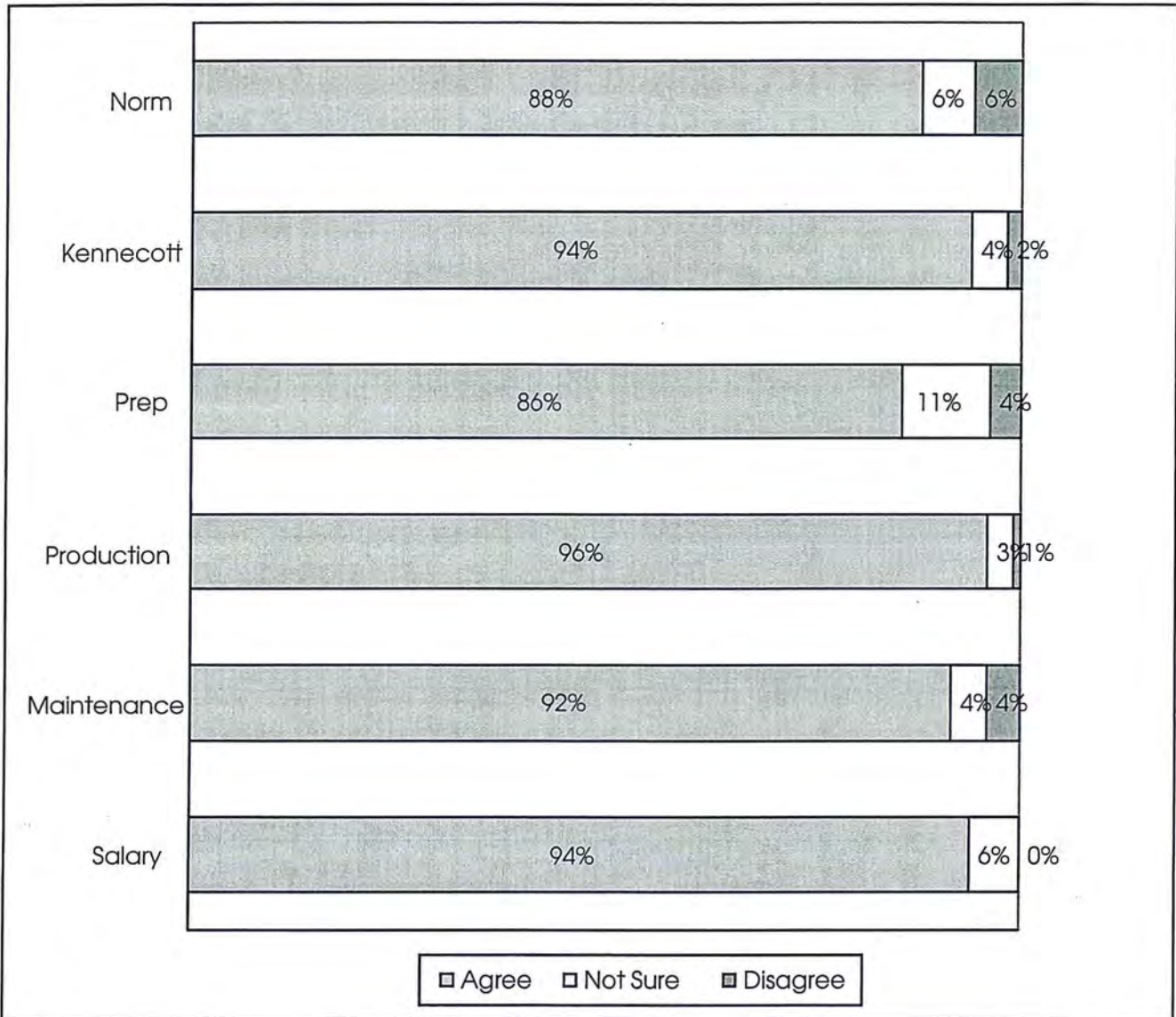
We can foster individuals' sense of personal responsibility for safety by providing the systems to allow additional opportunities to improve safety and then providing recognition to support these efforts. In a Total Safety Culture, employees realize these opportunities take many forms. Reporting a near miss, correcting a hazard, reporting injuries, observing peers and giving feedback all present employees with the chance to help improve safety performance. Holding people accountable for safety means helping them set reasonable safety goals for themselves, then providing them with the tools to achieve those goals. As employees begin to see improvements resulting from their efforts, they continue to develop added commitment to safety and subsequent ownership over the safety process.

Overall Personal Responsibility for Safety by Position



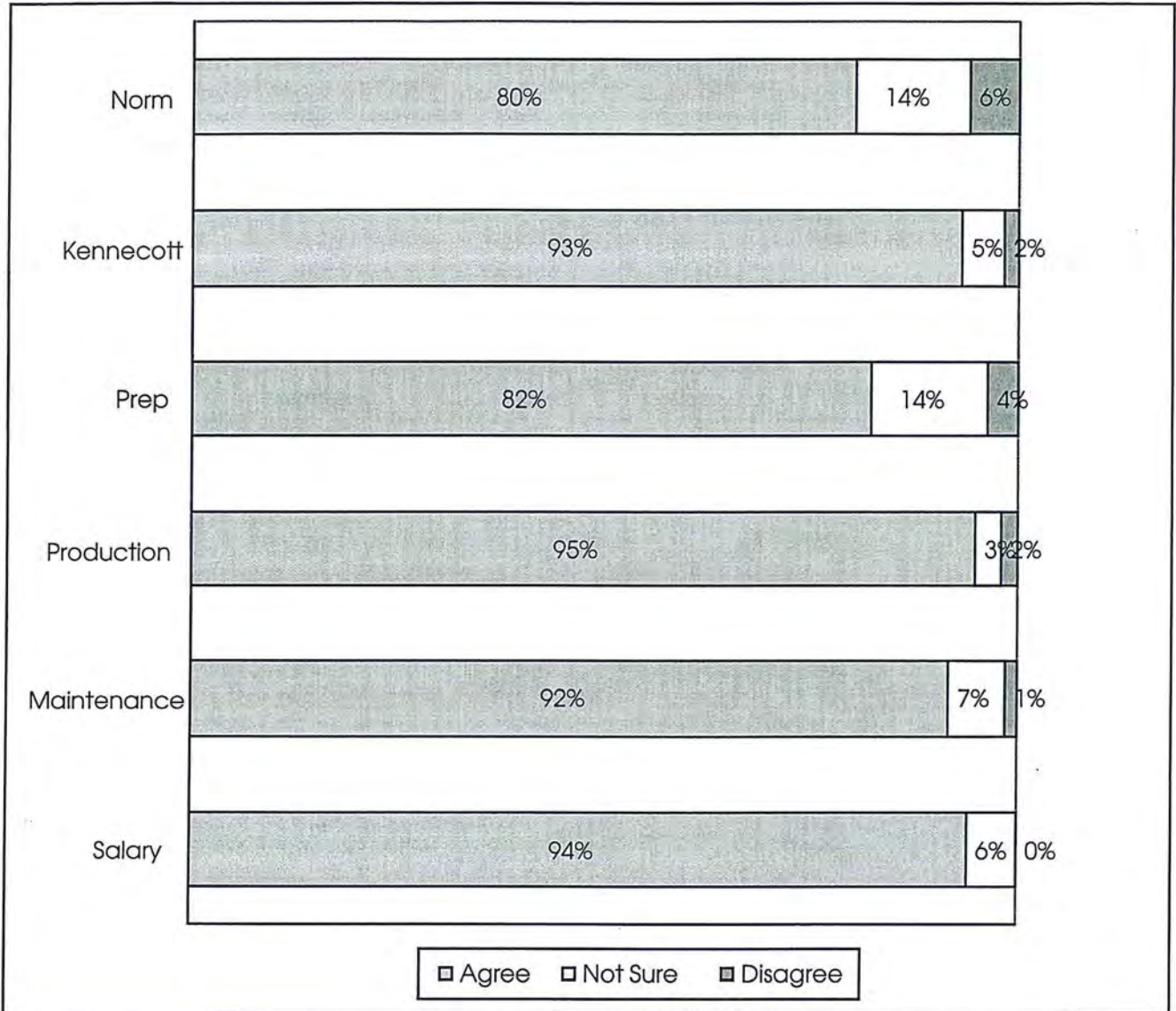
Personal Responsibility for Safety by Question

82. It is the responsibility of each employee to seek out opportunities to prevent injury to him- or herself.



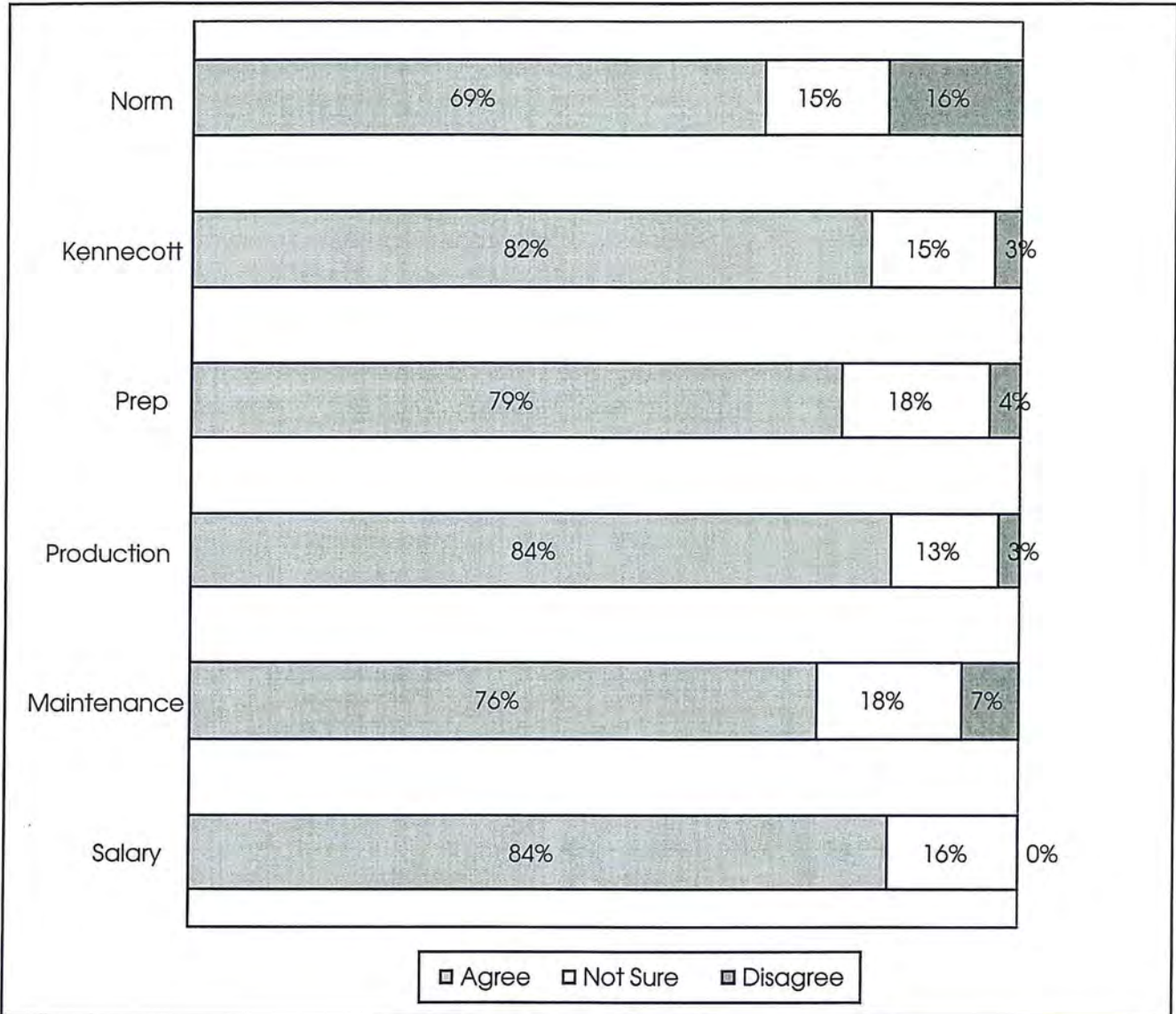
Personal Responsibility for Safety by Question (continued)

61. It is the responsibility of each employee to seek out opportunities to prevent injury to others.



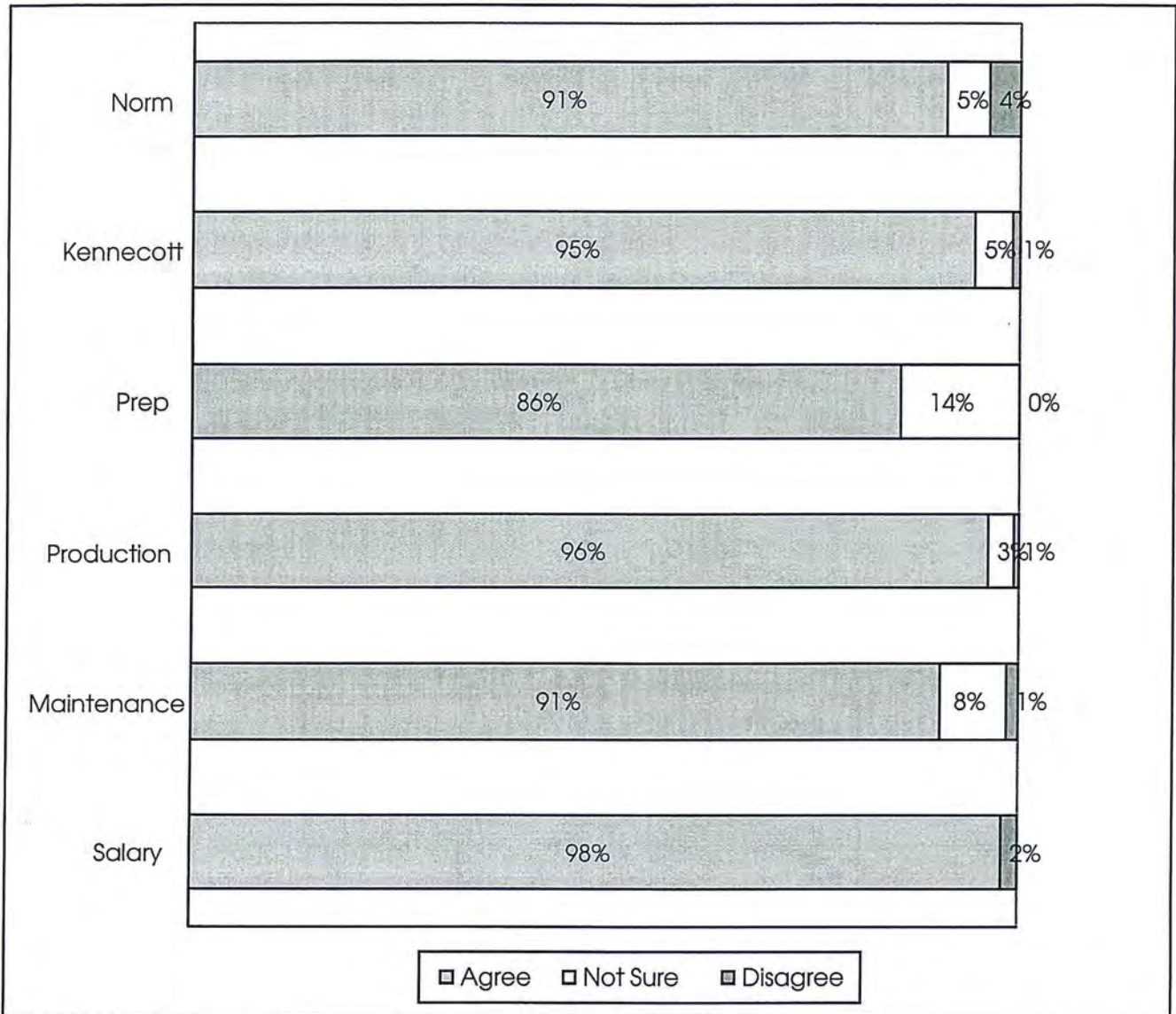
Personal Responsibility for Safety by Question (continued)

109. I have more respect for workers who work safely than for those who do not.



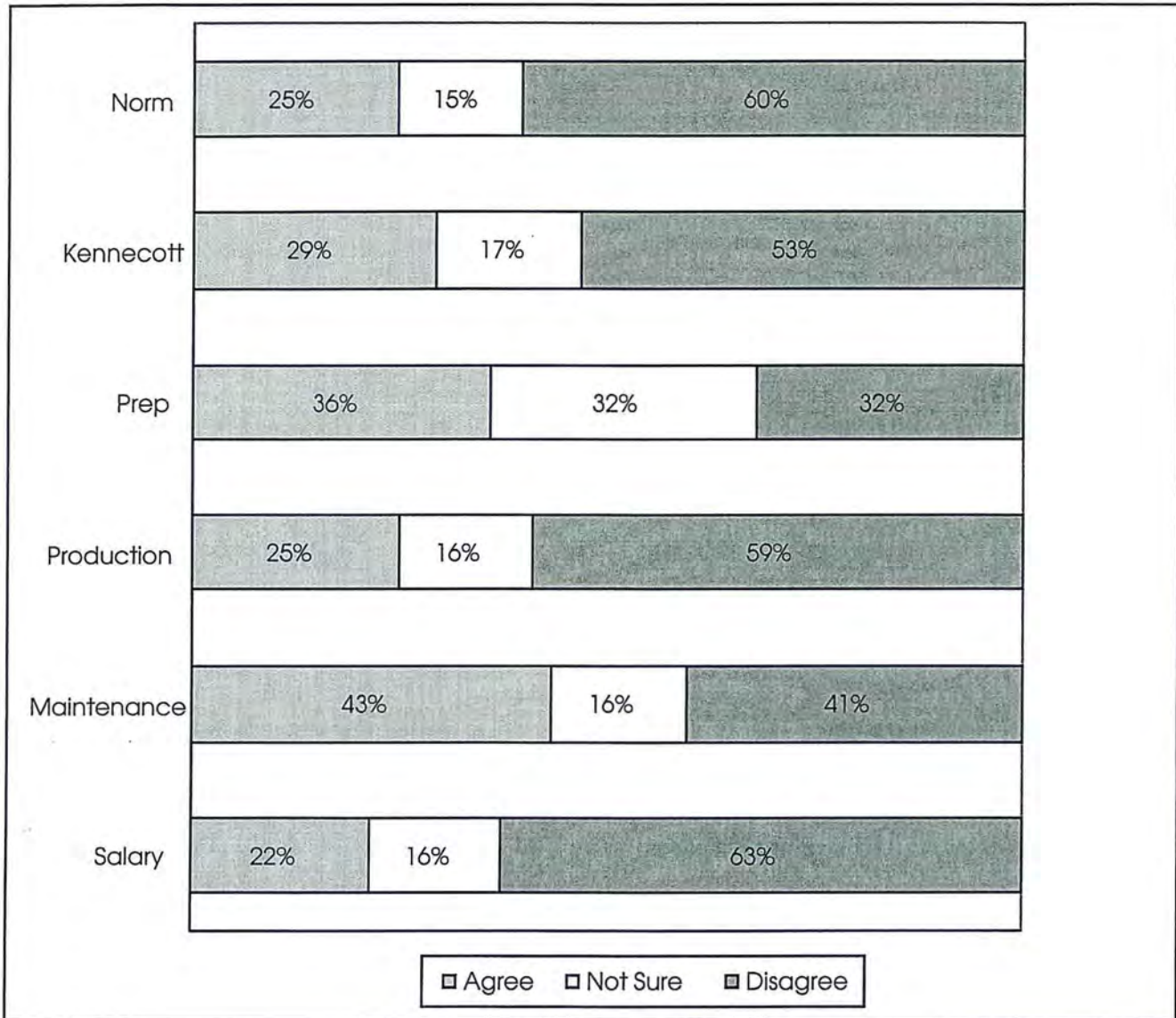
Personal Responsibility for Safety by Question (continued)

69. When a safety rule or procedure is issued, I try to follow it as best I can.



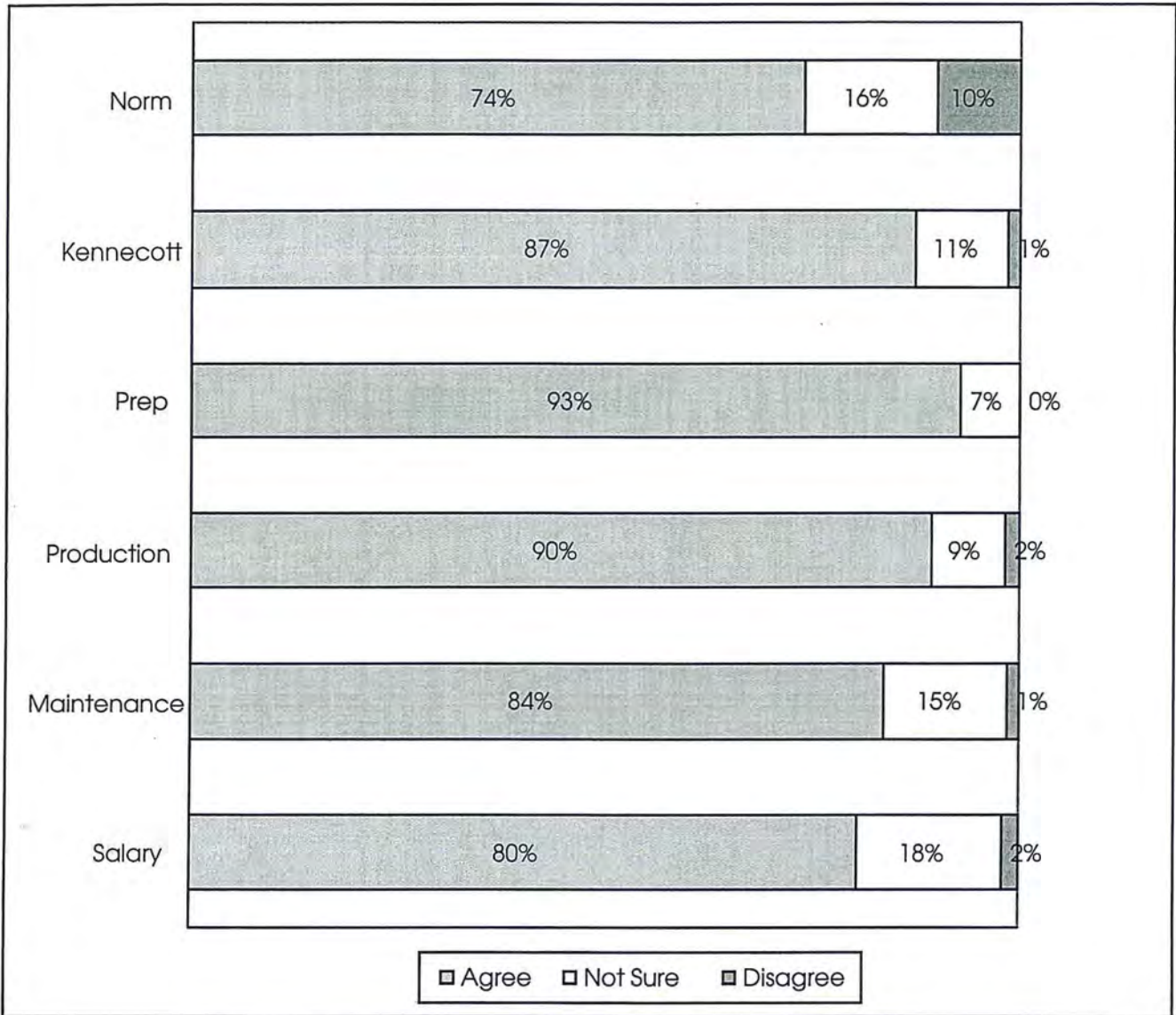
Personal Responsibility for Safety by Question (continued)

16. I sometimes overlook hazards to get the job done.



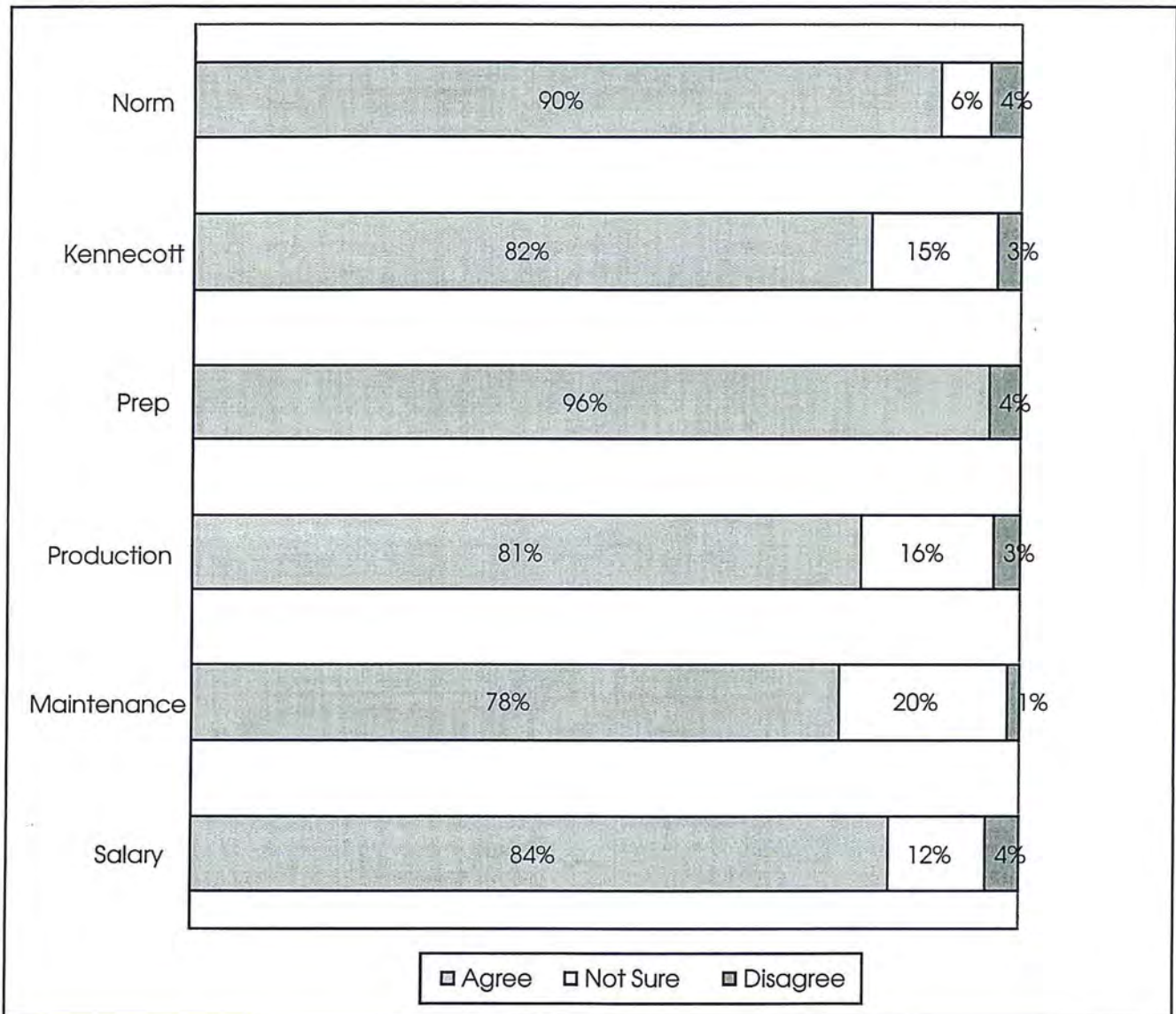
Personal Responsibility for Safety by Question (continued)

65. When I see a potential safety hazard, I personally do something to correct it.



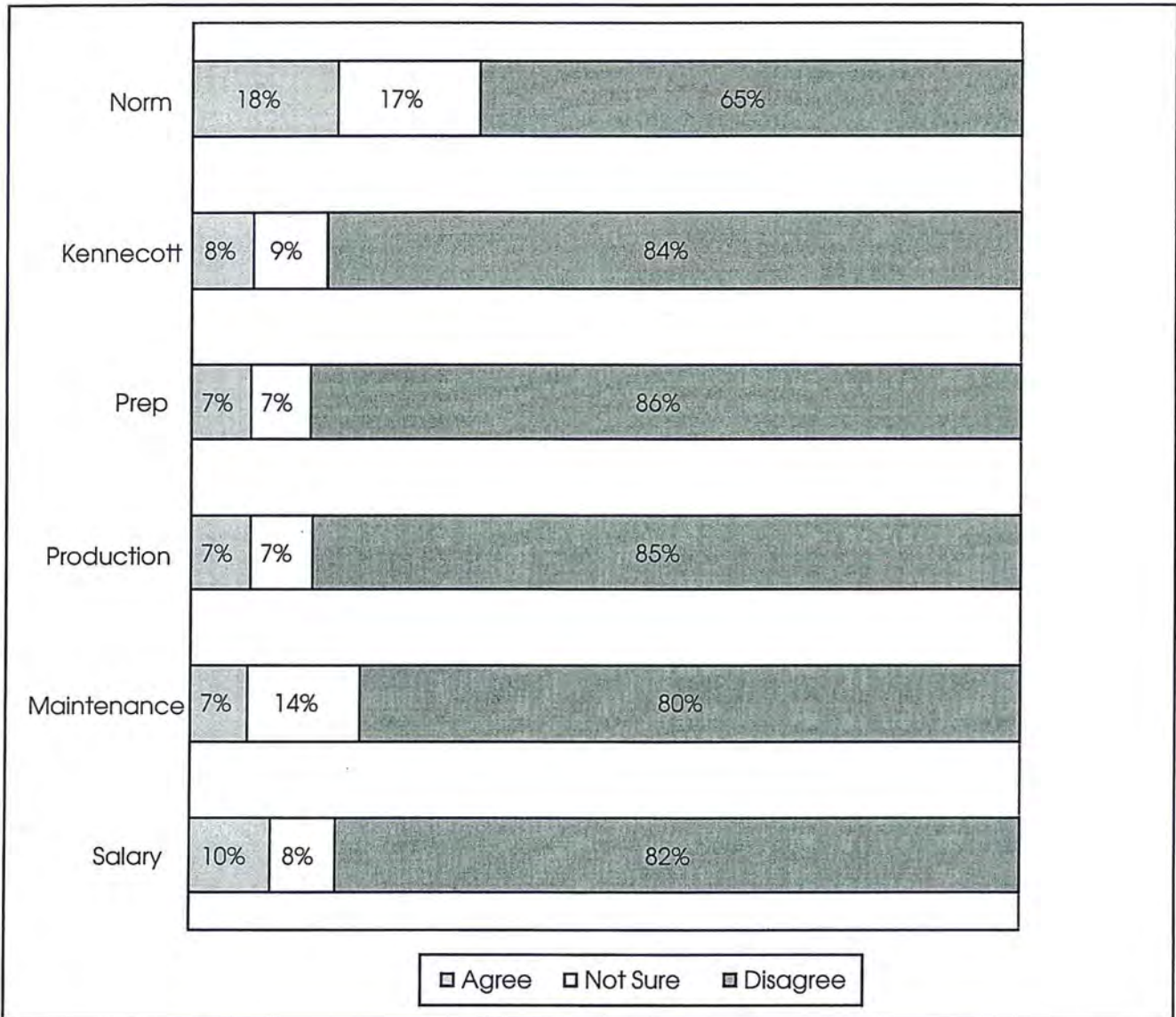
Personal Responsibility for Safety by Question (continued)

8. I am willing to put forth a little extra effort to improve safety at our site.



Personal Responsibility for Safety by Question (continued)

2. Besides performing my own job safely, there is little I can do to improve site safety.



Safety Management Systems

The Safety Management Systems scale measures employee perceptions of a variety of formal management systems including discipline; incident reporting and investigation; safety rules and procedures; safety training; safety communications; safety suggestions; rewards and reinforcement; and hazard identification and correction. In addition, it also assesses employees' opinions about the company's safety performance; the effects of stress, drugs, and alcohol on safety; and the level of employee involvement in safety. Specific survey items are listed below. Those items appearing in *italics* are repeated in two or more categories.

Safety Performance

- The risk level of my job concerns me quite a bit.
- Compared to other workplaces, I think mine is rather risky.
- The company's current safety performance is very good.
- If the company maintains its current safety performance, that will be good enough.
- The company currently spends too much effort on safety.
- The company should be doing more to improve workplace safety.

Stress, Drugs, and Alcohol

- Alcohol or drug abuse is a problem in my plant.
- I believe that work-related stress affects my ability to perform my job safely.
- I believe that stress caused from factors outside of work affects my ability to perform my job safely.

Discipline

- It is common for employees to be disciplined for having a work injury.
- I have been disciplined for having a work injury.
 - The company uses a consistent procedure for dealing with employees who violate safety rules.
- Discipline of some sort should be assessed for serious safety violations.
- Discipline is not used often enough for dealing with serious safety violations.

Incident Reporting and Investigations

- I am encouraged to report near misses.
- Near misses are consistently reported and investigated at our plant.
- Minor injuries often go unreported.
- If I received a minor injury on the job, I would report it.
- Management truly wants to know about all incidents and injuries, even if they are minor.
- Incidents and injuries are thoroughly investigated.
- I would feel free to discuss the causes of my injury with the investigation team.
- Management places most of the blame for an accident on the injured employee.
- *When an incident or injury is investigated, the results are promptly reported back to involved employees.*

Rules and Regulations

- Employees understand the safety rules and procedures for their own jobs.
- Employees get sufficient background and reasons behind the company's safety rules.

- The company has too many rules and regulations governing safety.
- Compliance with safety rules and regulations needlessly slows down my job.
- *When a safety rule or procedure is issued, I try to follow it as best I can.*
- *Safety rules and procedures are regularly reviewed with employees.*

Training

- I have received adequate job safety training.
- Information needed to work safely is made available to all employees.
- Employees fully understand the potential hazards of the operations they perform.
- When asked to do a new job, I receive adequate training to be able to do it safely.
- New employees receive sufficient safety training before being allowed to work alone.

Communication

- Employees are provided information on such things as the type, frequency, cause, and cost of accidents.
- Supervisors discuss safety improvement goals and efforts with employees on a regular basis.
- Employees are routinely given feedback by supervisors regarding their safe and unsafe work behaviors.
- When an incident or injury is investigated, the results are promptly reported back to involved employees.
- Safety rules and procedures are regularly reviewed with employees.
- *Information needed to work safely is made available to all employees.*
- *Employees receive prompt feedback in response to their safety suggestions.*

Safety Suggestions

- My supervisor asks me what I need to do my job safer.
- Employee safety suggestions are listened to and taken seriously.
- Employees receive prompt feedback in response to their safety suggestions.

Rewards and Reinforcement

- Our safety award program(s) motivate me to work more safely.
- First line supervisors acknowledge and/or reward employees for safe behaviors.
- Employees who work safely have a better chance for promotion than those who don't.
- An employee who gets injured will likely receive a poorer performance evaluation.

Hazards Identification and Correction

- Safety audits/inspections are conducted regularly in my department.
- Safety audits/inspections are effective in identifying and correcting safety hazards.
- Safety hazards found during inspections are usually followed-up on quickly.
- Employees are encouraged to correct safety problems themselves wherever possible.
- *Employees participate in inspections for potential hazards.*

Employee Involvement

- Employees should be given more opportunities to become involved in safety improvement efforts.
- Employees in my work group participate in defining safe work practices.
- Employees participate in inspections for potential hazards.
- *Employees are encouraged to correct safety problems themselves wherever possible.*
- *My supervisor asks me what I need to do my job safer.*
- *Employee safety suggestions are listened to and taken seriously.*

Other Safety Management Systems

- Safety meetings are effective at making this a safer place to work.
- The safety committees' efforts are effective in improving safety.

Each of these safety management systems has an important contribution to make in terms of improving workplace safety and influencing the organization's safety culture. At best, when the system is poorly designed or operating ineffectively, its benefits will be lost. At worst, a poorly designed, badly implemented, or ill-functioning system can actually have a destructive influence on the organization's overall safety culture. To further compound the situation, these systems are interactive and, in many cases, overlap. For example, **hazard identification and correction** requires an atmosphere fostering **employee participation**, sufficient **training** so employees can recognize and correct hazards, and ample **communication** of the hazard and/or its solution. So, poor features of one system may have negative influences on other systems, making the problem areas more difficult to isolate and correct.

As with others, it is important to remember this scale measures perceptions not reality. That is, the results indicate how employees *feel* **incident investigations** are being handled not necessarily how the actual process is working or not working. Similarly, items in the **discipline** category measure only what employees perceive as common practice or at least an active threat. Perhaps only one incident in one hundred results in an employee being formally disciplined but if that event is what employees talk about and remember, discipline may be viewed as the norm. Further complicating this scenario is the fact that perceptions often lag reality. Therefore, recent changes to any of these management systems may not yet be reflected in the survey findings.

The central themes of a Total Safety Culture (e.g., employee involvement, focus on the process of achieving safety, emphasis on behavior as part of the safety system) can serve as a ruler against which to measure and modify an organization's safety management systems. The same principles of psychology which underlie the behavioral observation and feedback process are equally applicable for creating other safety management systems which motivate and reinforce safe work practices. For example, in many organizations **reward or reinforcement** in the area of safety focuses on outcomes (i.e., injury rates) and avoiding failure. If employee incentive programs and/or supervisor performance evaluations are based primarily on injury rates, it is unreasonable to expect those employees to embrace an open injury reporting system or to feel comfortable being observed performing risky behavior which may result in injury.

Examine the scores associated with each safety management system. Where undesirable patterns exist, two options for action may be considered. First, look at the actual practices of the company, department, or team to assess the strengths or weaknesses. For example, **safety training** concerns may be caused by a variety of issues, each with different solutions. Safety training may be too short, too complicated, poorly conducted, or too general for application on the job. Training may be given by employees who lack credibility, or may be conducted on required overtime either for the trainee or his counterpart back on the job. The training itself may be top notch but is treated by the employee's supervisor as a nuisance or as secondary to "getting the work done." All these issues and more may give training a bad reputation and, more importantly, cause it to be ineffective at maintaining or improving employee safety and health.

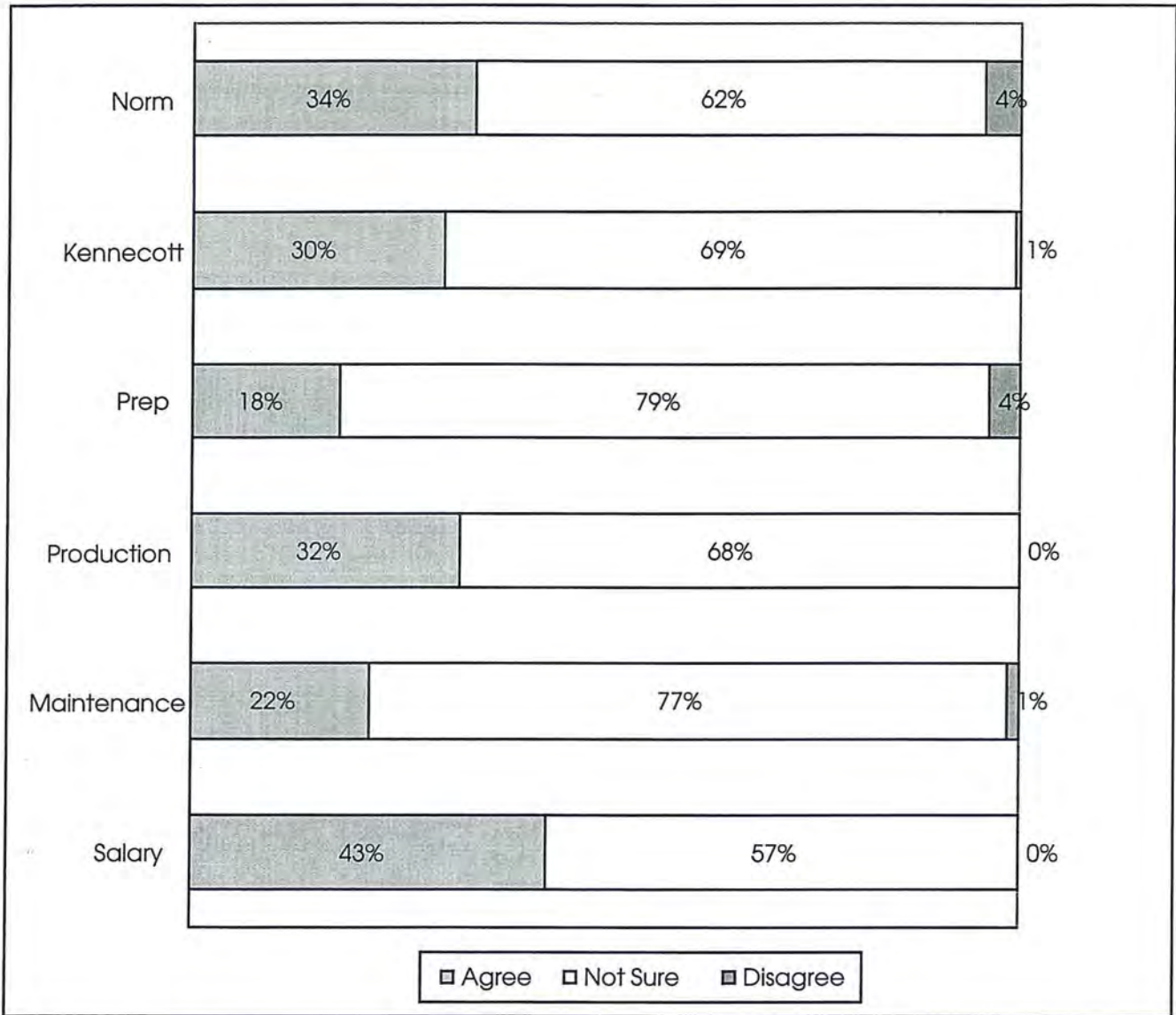
The second option is to analyze how *perceptions* of the system are being managed (or not managed). For example, a **safety suggestion process** will likely be seen as beneficial only by those whose suggestions have been implemented or at least have warranted feedback. Suggestions may be actively solicited, fairly evaluated by a cross-functional team of employees, amply funded, and quickly acted on *but* poorly communicated to the rest of the workforce. Employees may negatively evaluate this system, but the situation is addressed easily without revamping the entire safety suggestion system.

Two items in this scale give particular insight into an organization's safety culture. Examine the responses to the **safety performance** items to assess employee perception of the *need* to place additional focus on safety. If employees agreed with statement #19, "The company should be doing more to improve safety" and disagreed with statement #40, "If the company maintains its current safety performance, that will be good enough", the workforce appears open to a new safety process. On the other hand, if employees already feel, "The company currently spends too much effort on safety" (statement #73), introducing new safety improvement initiatives of any type will require convincing employees there is a need for safety improvement.

A second system which is very telling of the current culture is **incident reporting and investigation**. The level of first aid cases and near miss reporting is higher in organizations where employees share trust and a problem solving perspective. If incident reporting is suppressed, investigations may be less than thorough, communication of findings may be spotty, or discipline may be feared. Initiating and maintaining a peer observation and feedback process in this type of culture takes more time, effort, and patience.

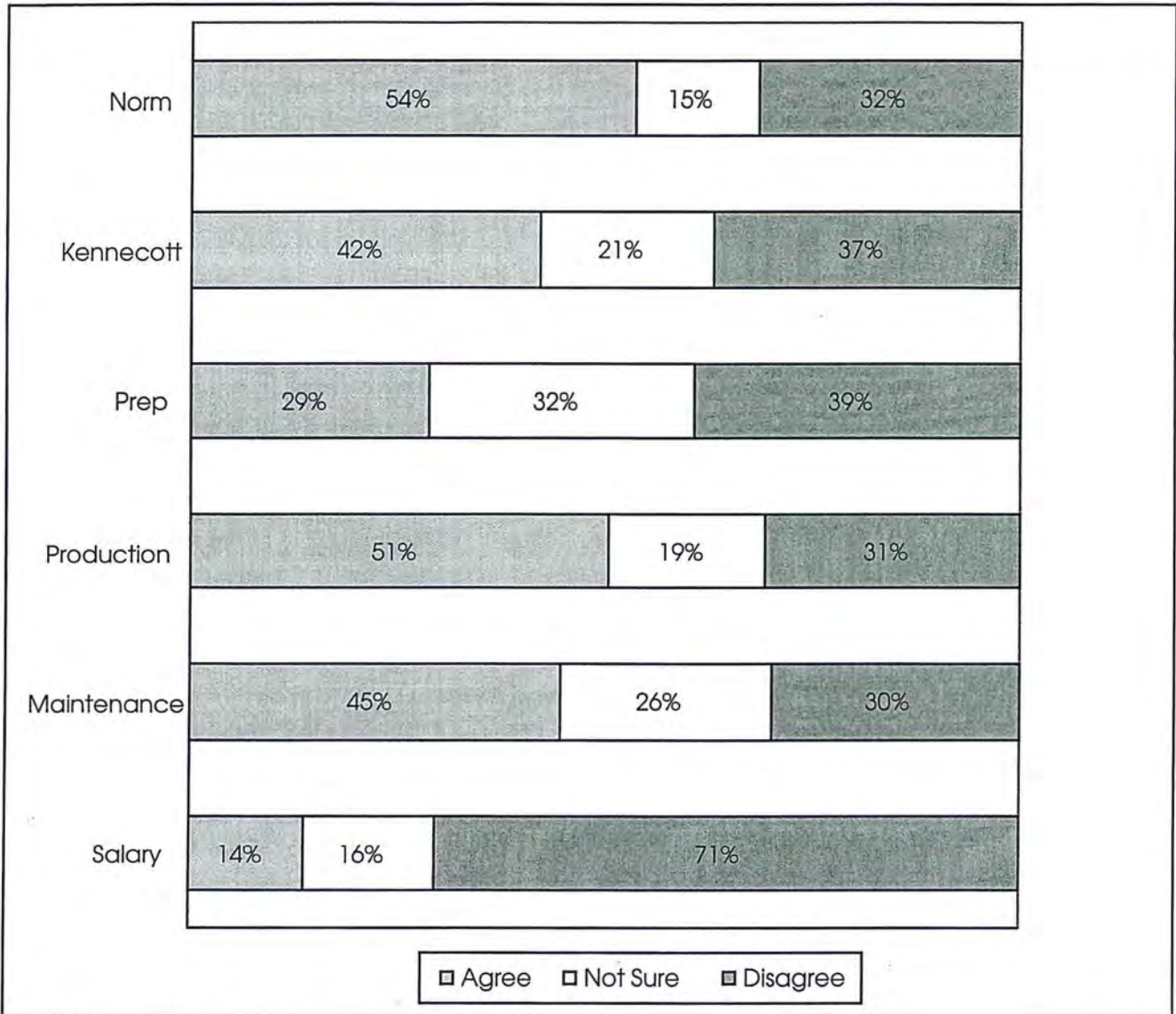
Organizations serious about changing their safety culture should critically analyze each system to be certain it is aligned with Total Safety Culture principles. Even when weaknesses are identified, organizations should be cautious about overhauling existing safety management systems too abruptly. For example, employees accustomed to receiving "a payoff" for working a certain length of time without an injury may be resistant to a change in incentive programs. The redesign process is not a quick one and some systems may need to transition through several intermediate stages before they reflect employee ownership, achievement orientation, or a systems perspective.

Overall Safety Management Systems by Position



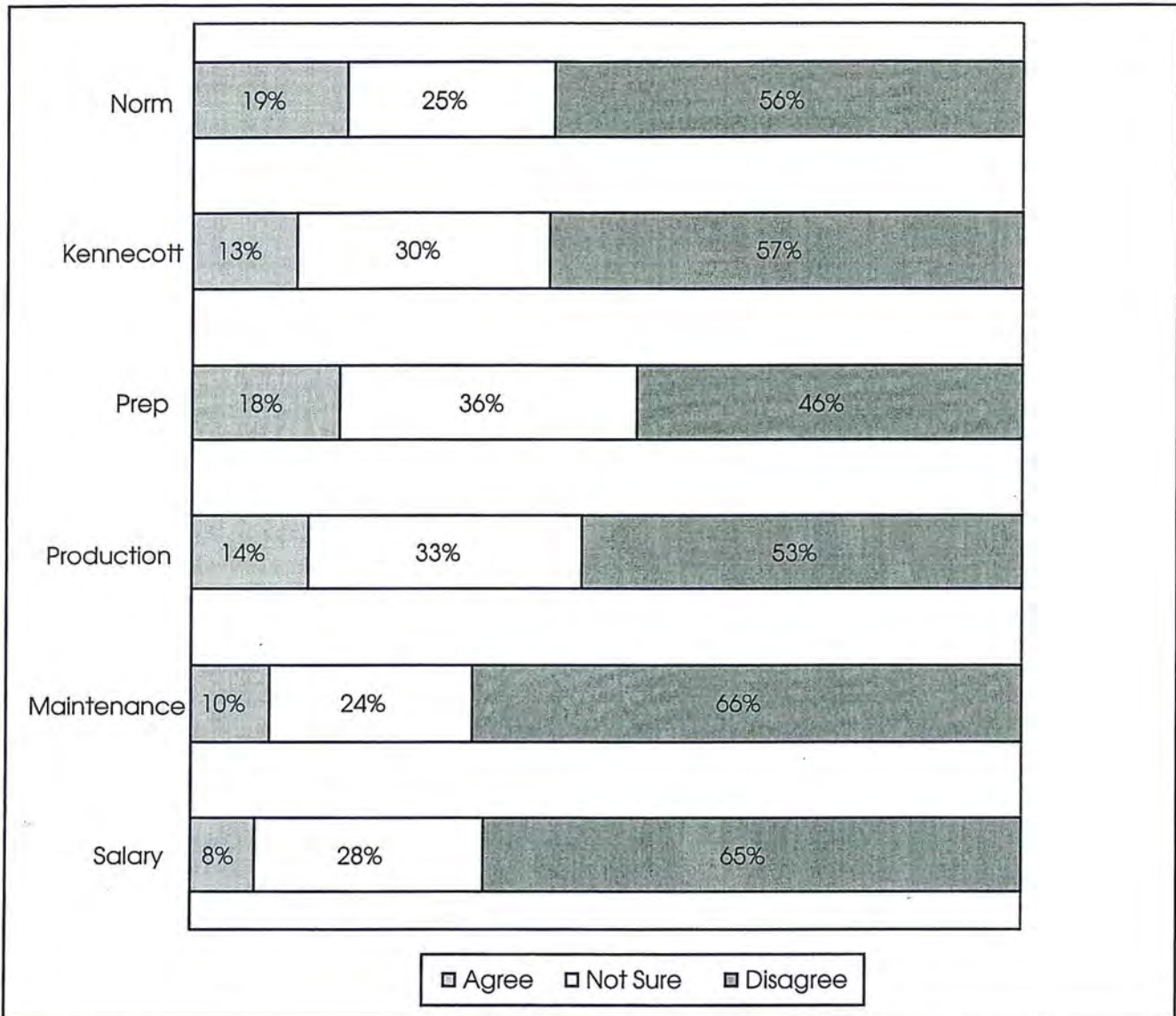
Safety Performance by Question

89. The risk level of my job concerns me quite a bit.



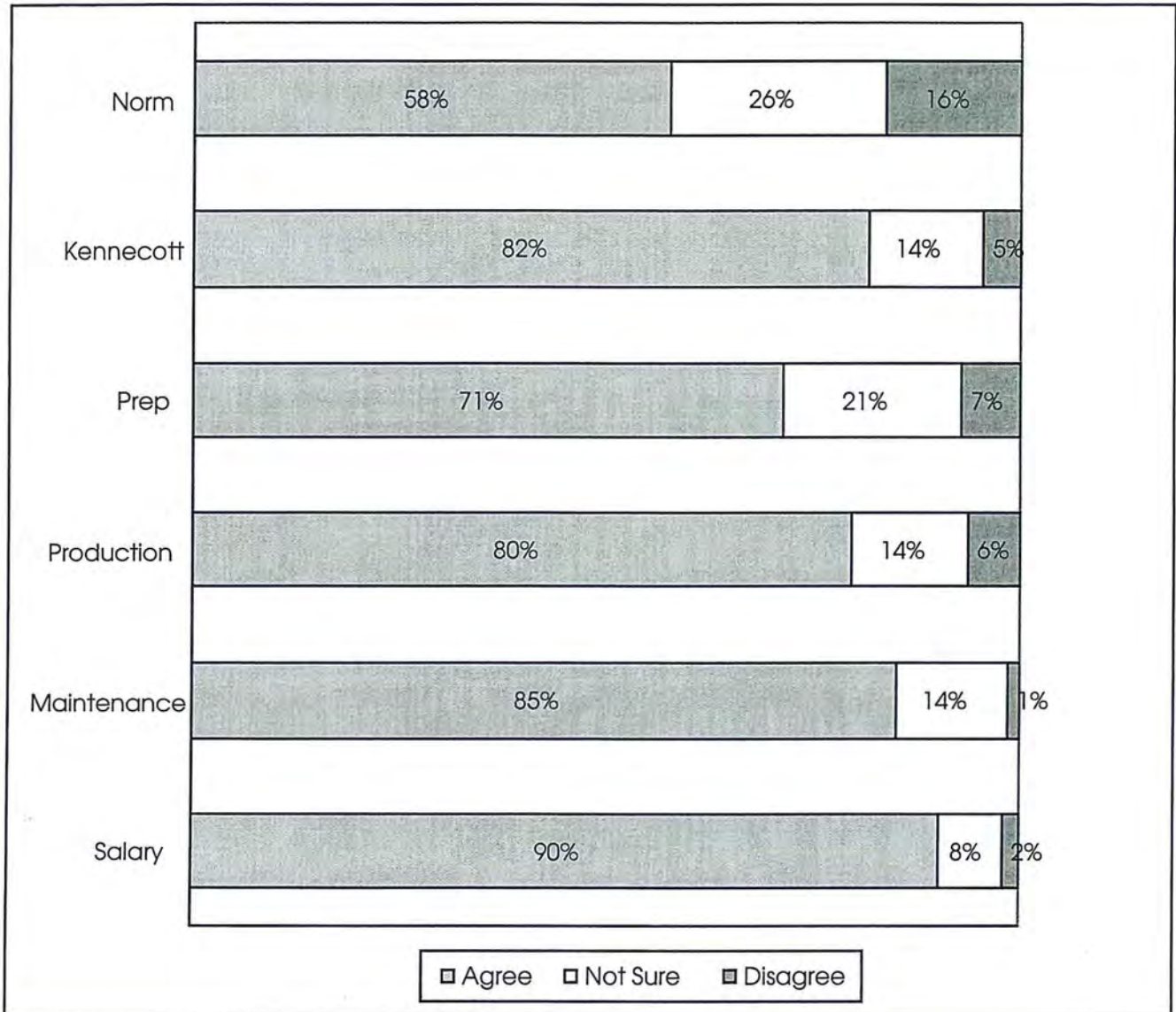
Safety Performance by Question (continued)

95. Compared to other workplaces, I think mine is rather risky.



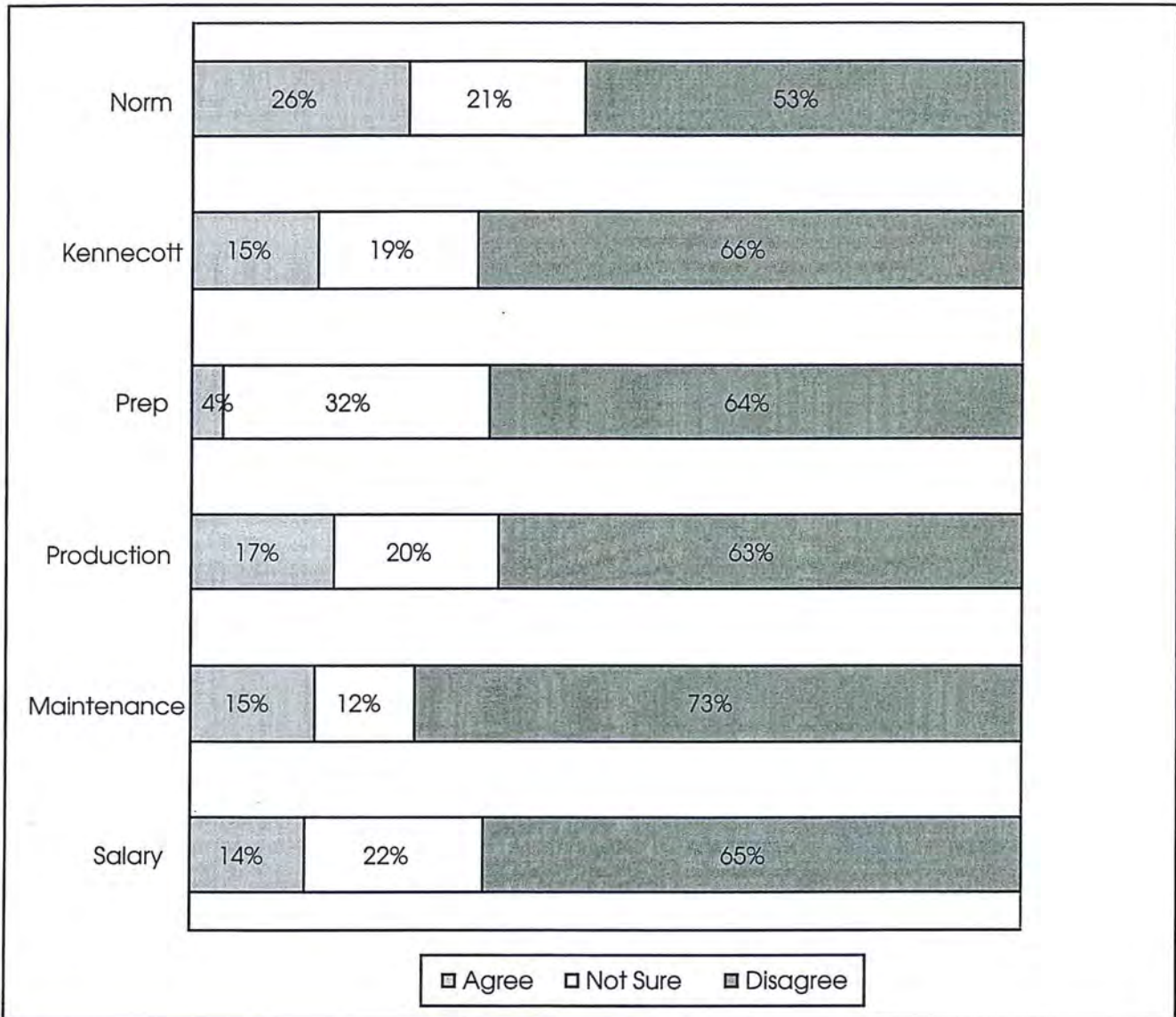
Safety Performance by Question (continued)

122. The company's current safety performance is very good.



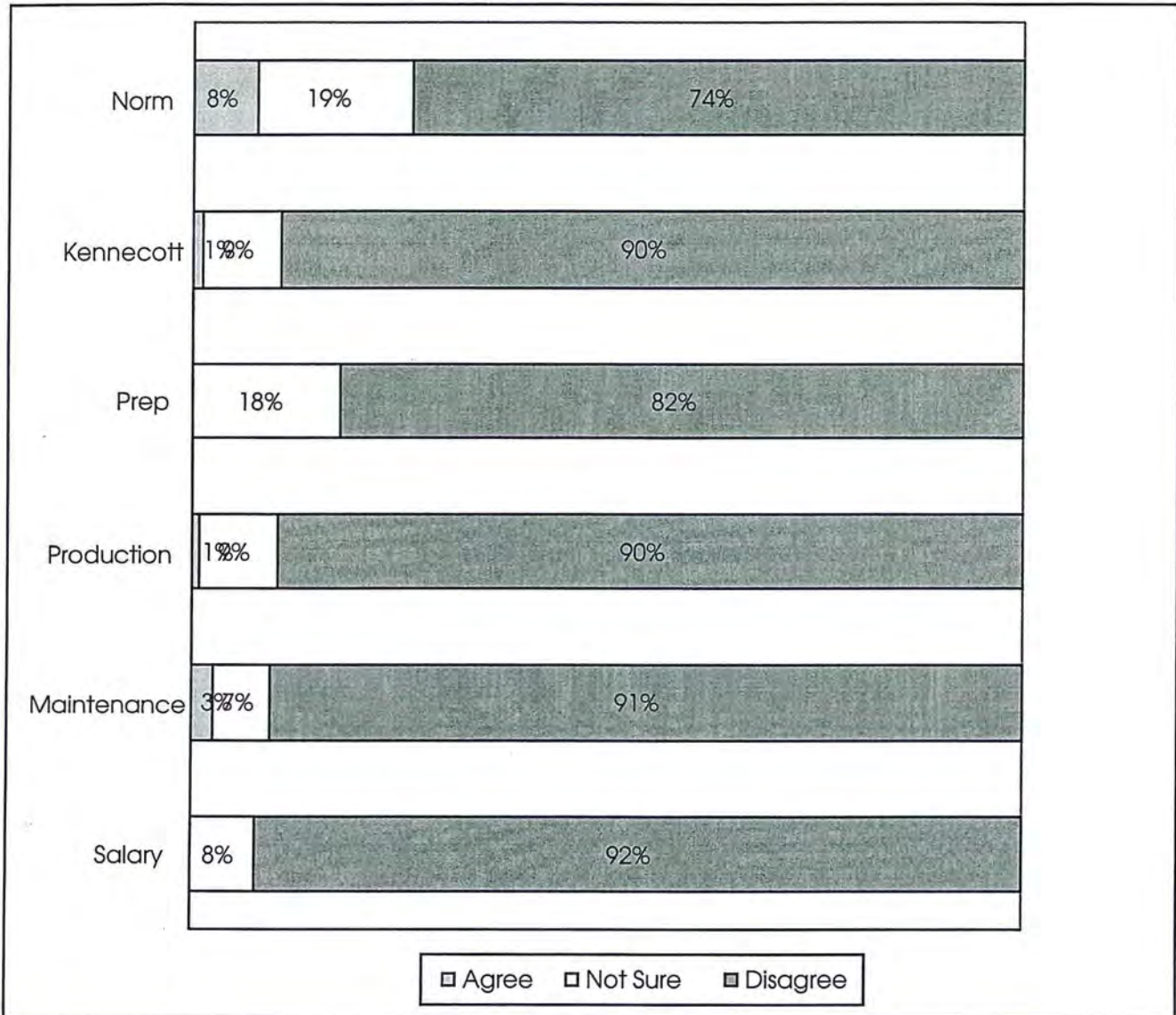
Safety Performance by Question (continued)

40. If the company maintains its current safety performance, that will be good enough.



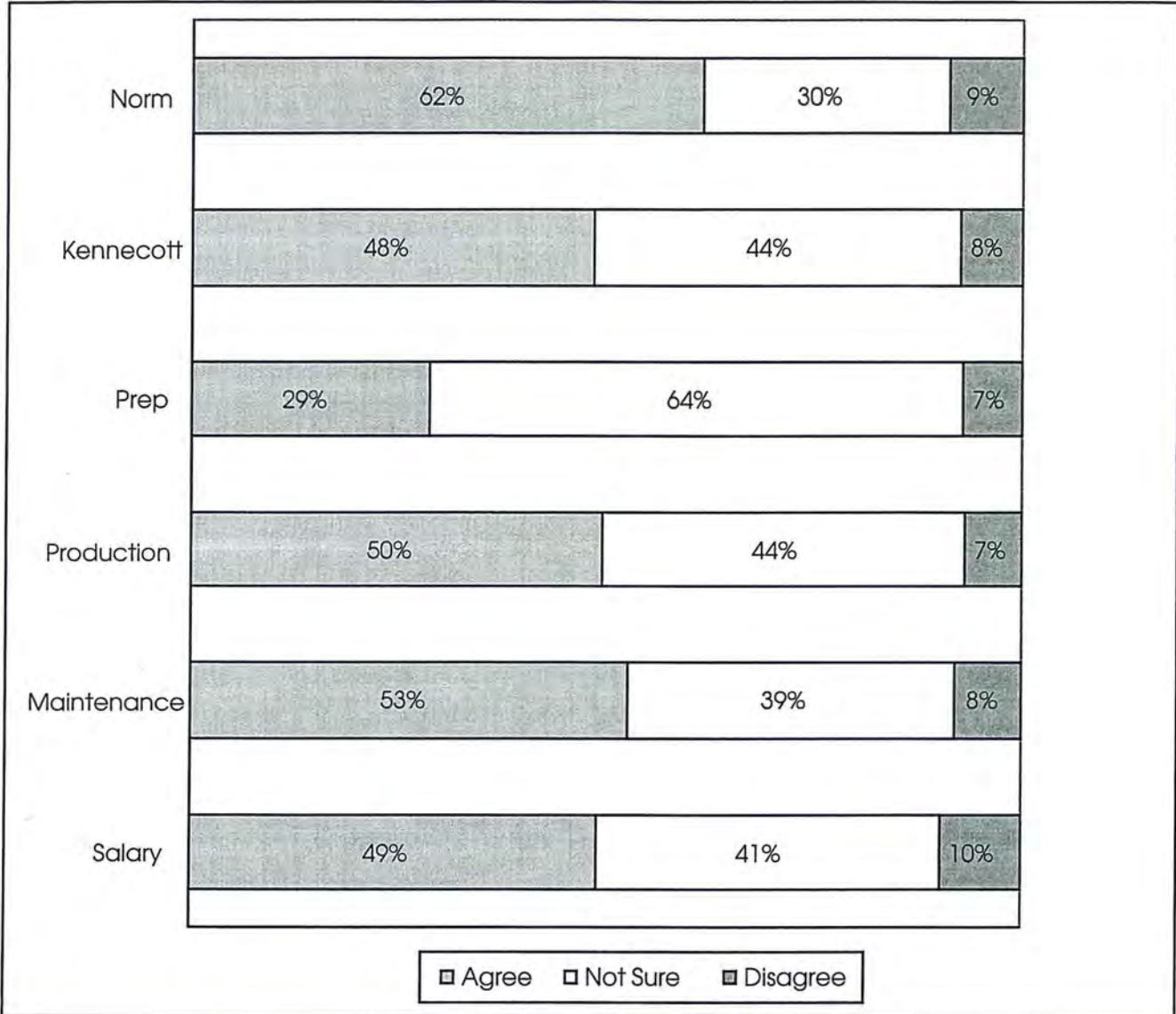
Safety Performance by Question (continued)

73. The company currently spends too much effort on safety.



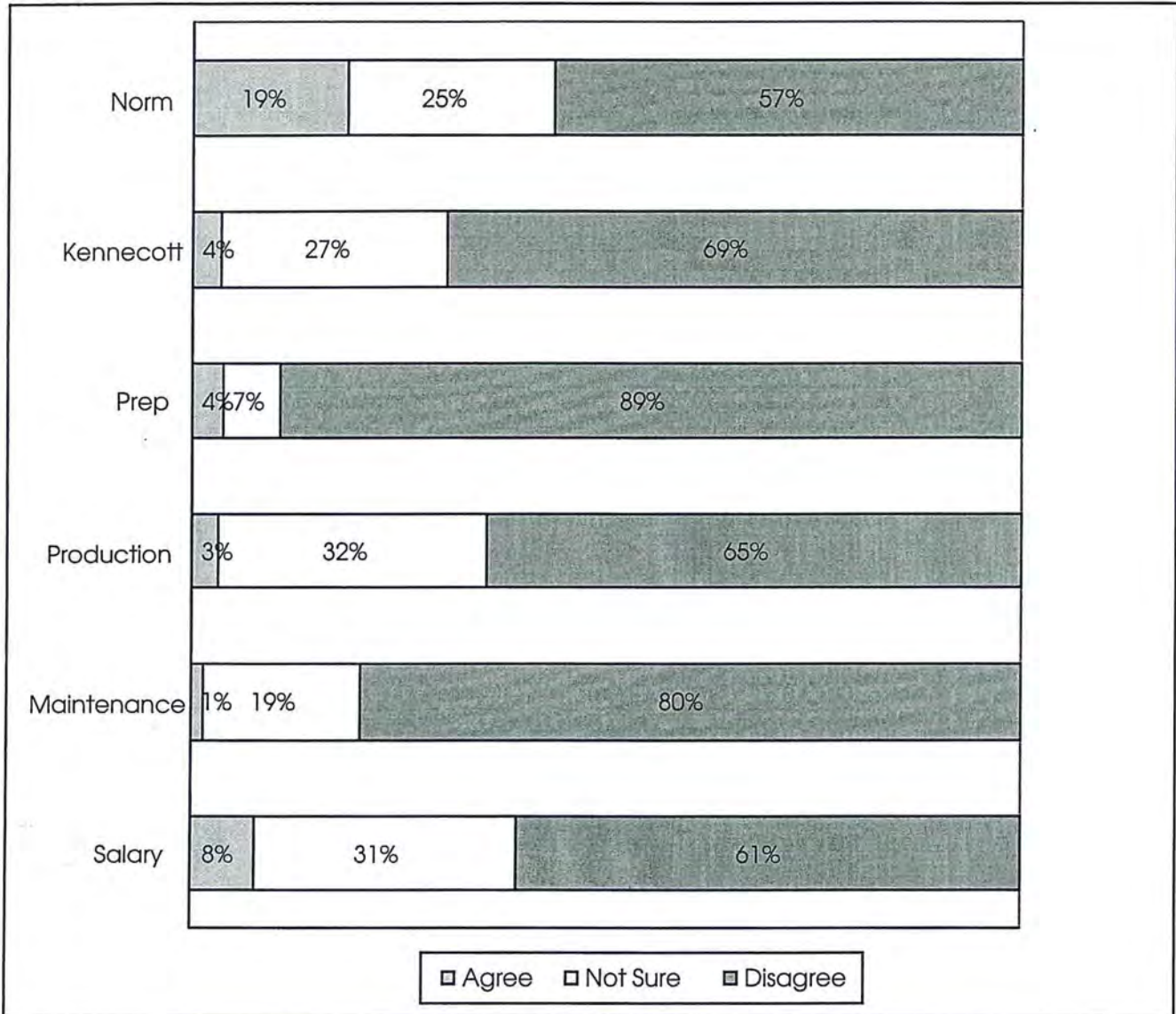
Safety Performance by Question (continued)

19. The company should be doing more to improve workplace safety.



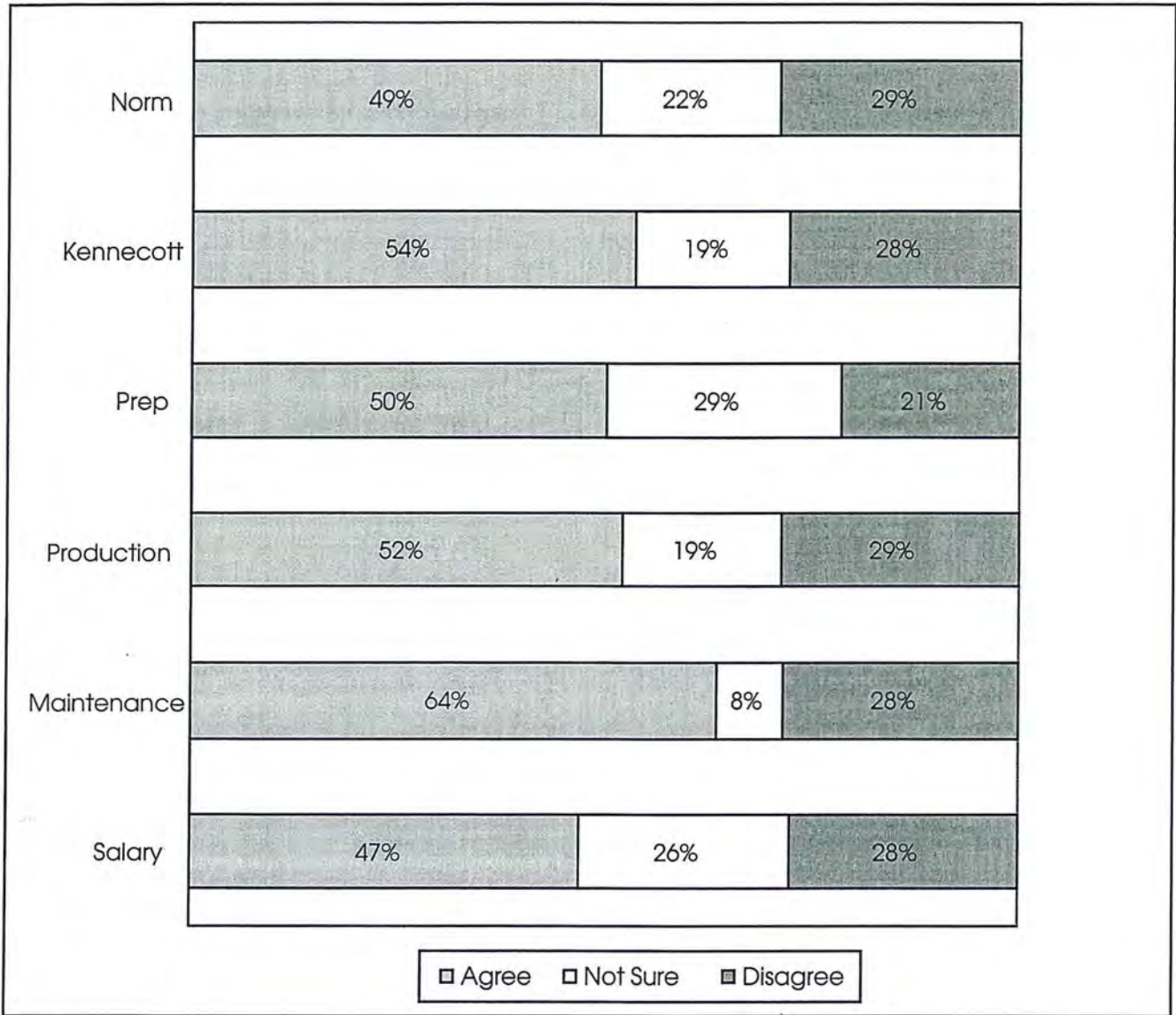
Stress, Drugs, and Alcohol by Question

90. Alcohol or drug abuse is a problem in my plant.



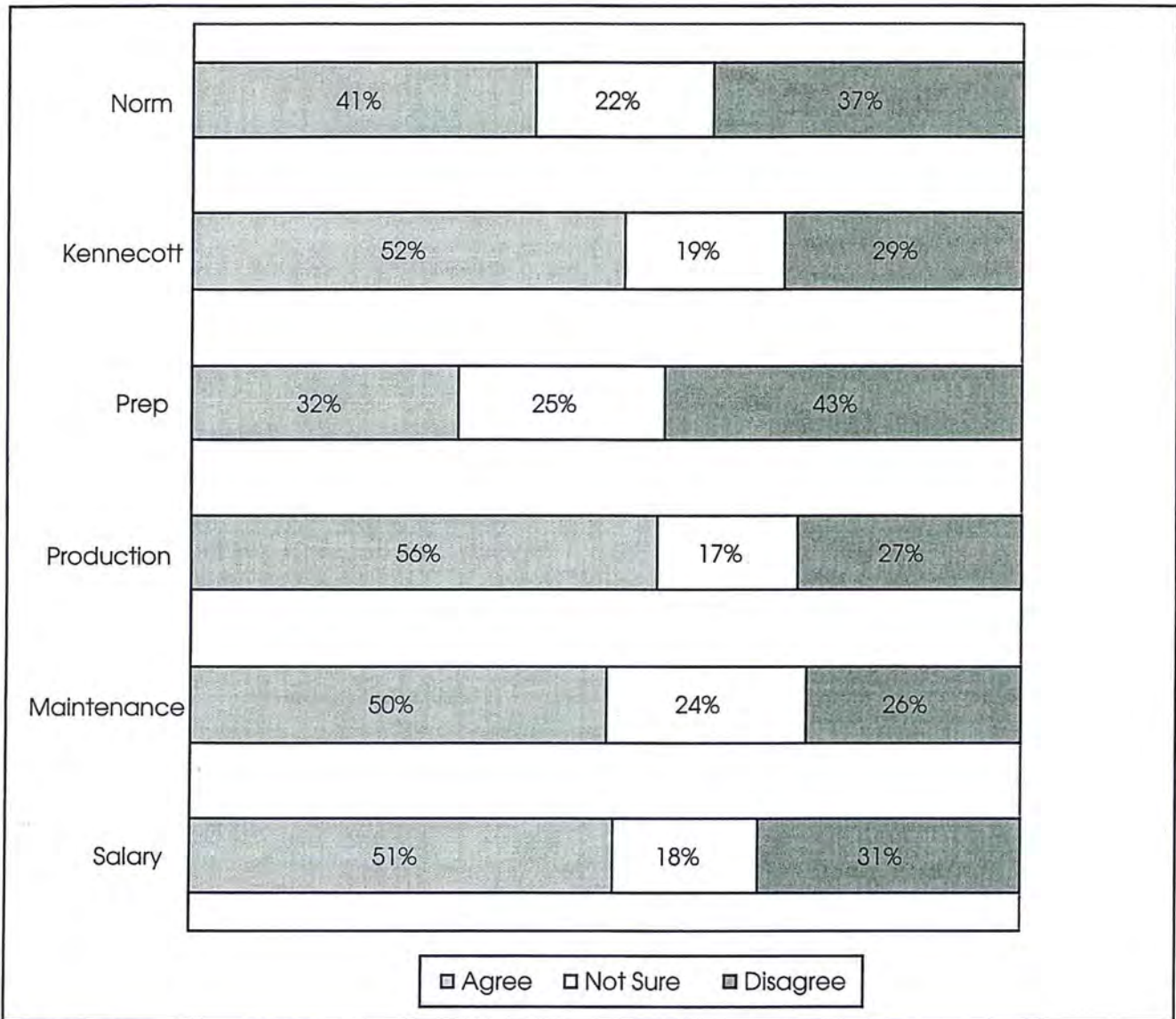
Stress, Drugs, and Alcohol by Question (continued)

78. I believe that work-related stress affects my ability to perform my job safely.



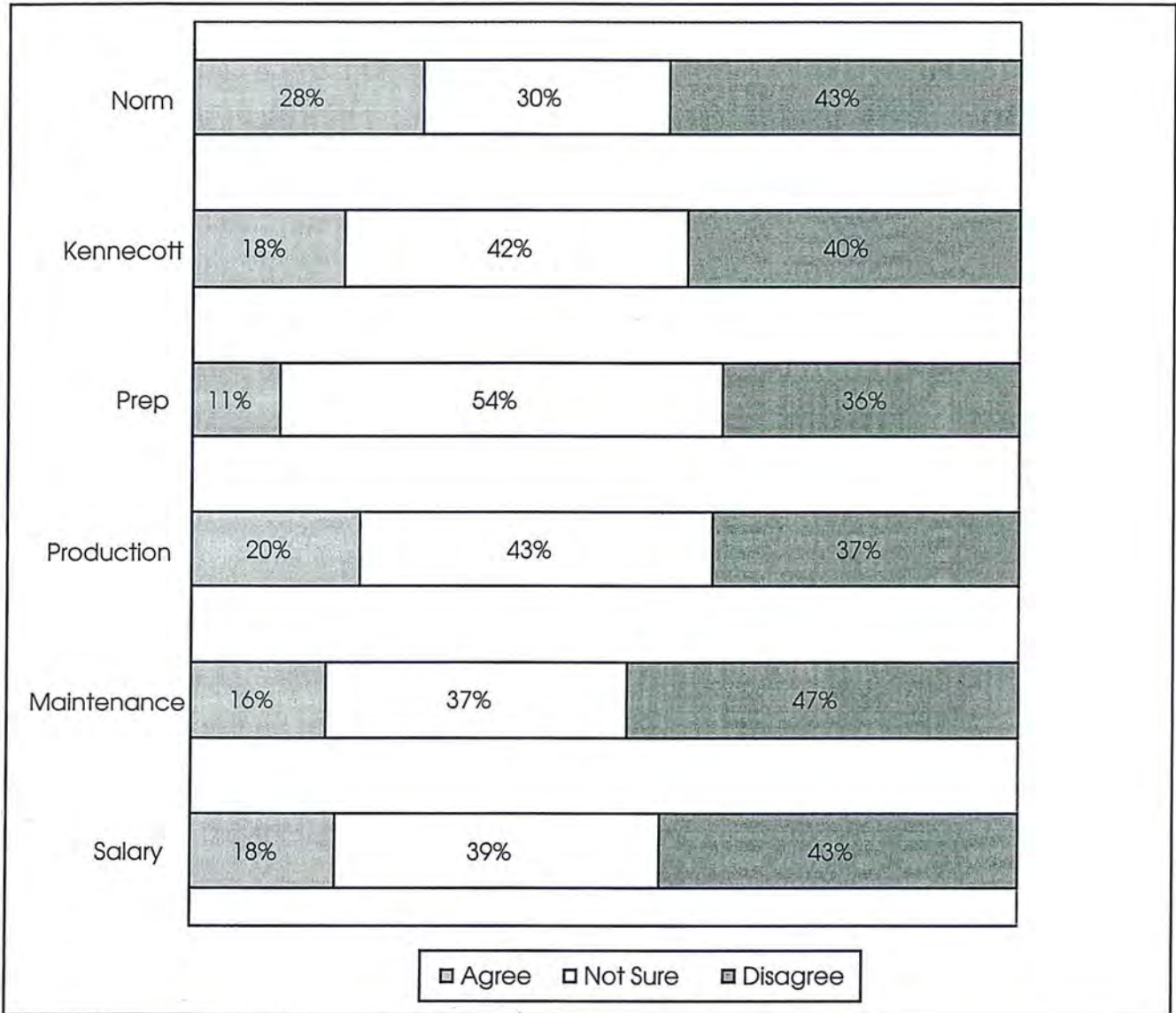
Stress, Drugs, and Alcohol by Question (continued)

30. I believe that stress caused from factors outside of work affects my ability to perform my job safely.



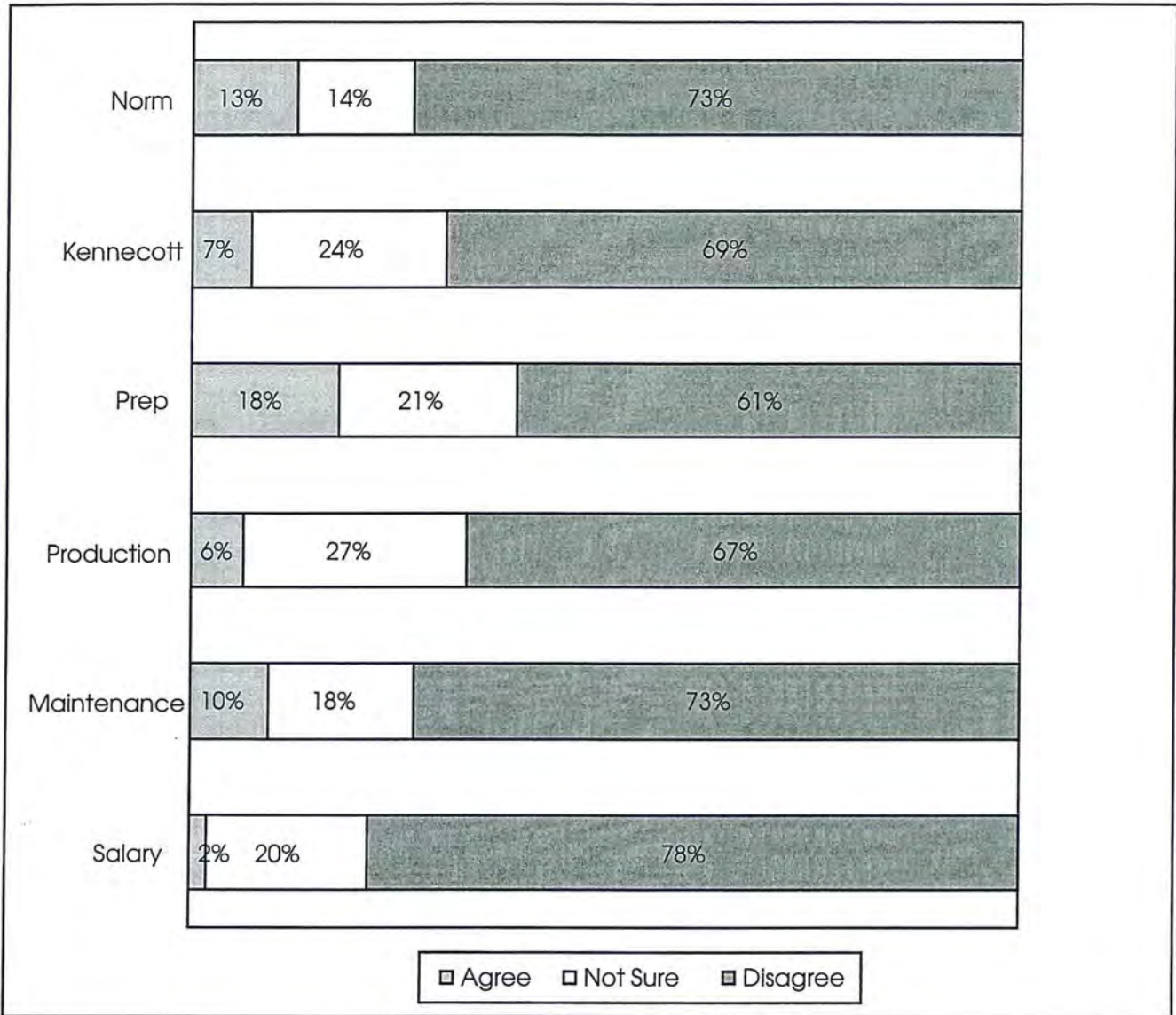
Discipline by Question

116. It is common for employees to be disciplined for having a work injury.



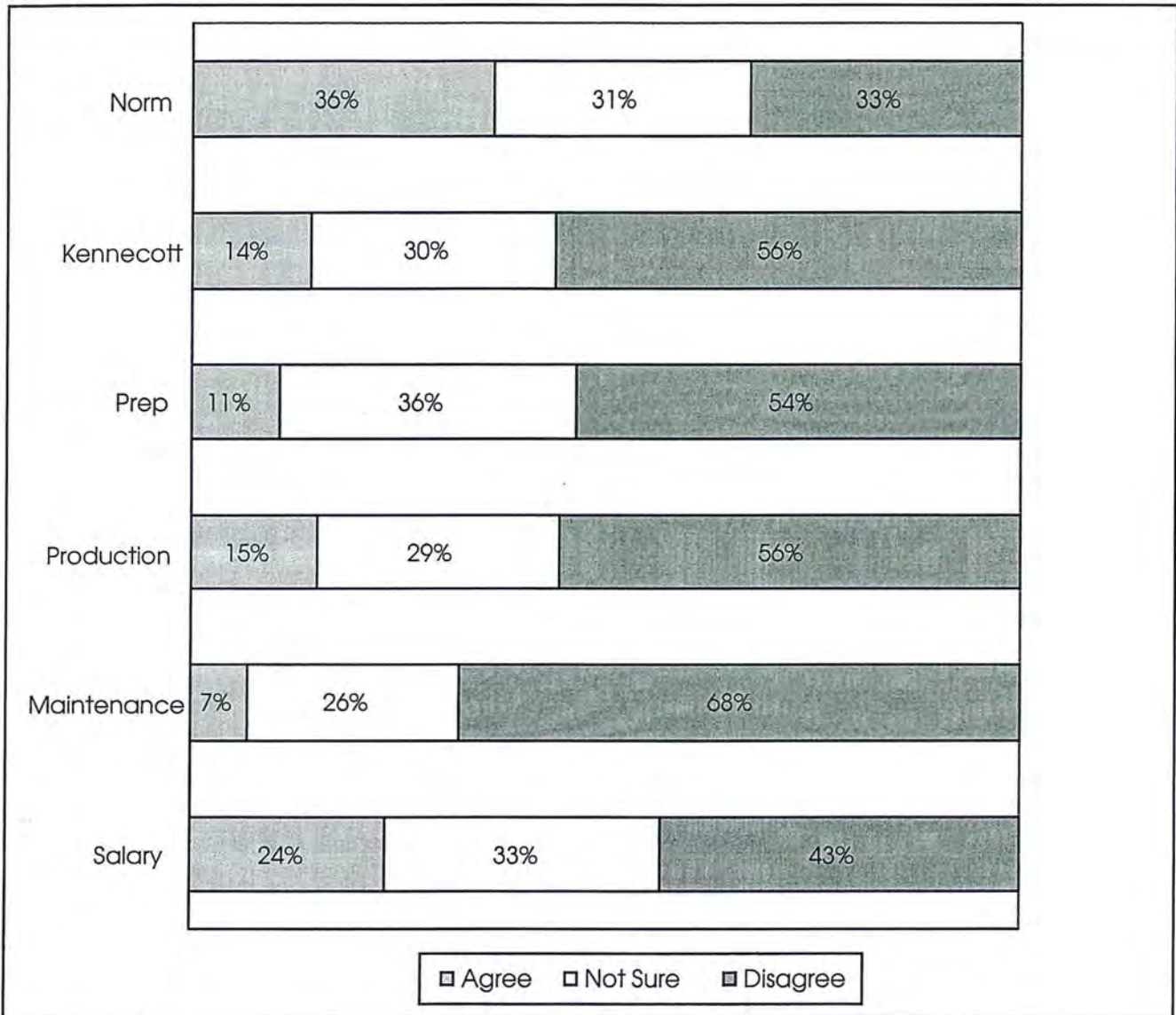
Discipline by Question (continued)

35. I have been disciplined for having a work injury.



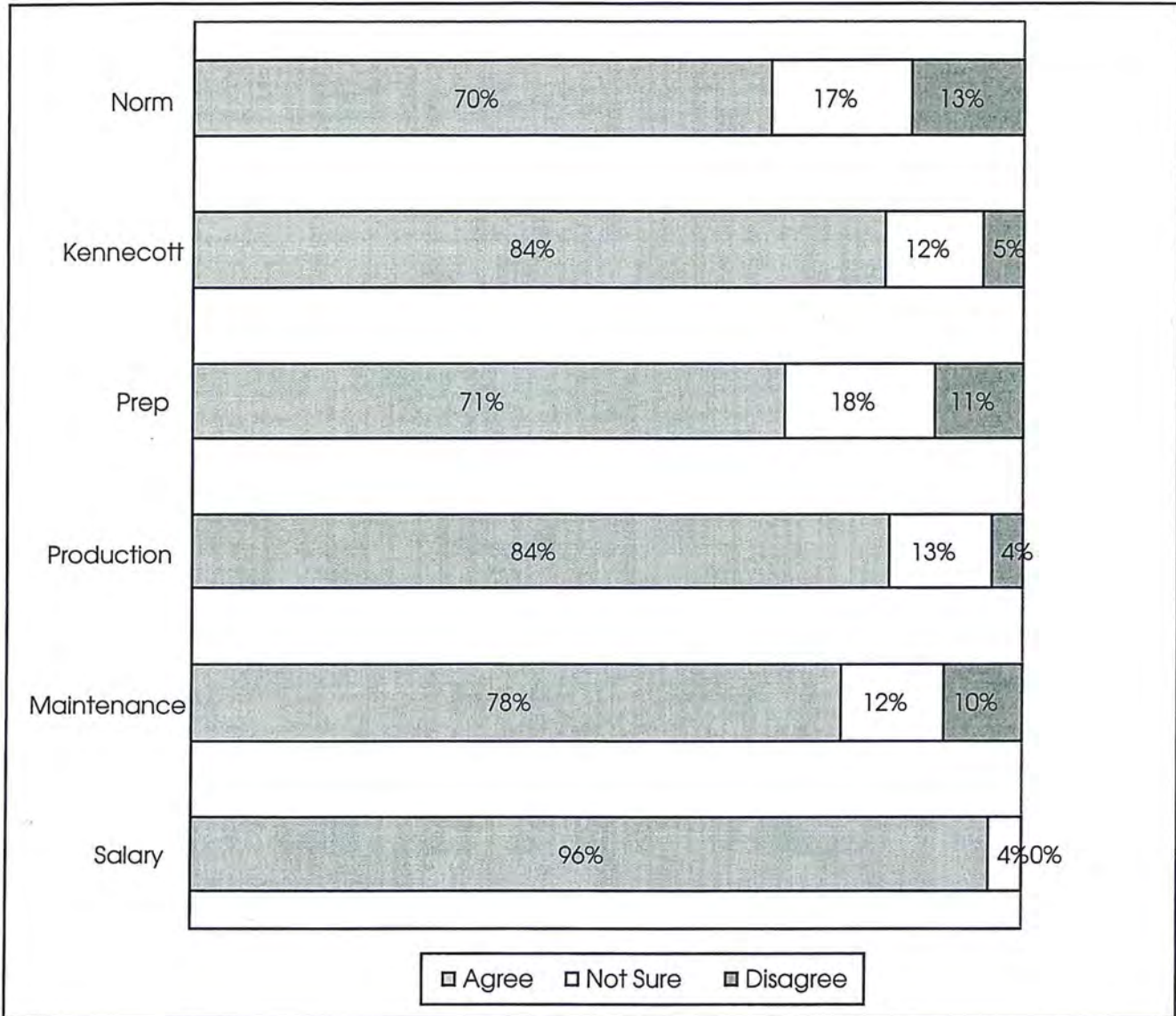
Discipline by Question (continued)

18. The company uses a consistent procedure for dealing with employees who violate safety rules.



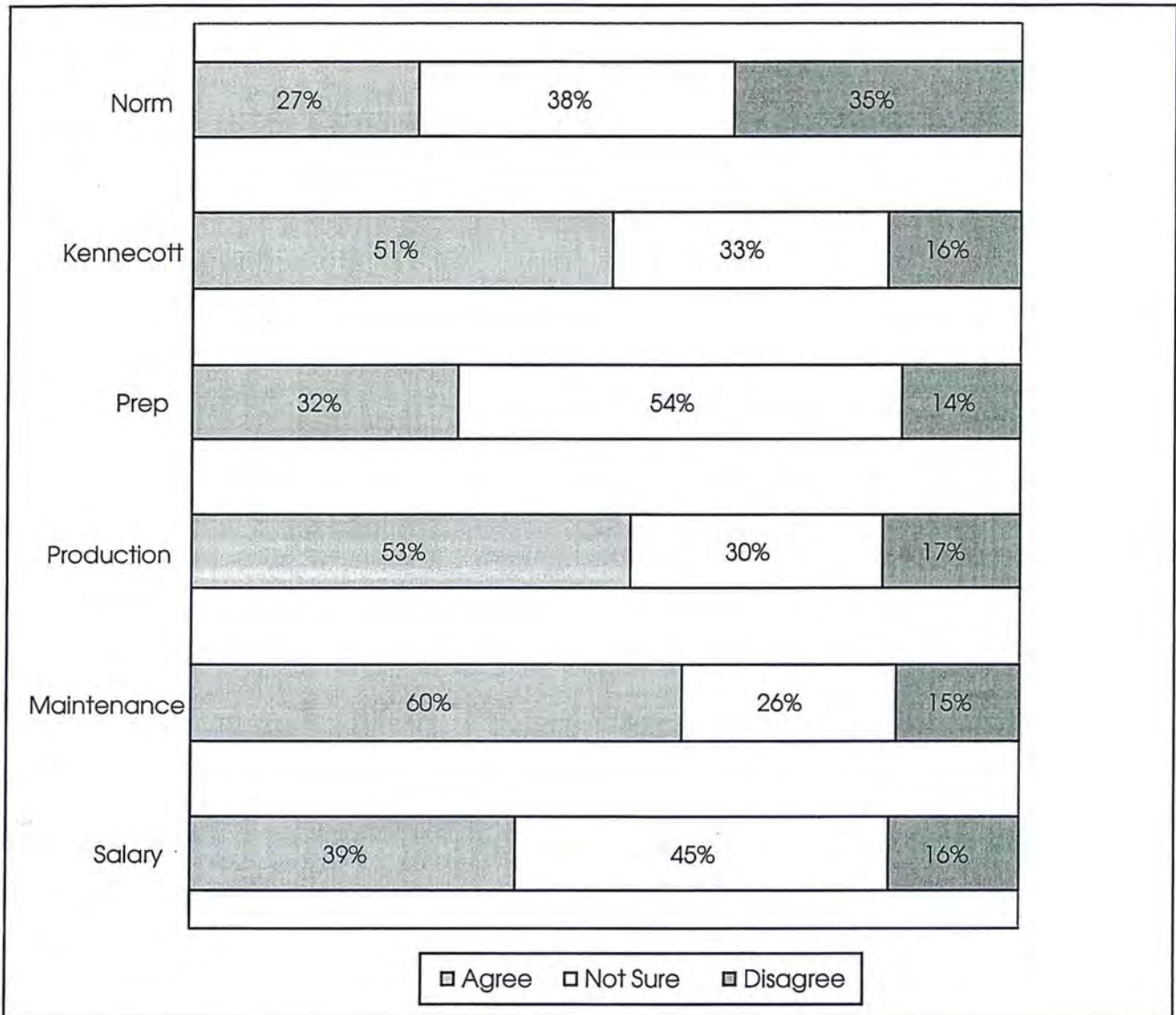
Discipline by Question (continued)

10. Discipline of some sort should be assessed for serious safety violations.



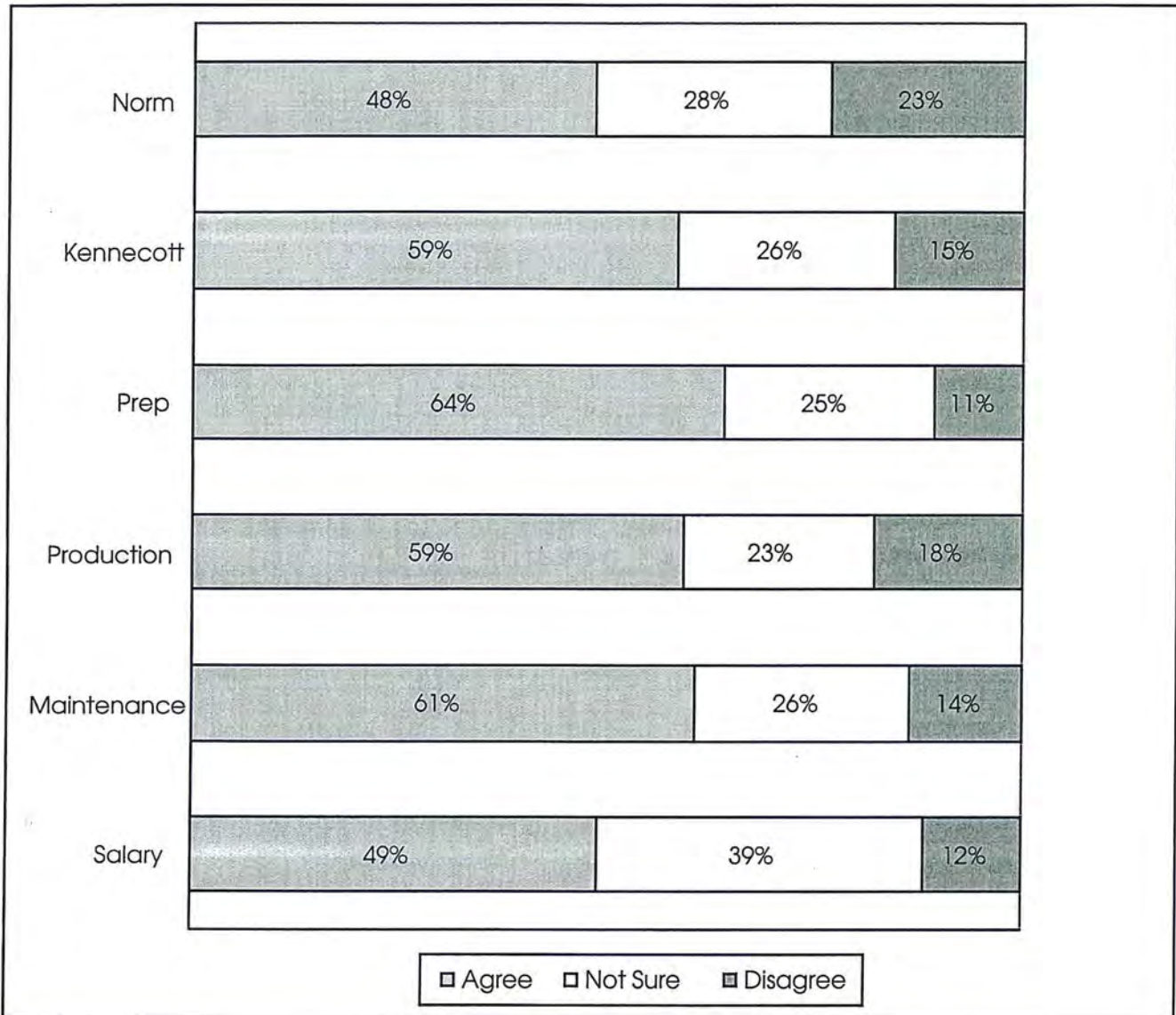
Discipline by Question (continued)

44. Discipline is not used often enough for dealing with serious safety violations.



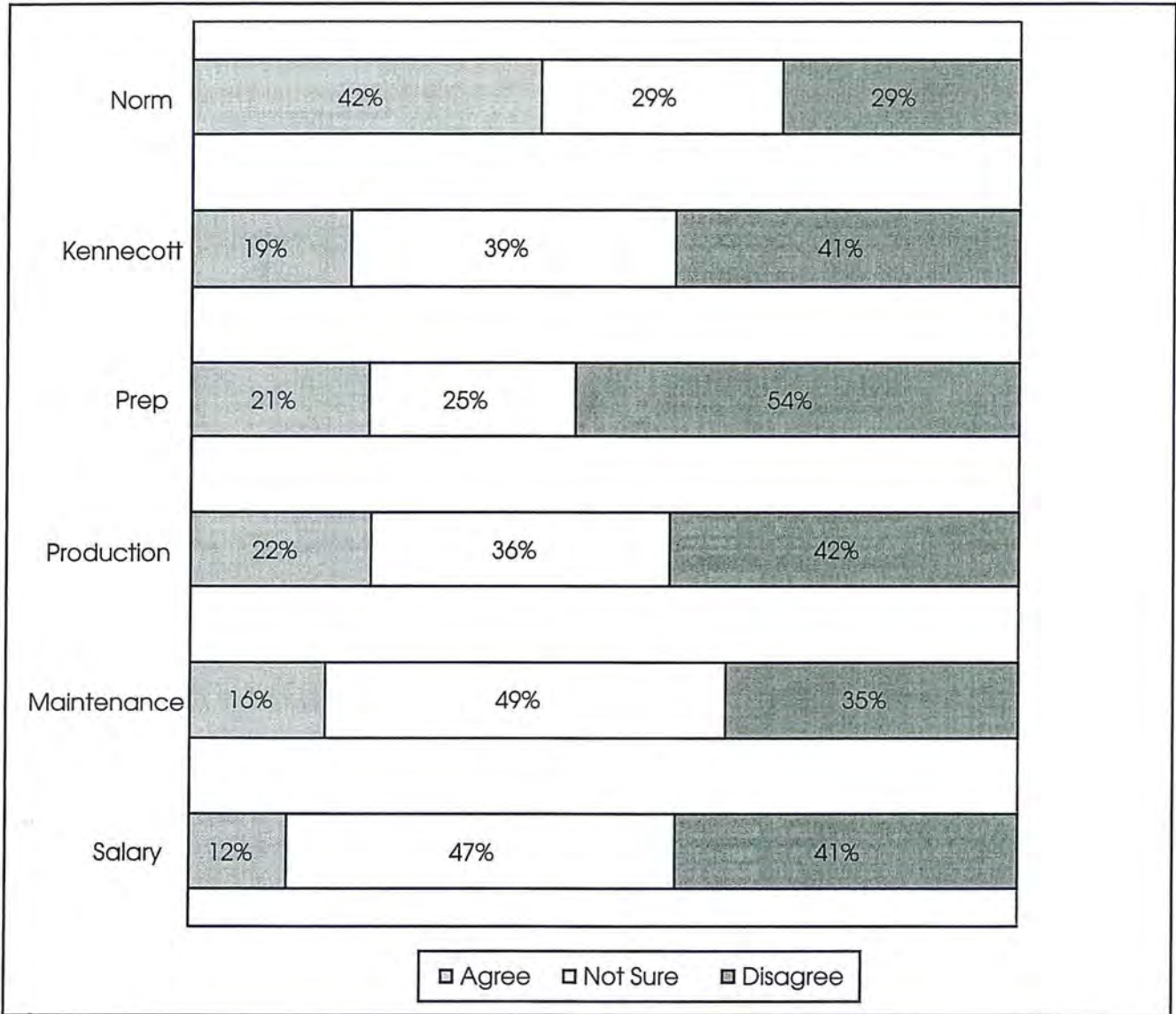
Incident Reporting and Investigations by Question

106. I am encouraged to report near misses.



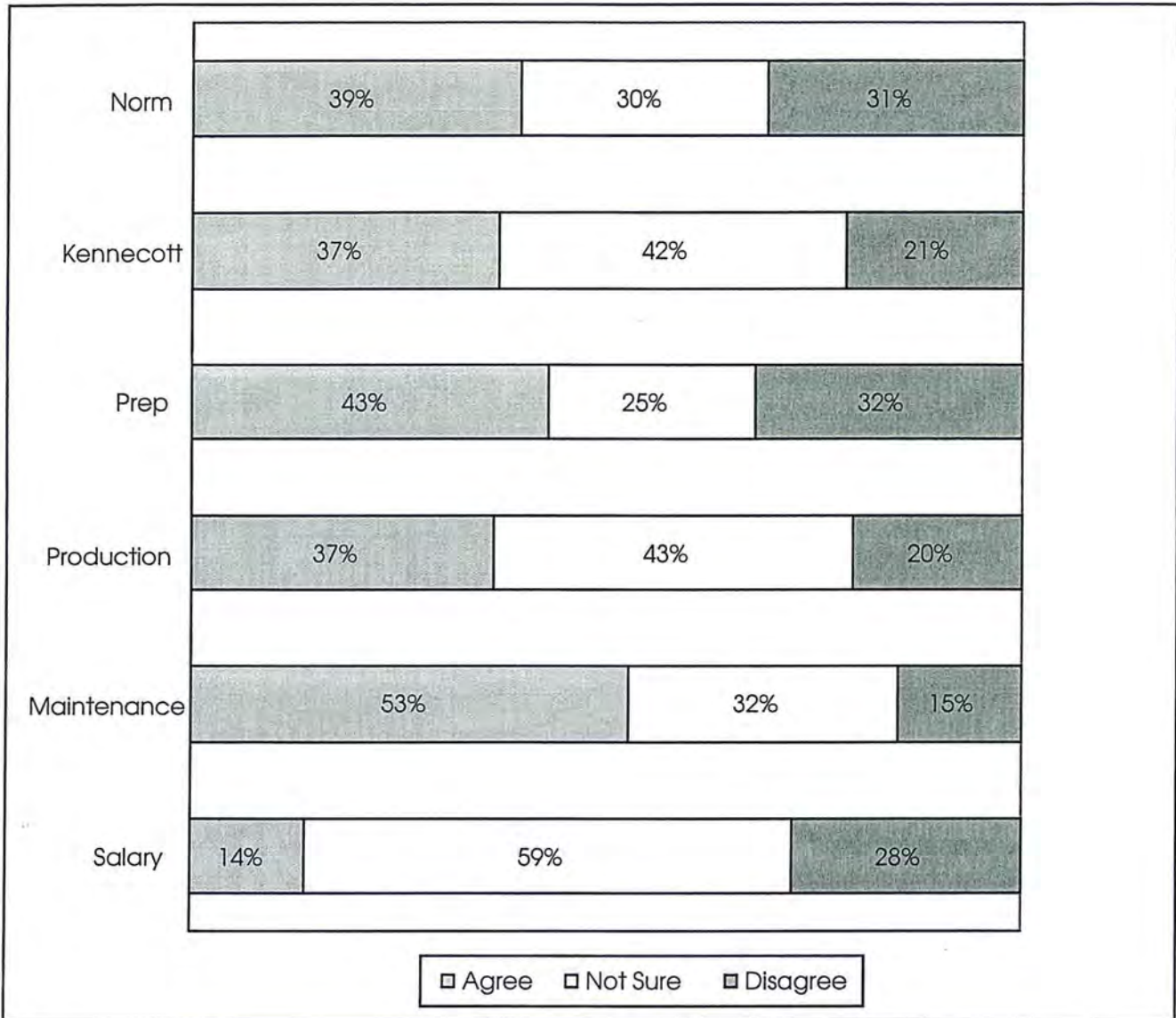
Incident Reporting and Investigations by Question (continued)

128. Near misses are consistently reported and investigated at our plant.



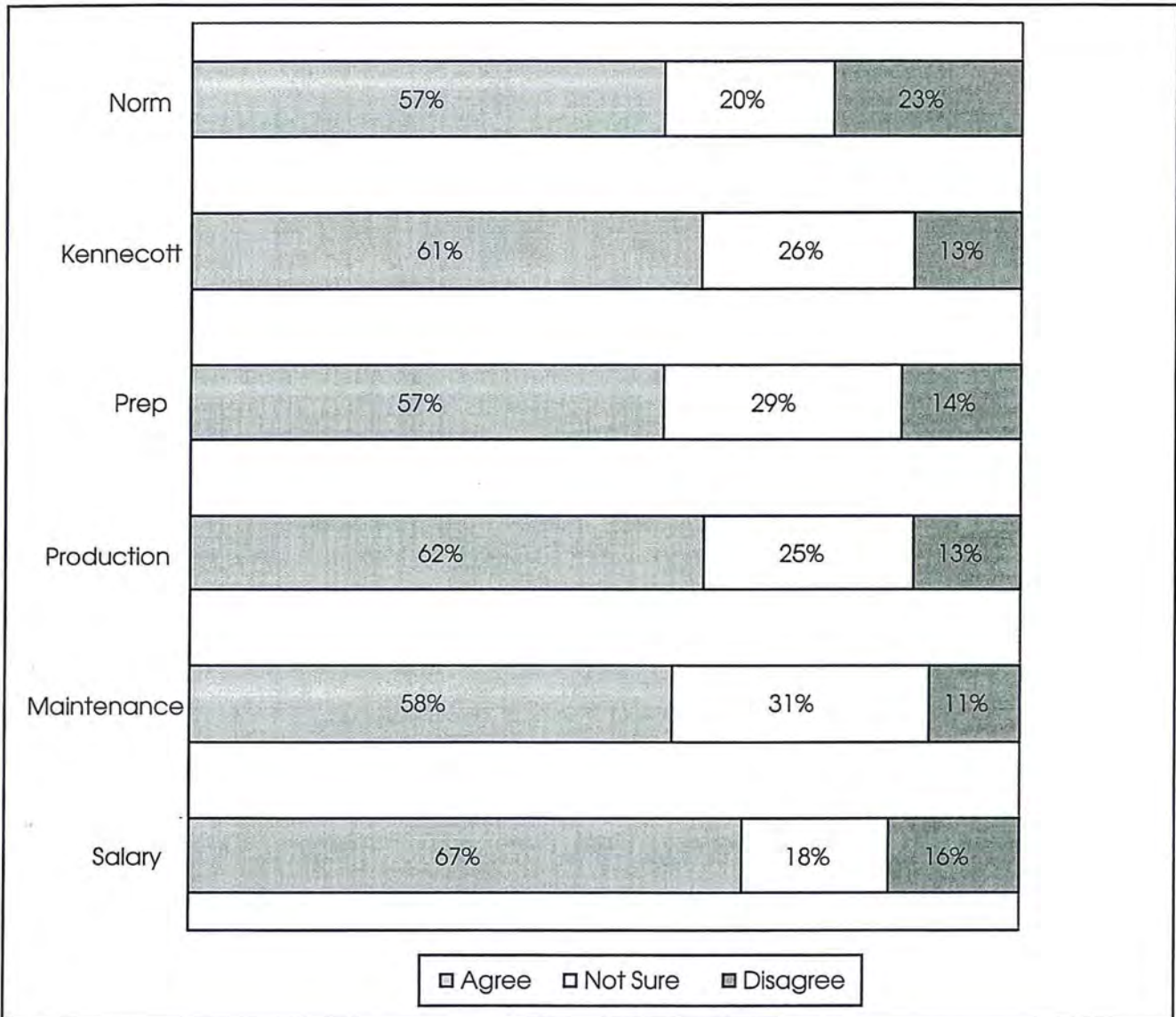
Incident Reporting and Investigations by Question (continued)

43. Minor injuries often go unreported.



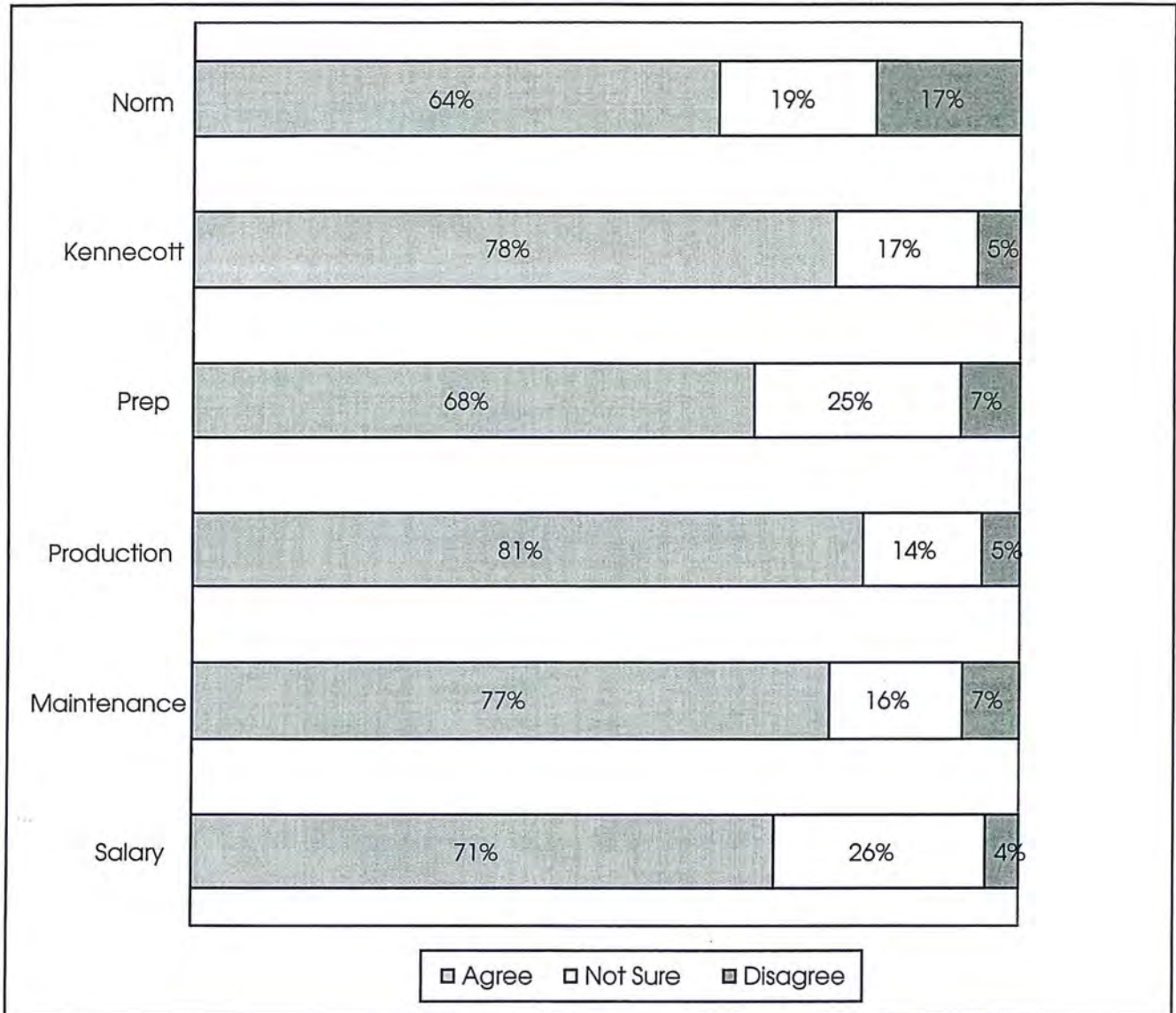
Incident Reporting and Investigations by Question (continued)

115. If I received a minor injury on the job, I would report it.



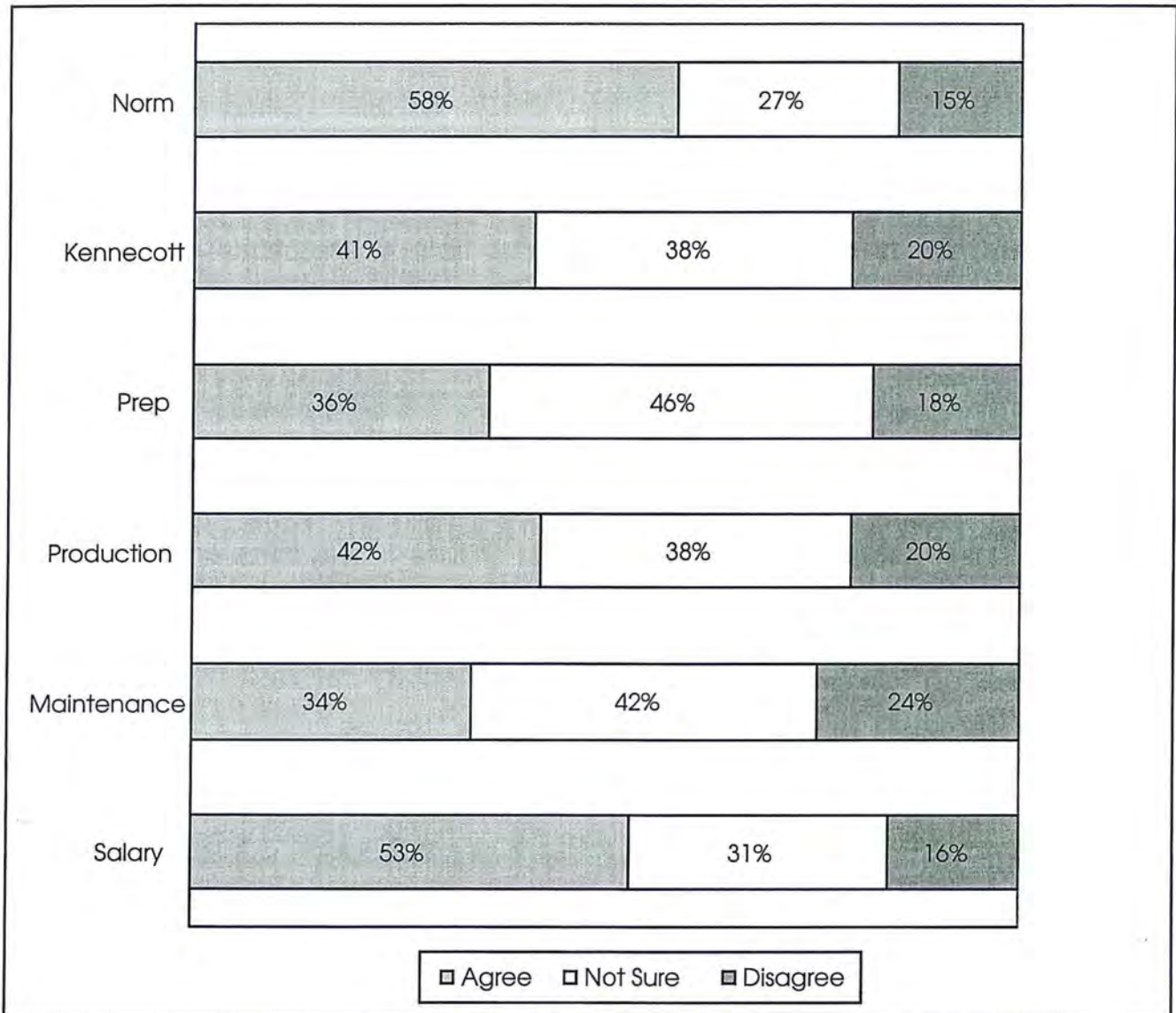
Incident Reporting and Investigations by Question (continued)

101. Management truly wants to know about all incidents and injuries, even if they are minor.



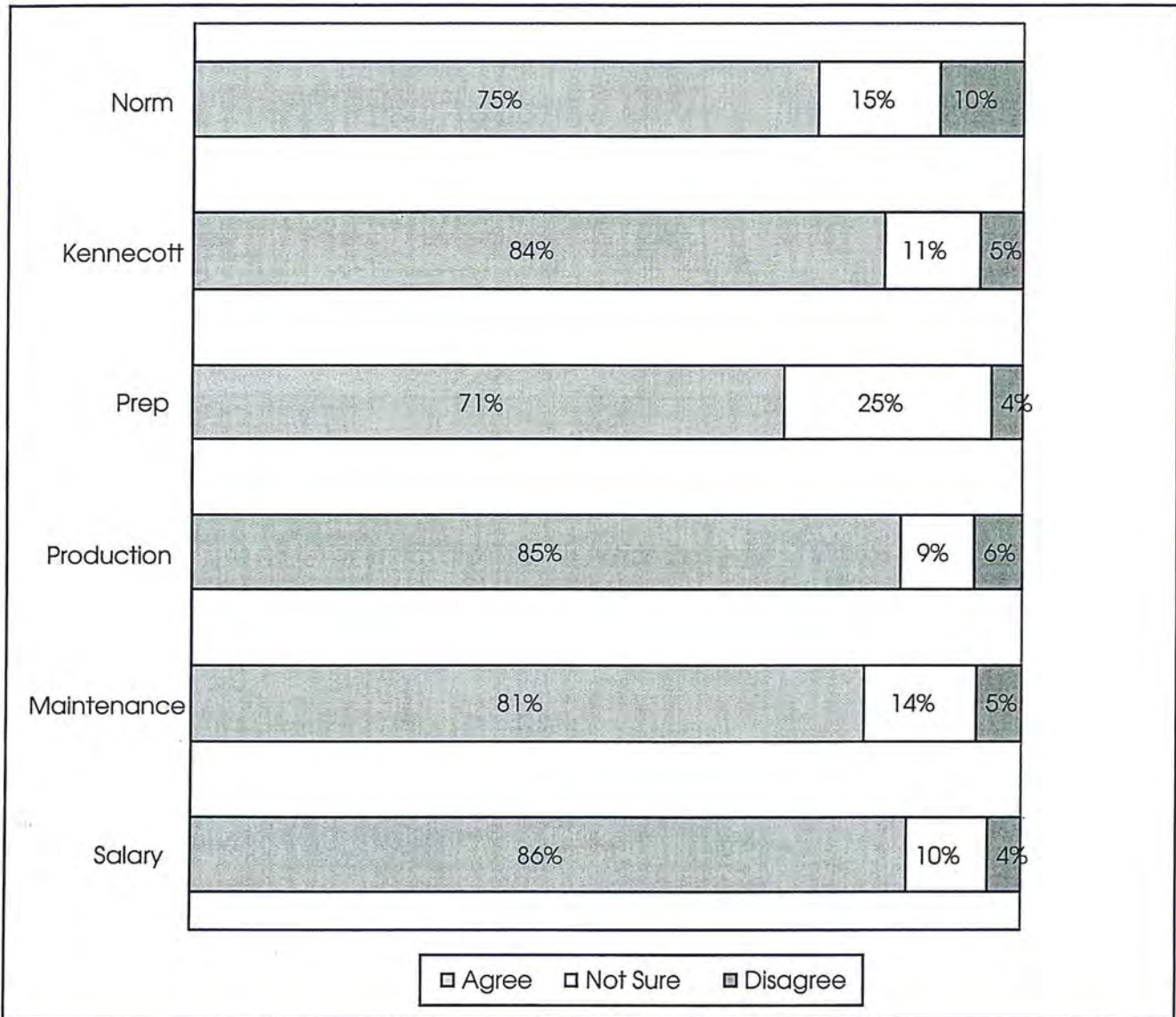
Incident Reporting and Investigations by Question (continued)

42. Incidents and injuries are thoroughly investigated.



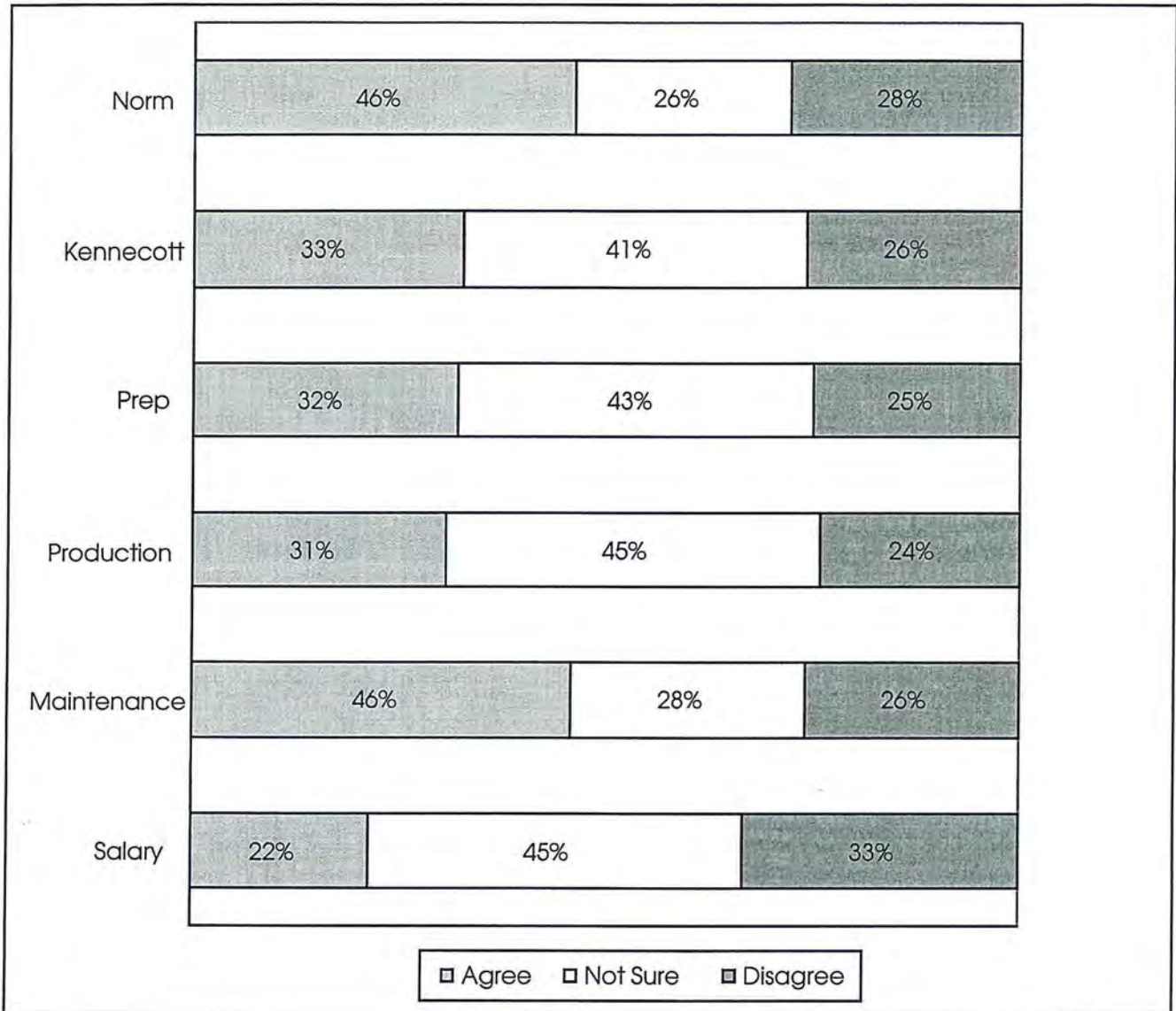
Incident Reporting and Investigations by Question (continued)

104. I would feel free to discuss the causes of my injury with the investigation team.



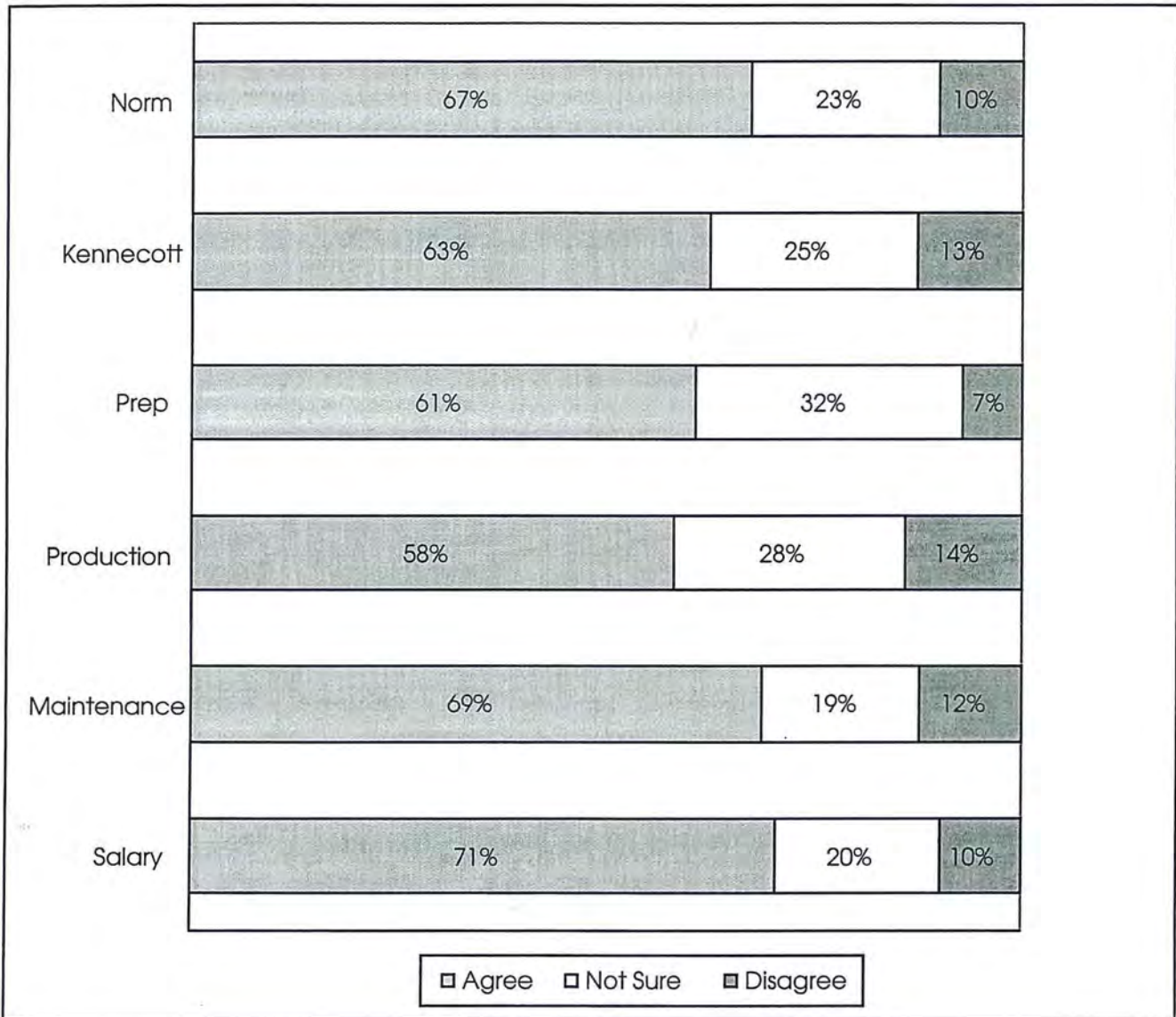
Incident Reporting and Investigations by Question (continued)

84. Management places most of the blame for an accident on the injured employee.



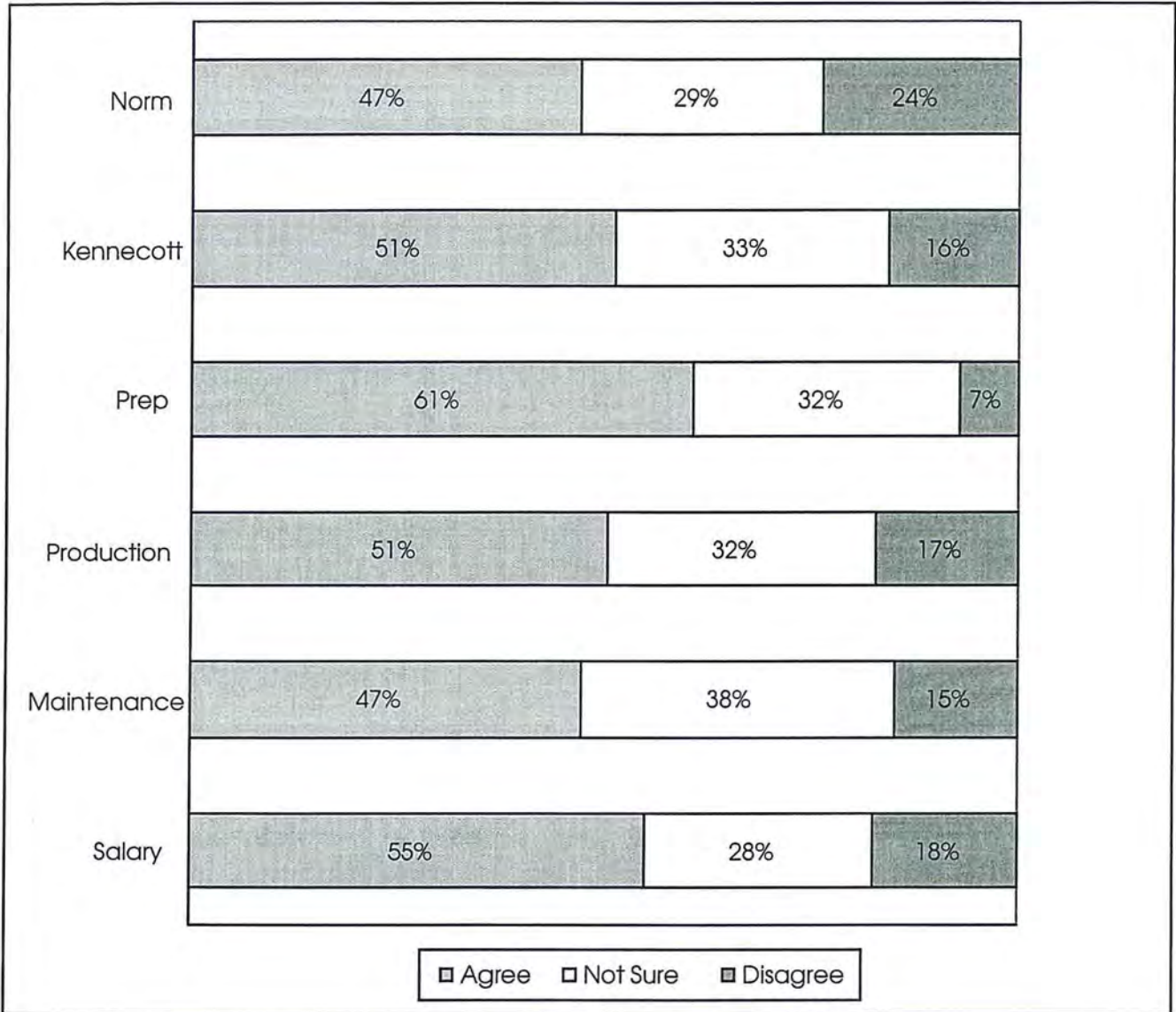
Rules and Regulations by Question

36. Employees understand the safety rules and procedures for their own jobs.



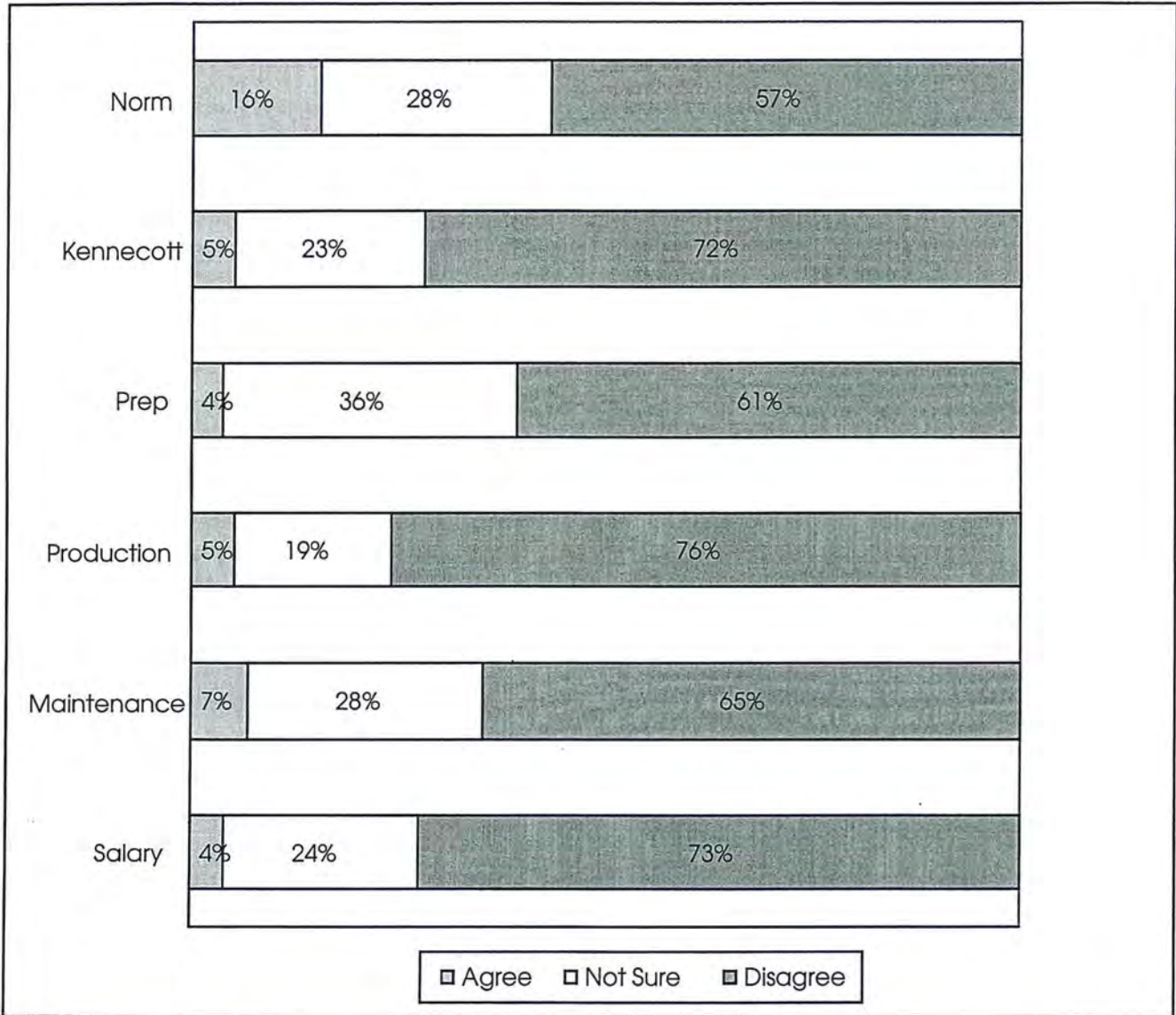
Rules and Regulations by Question (continued)

51. Employees get sufficient background and reasons behind the company's safety rules.



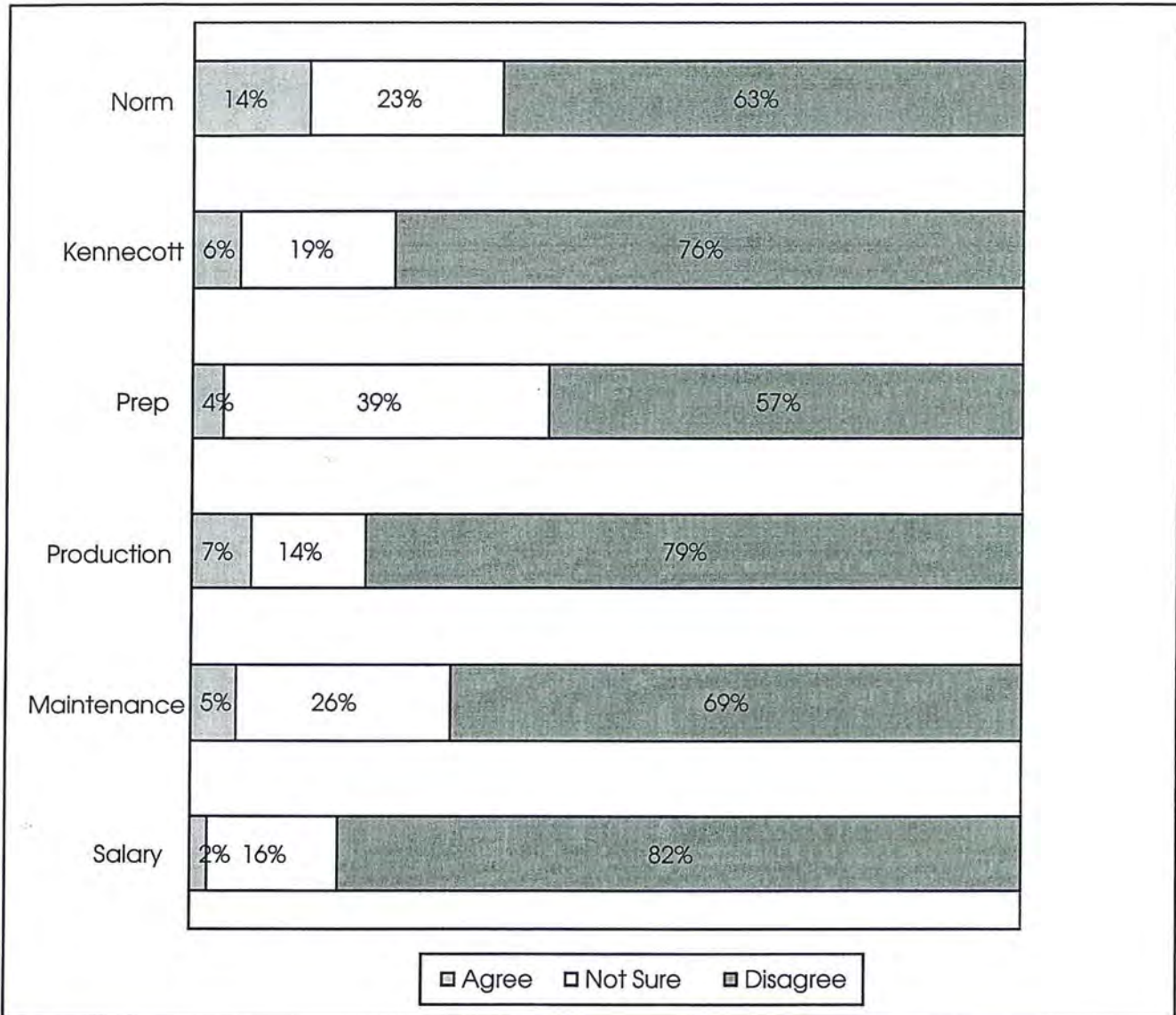
Rules and Regulations by Question (continued)

70. The company has too many rules and regulations governing safety.



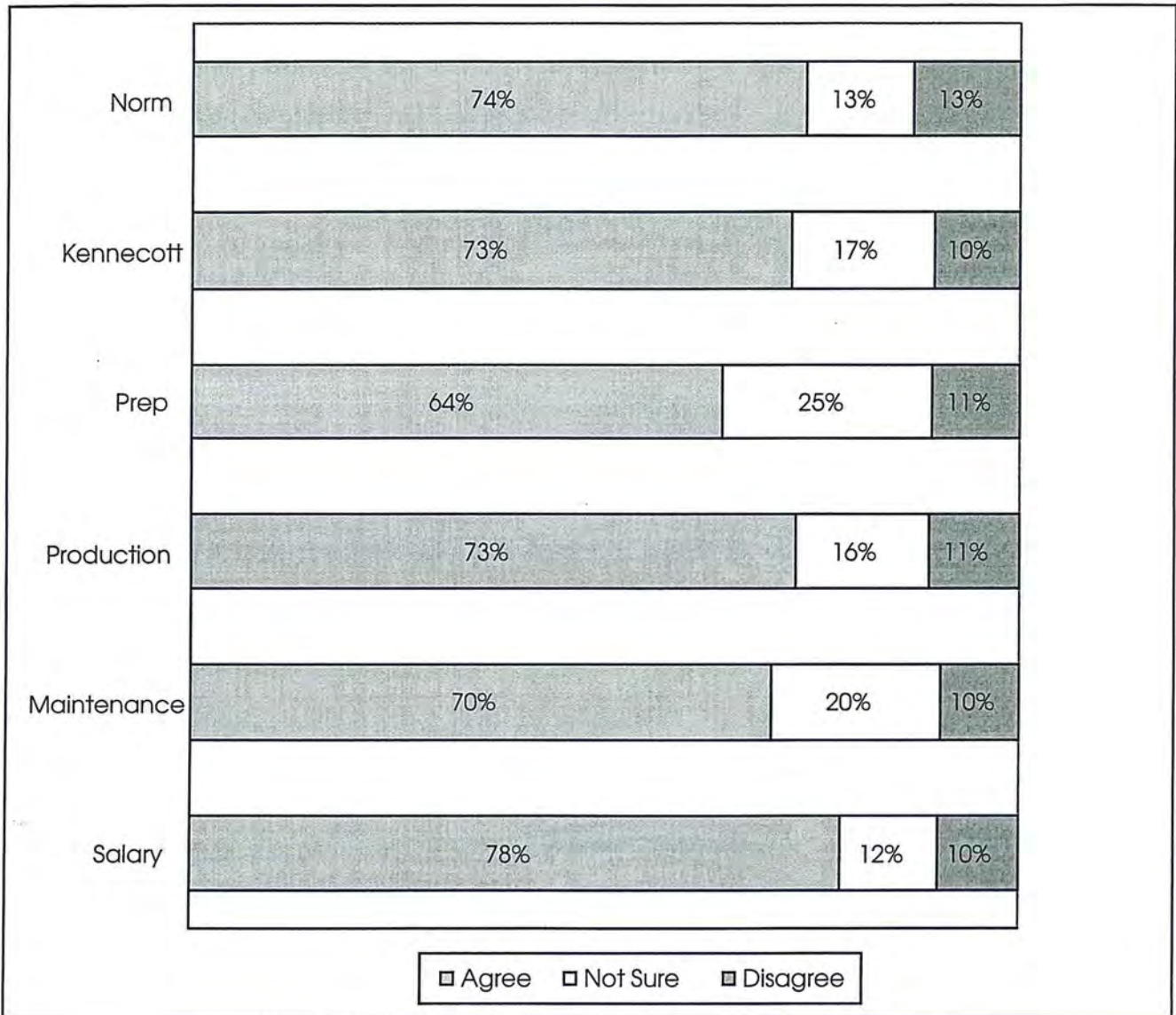
Rules and Regulations by Question (continued)

96. Compliance with safety rules and regulations needlessly slows down my job.



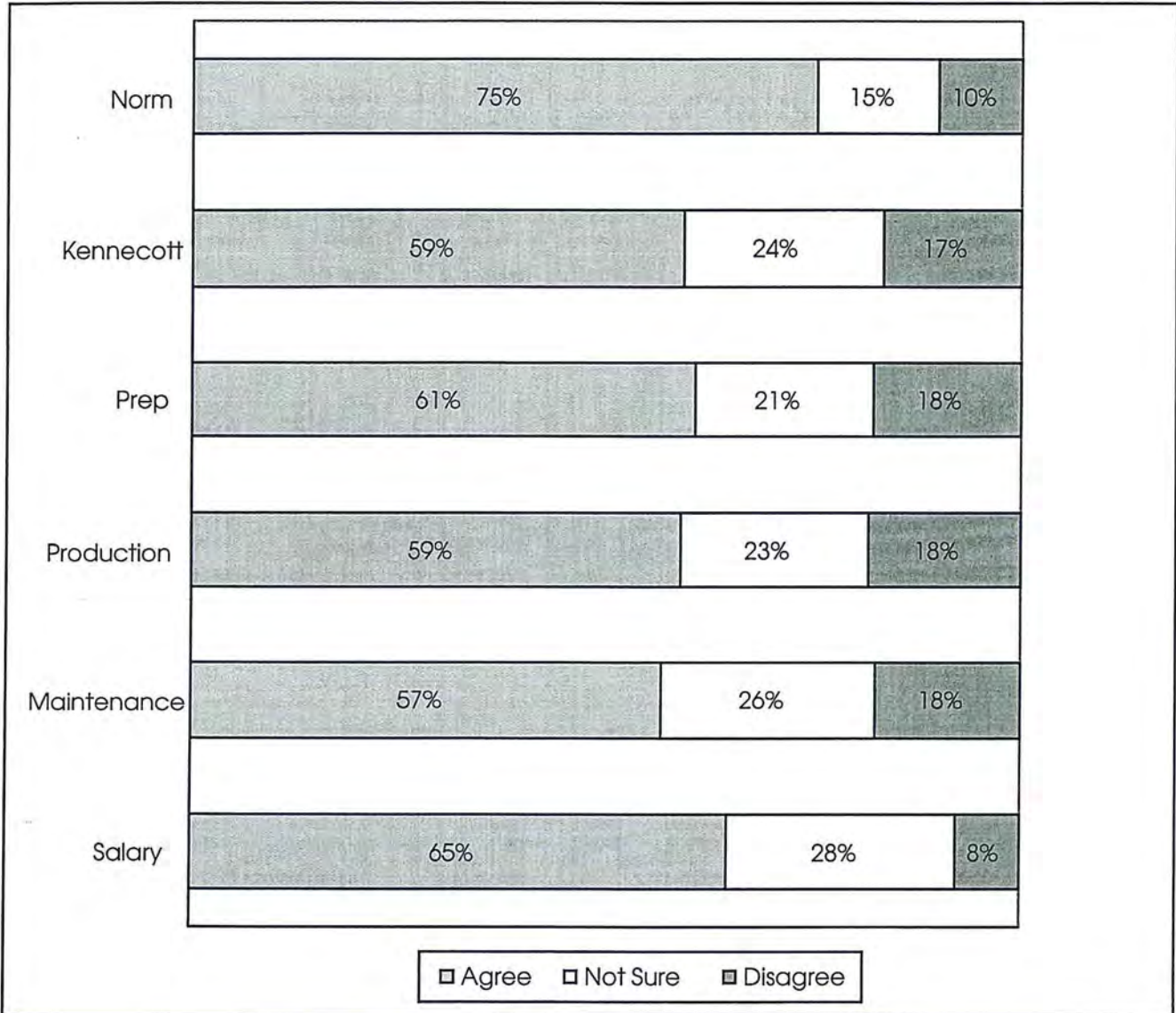
Training by Question

32. I have received adequate job safety training.



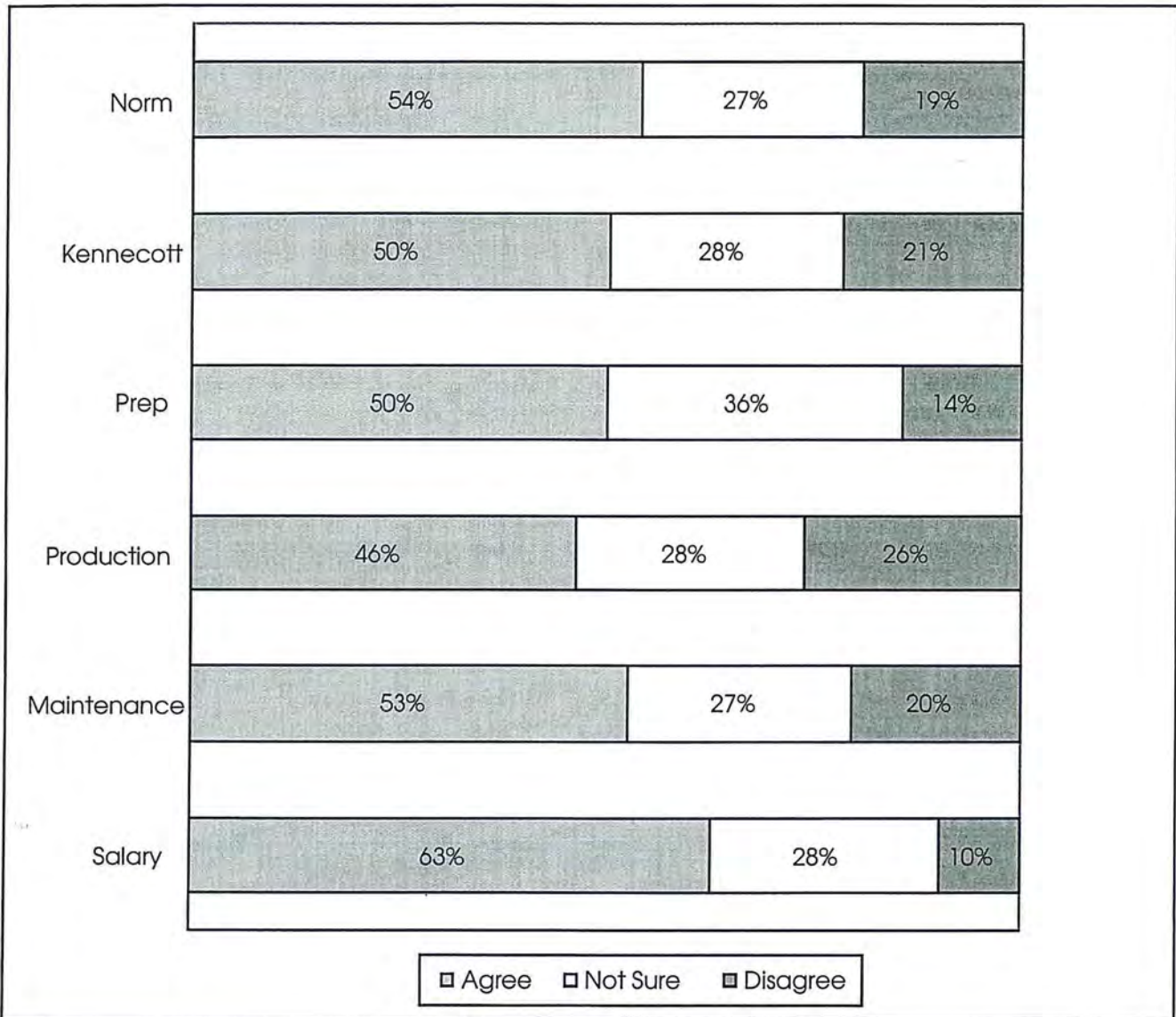
Training by Question (continued)

29. Information needed to work safely is made available to all employees.



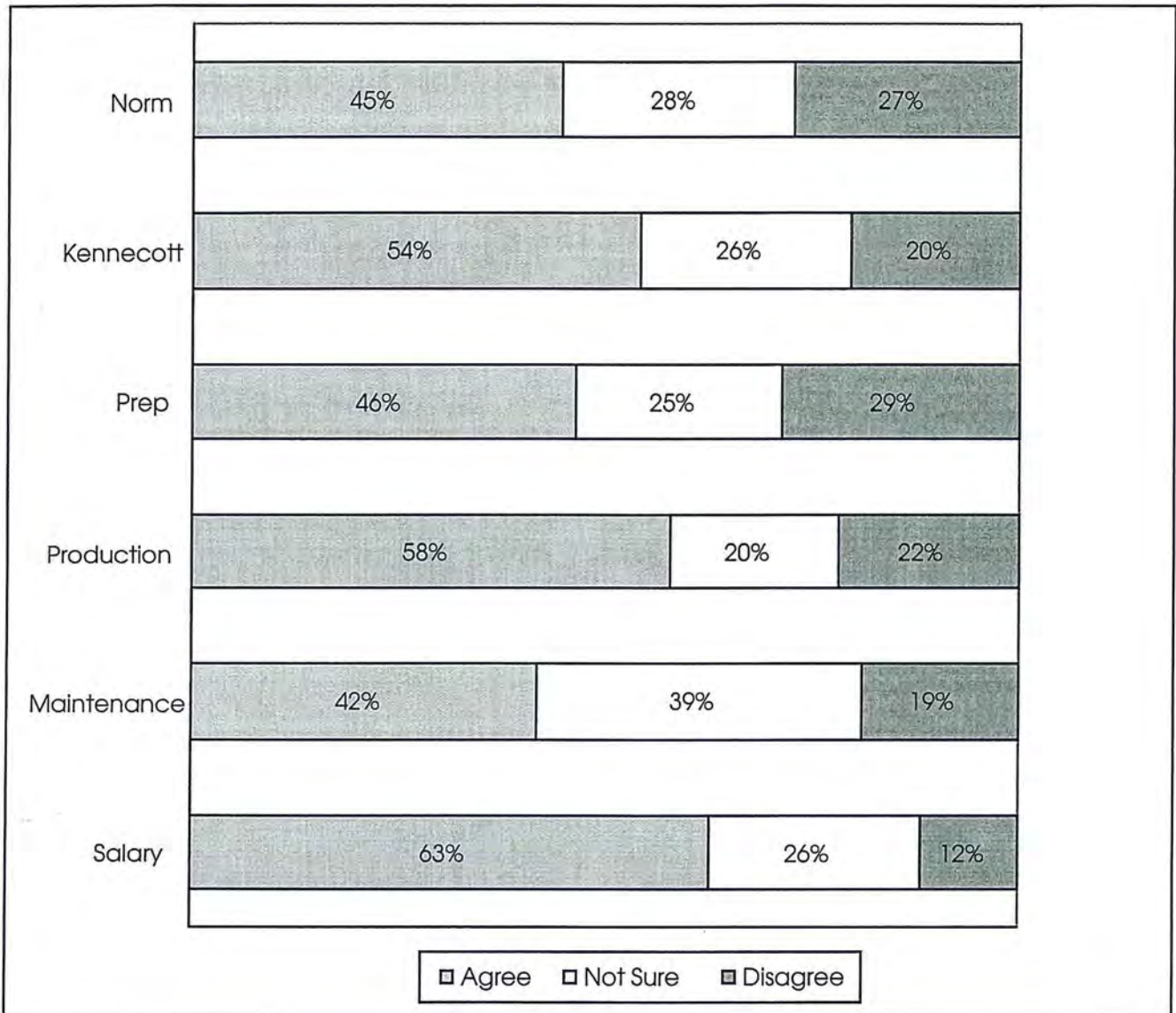
Training by Question (continued)

46. Employees fully understand the potential hazards of the operations they perform.



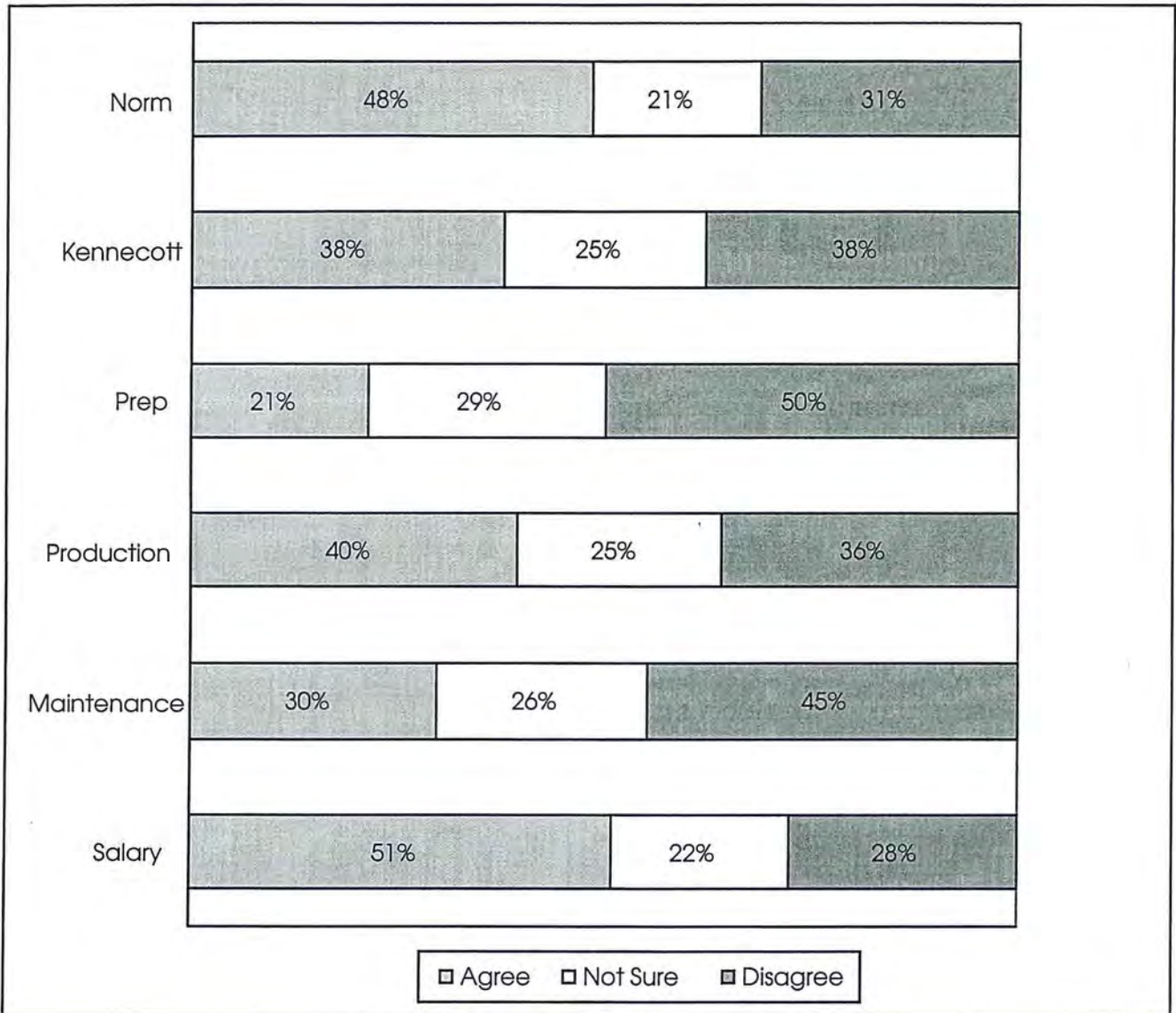
Training by Question (continued)

125. When asked to do a new job, I receive adequate training to be able to do it safely.



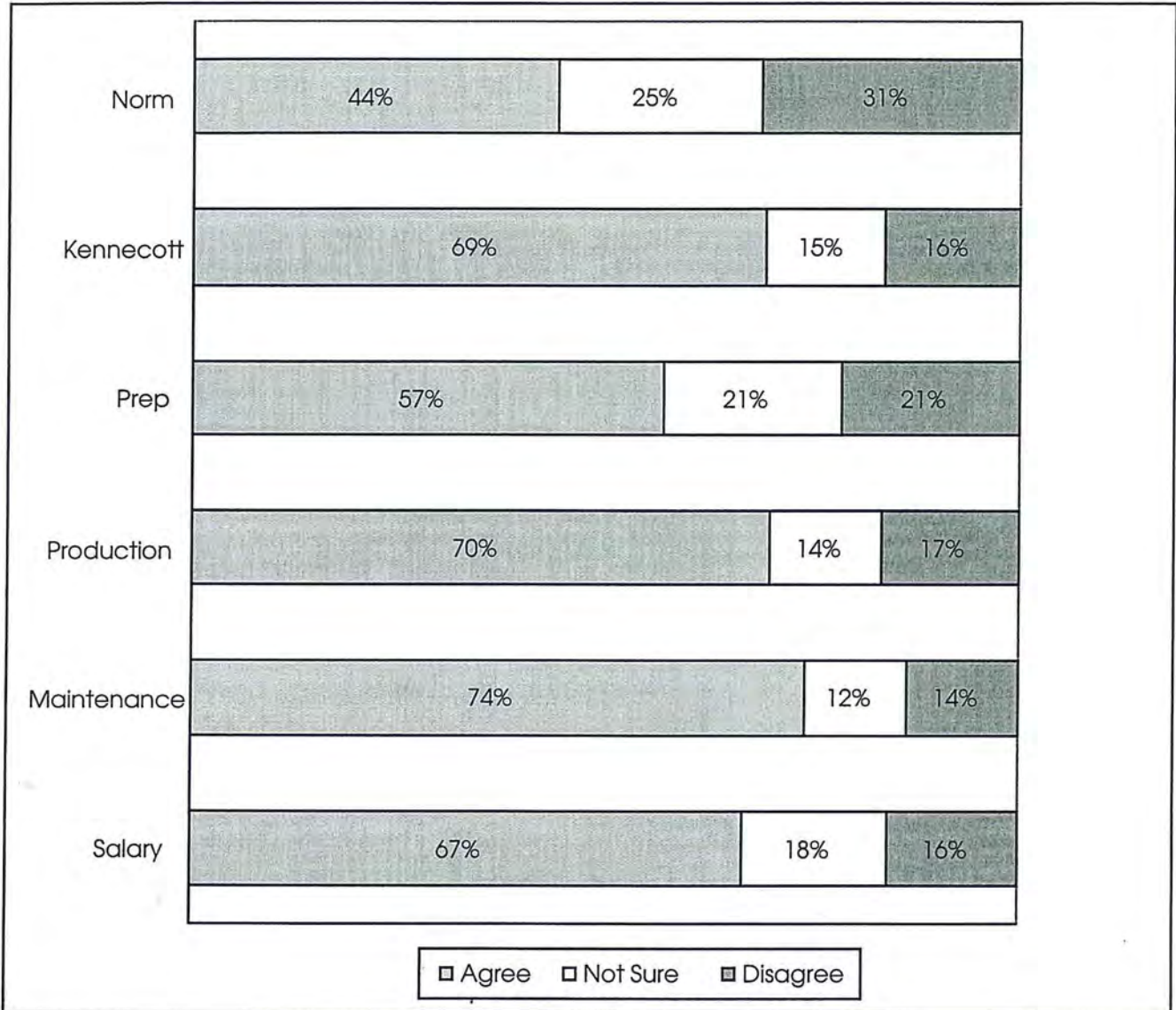
Training by Question (continued)

1. New employees receive sufficient safety training before being allowed to work alone.



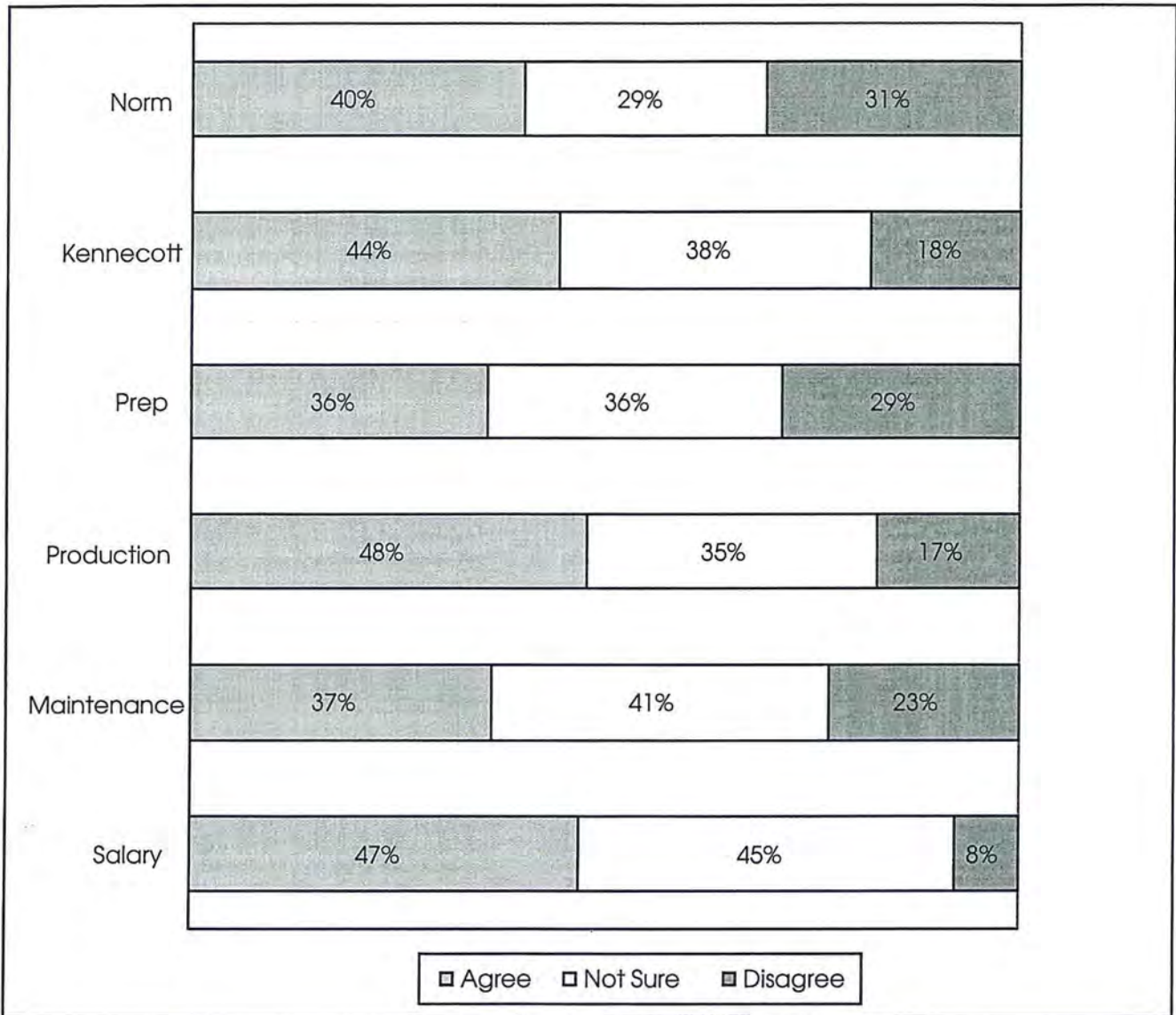
Communication by Question

47. Employees are provided information on such things as the type, frequency, cause, and cost of accidents.



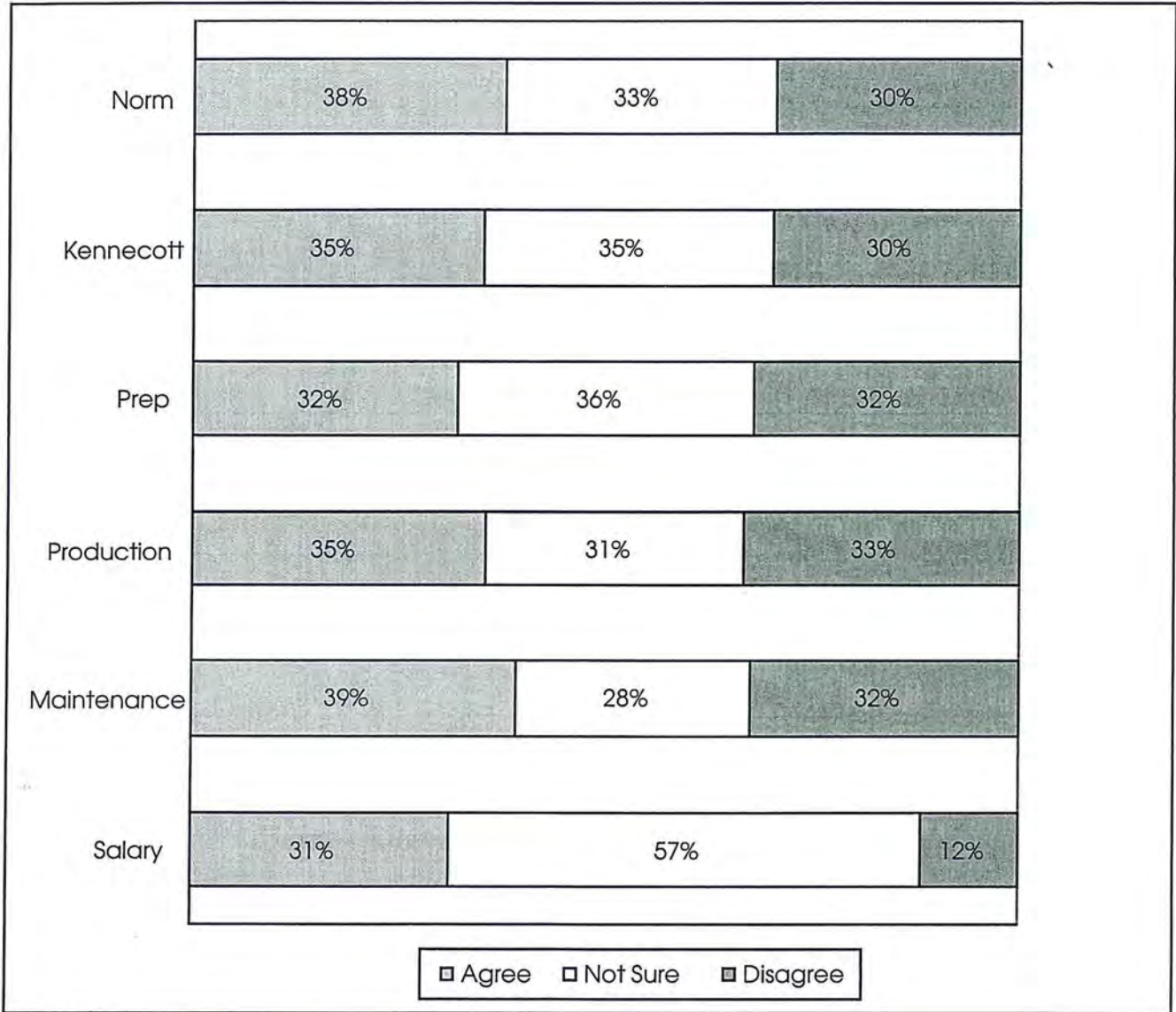
Communication by Question (continued)

20. Supervisors discuss safety improvement goals and efforts with employees on a regular basis.



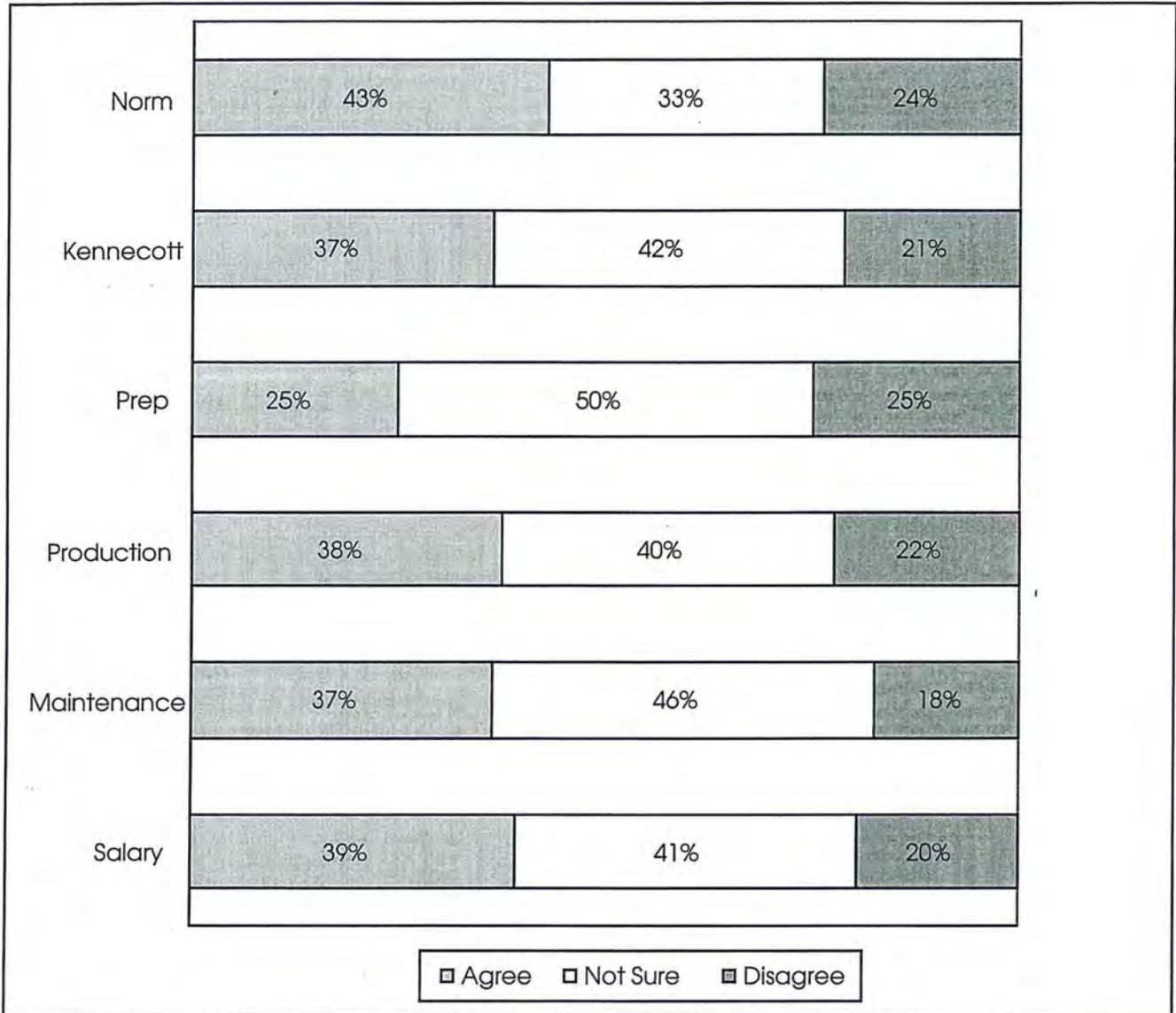
Communication by Question (continued)

111. Employees are routinely given feedback by supervisors regarding their safe and unsafe work behaviors.



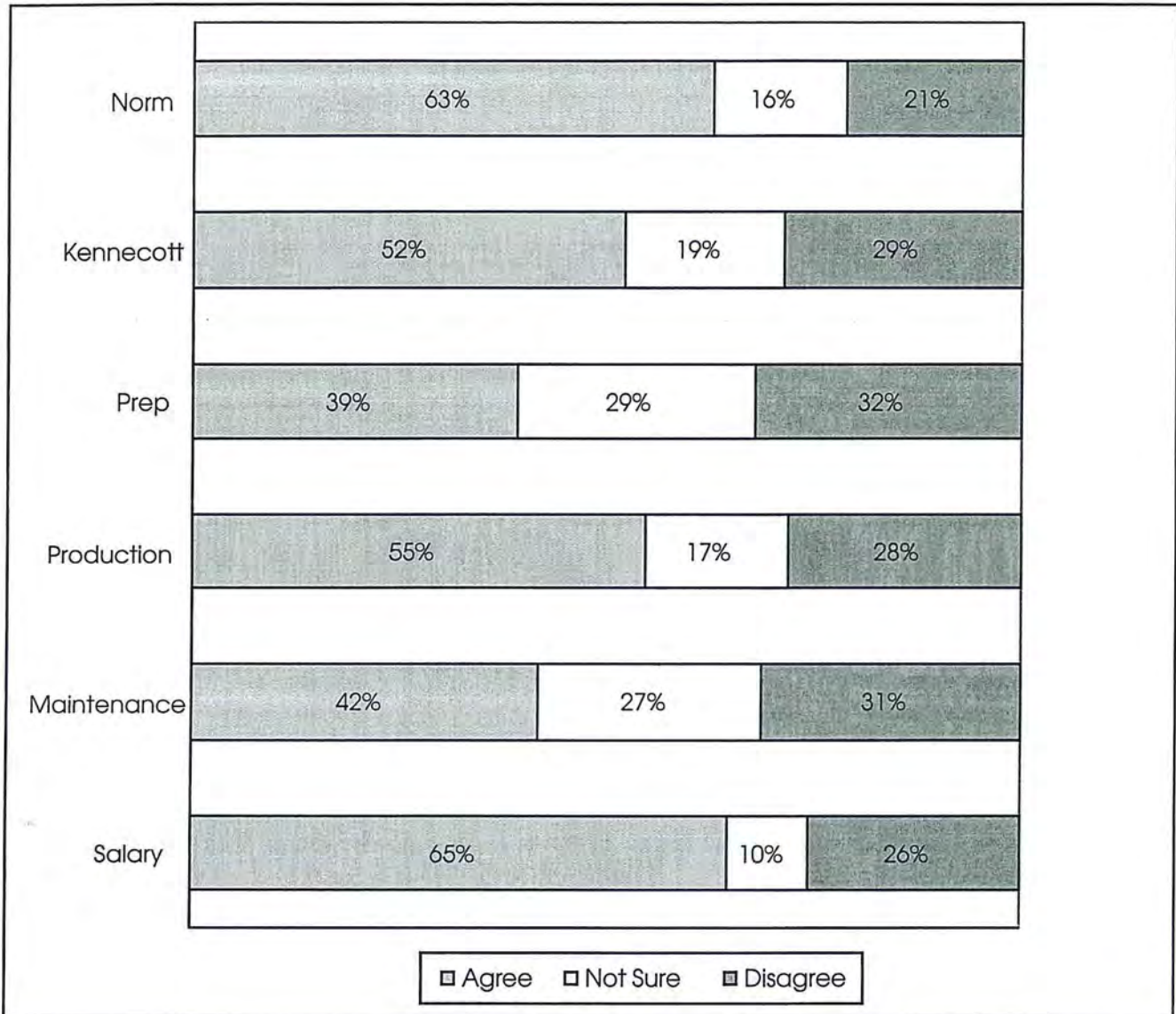
Communication by Question (continued)

15. When an incident or injury is investigated, the results are promptly reported back to involved employees.



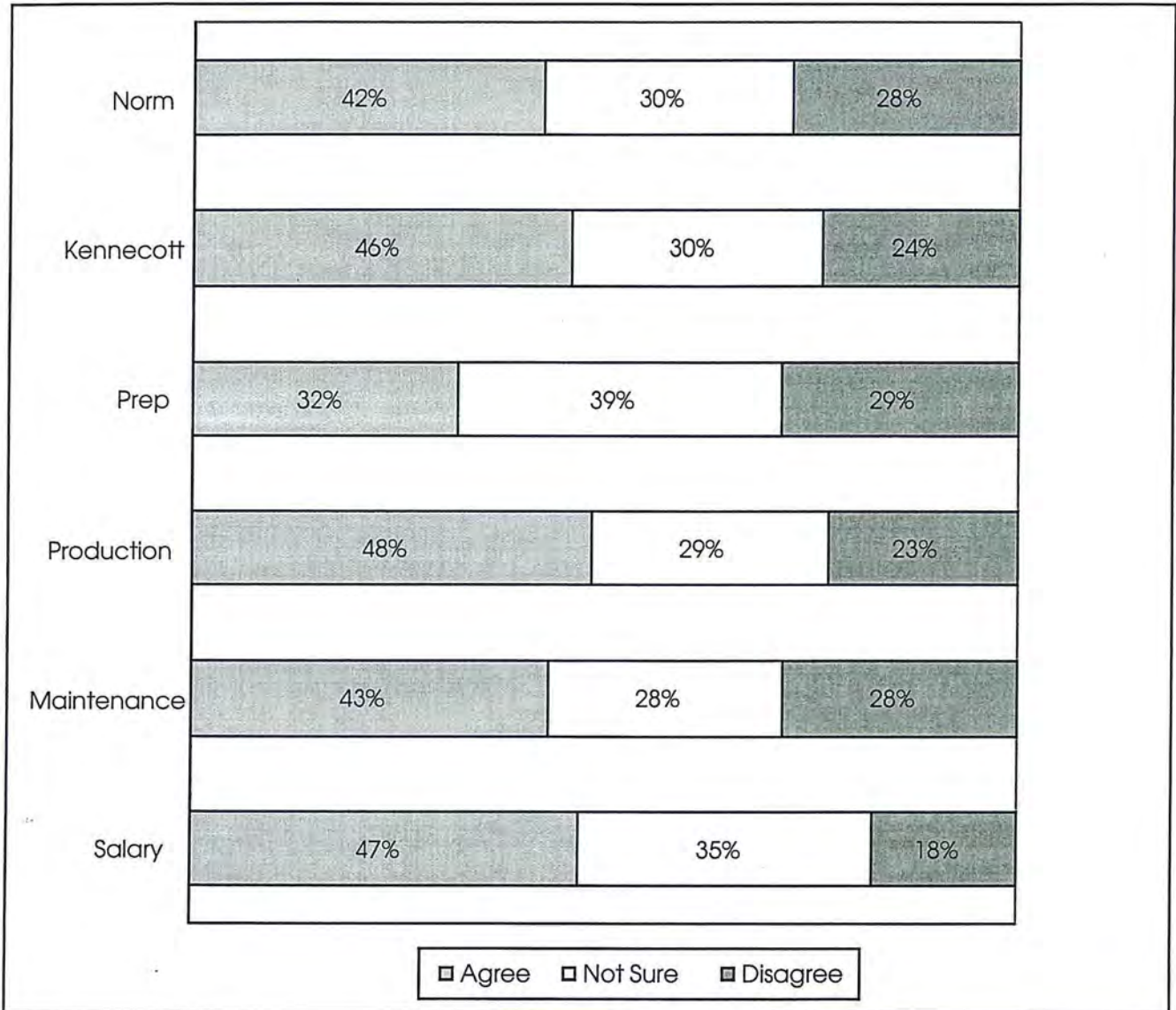
Communication by Question (continued)

11. Safety rules and procedures are regularly reviewed with employees.



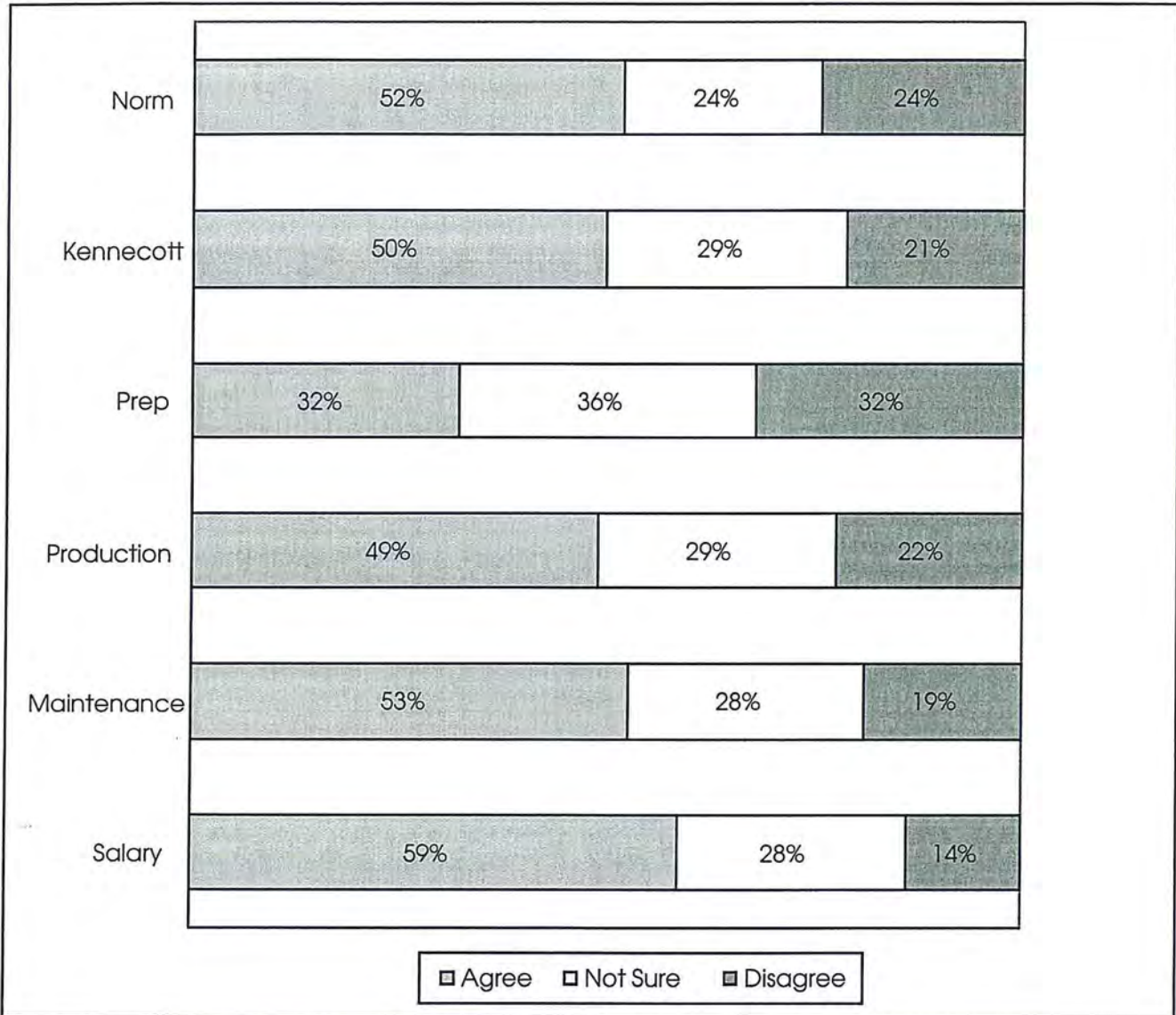
Safety Suggestions by Question

126. My supervisor asks me what I need to do my job safer.



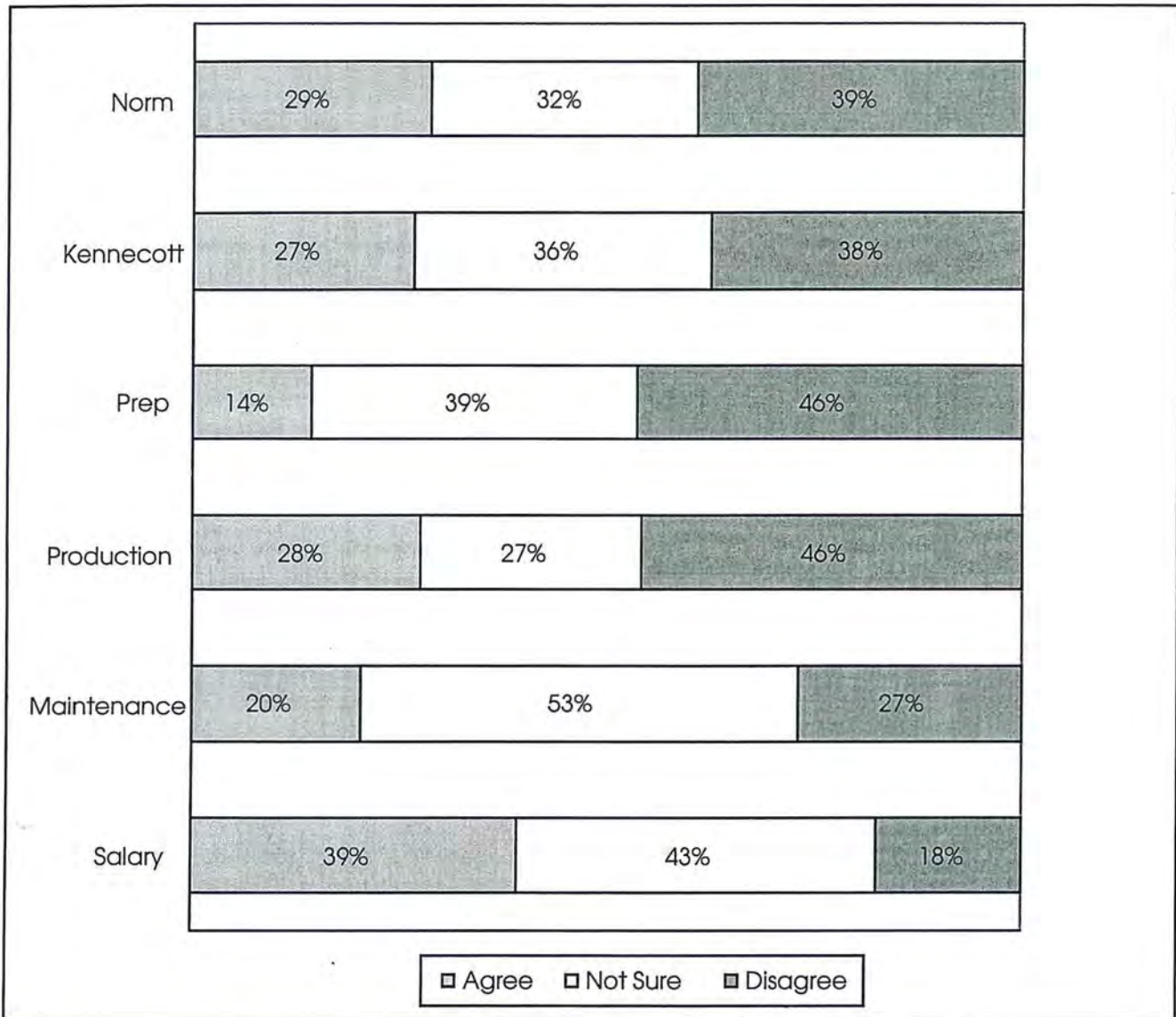
Safety Suggestions by Question (continued)

3. Employee safety suggestions are listened to and taken seriously.



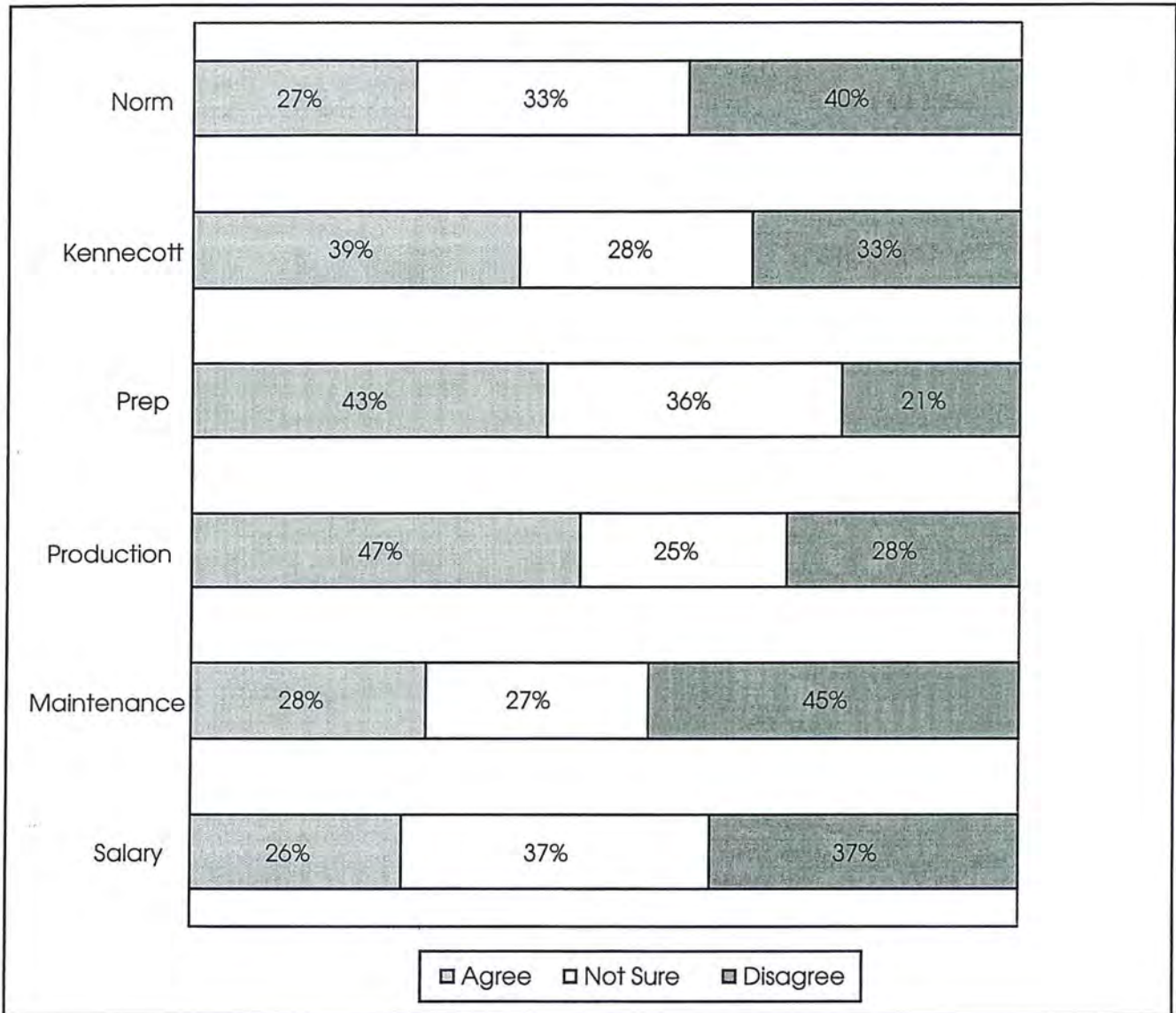
Safety Suggestions by Question (continued)

7. Employees receive prompt feedback in response to their safety suggestions.



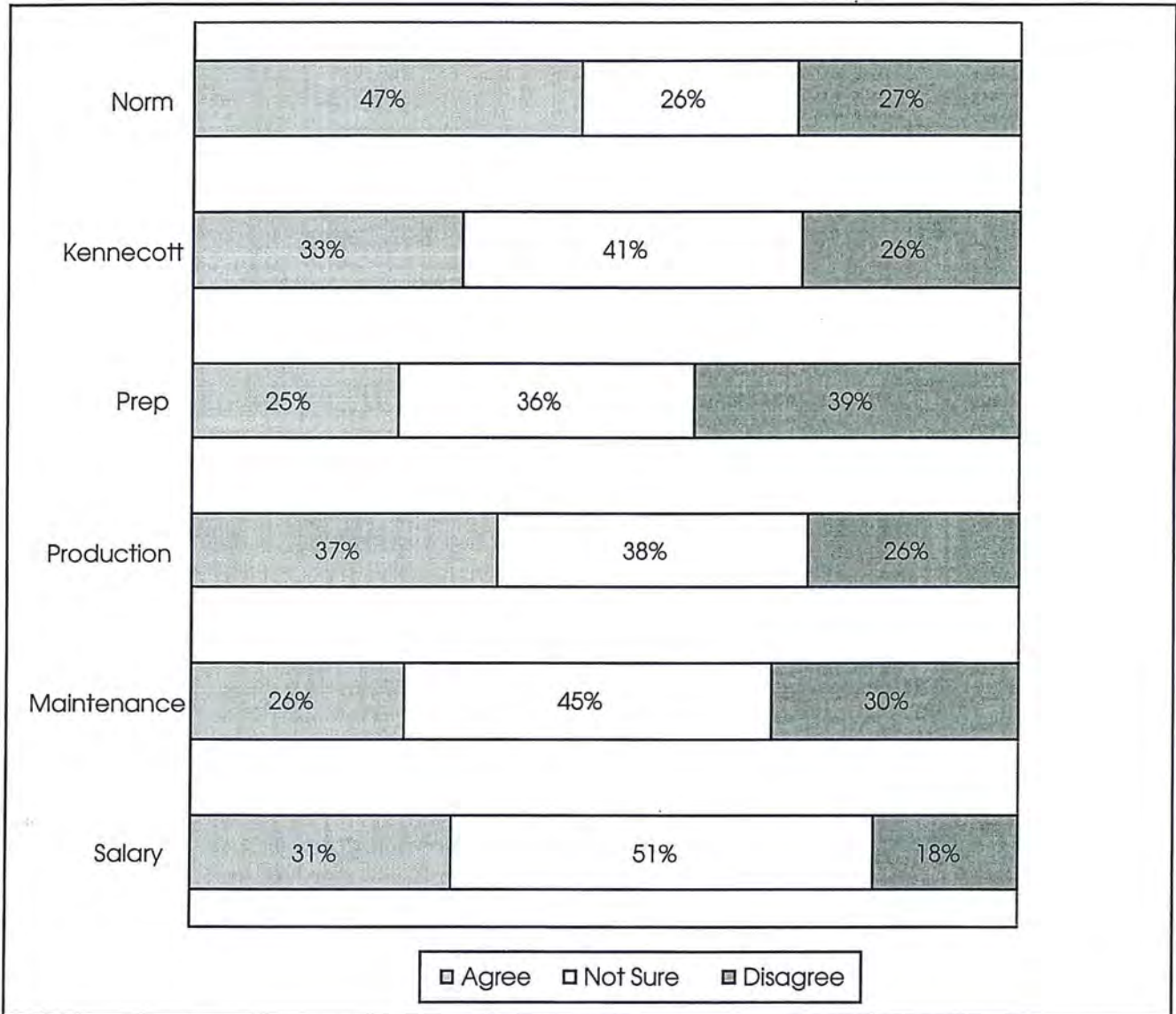
Rewards and Reinforcement by Question

81. Our safety award program(s) motivate me to work more safely.



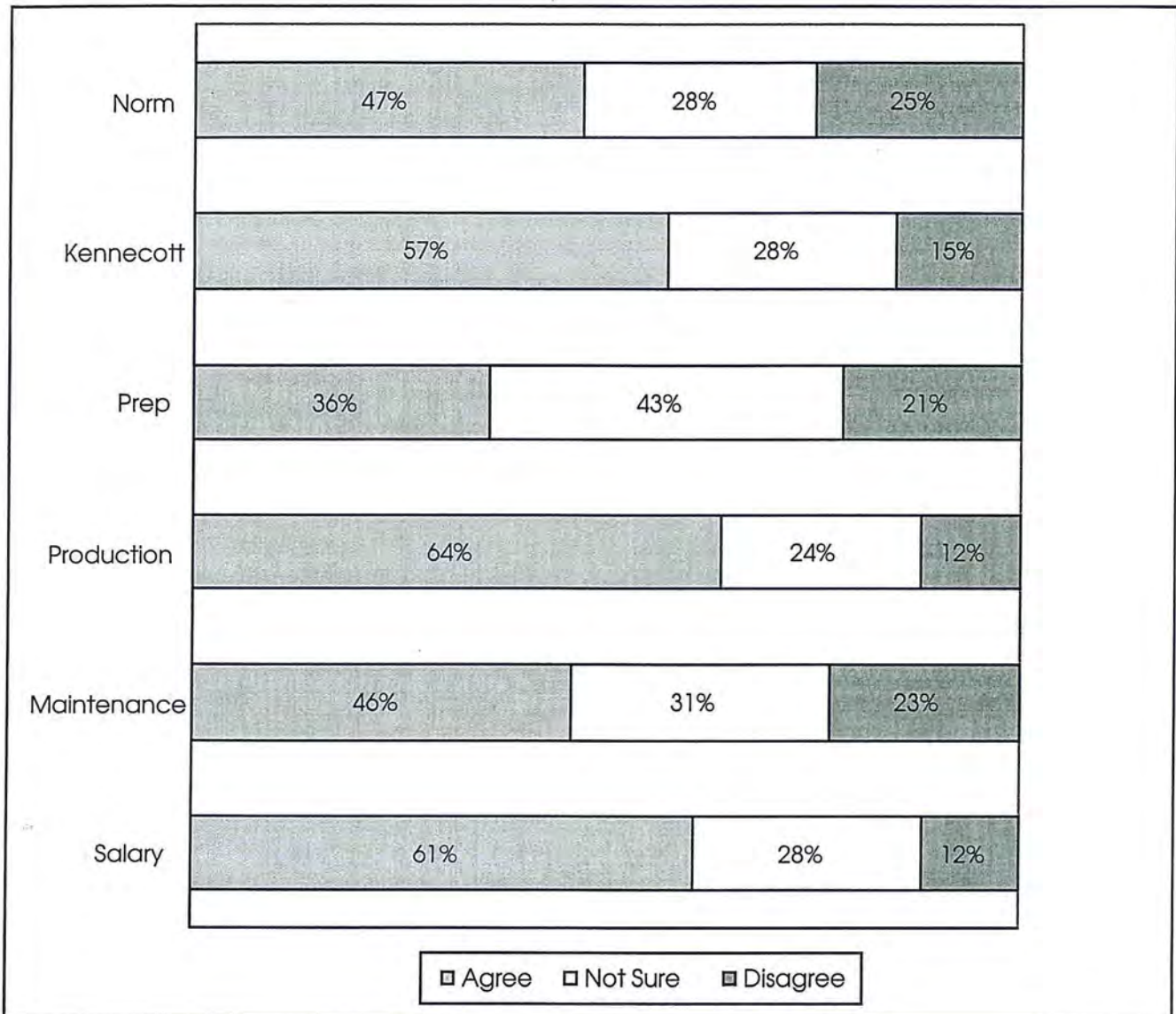
Rewards and Reinforcement by Question (continued)

66. First line supervisors acknowledge and/or reward employees for safe behaviors.



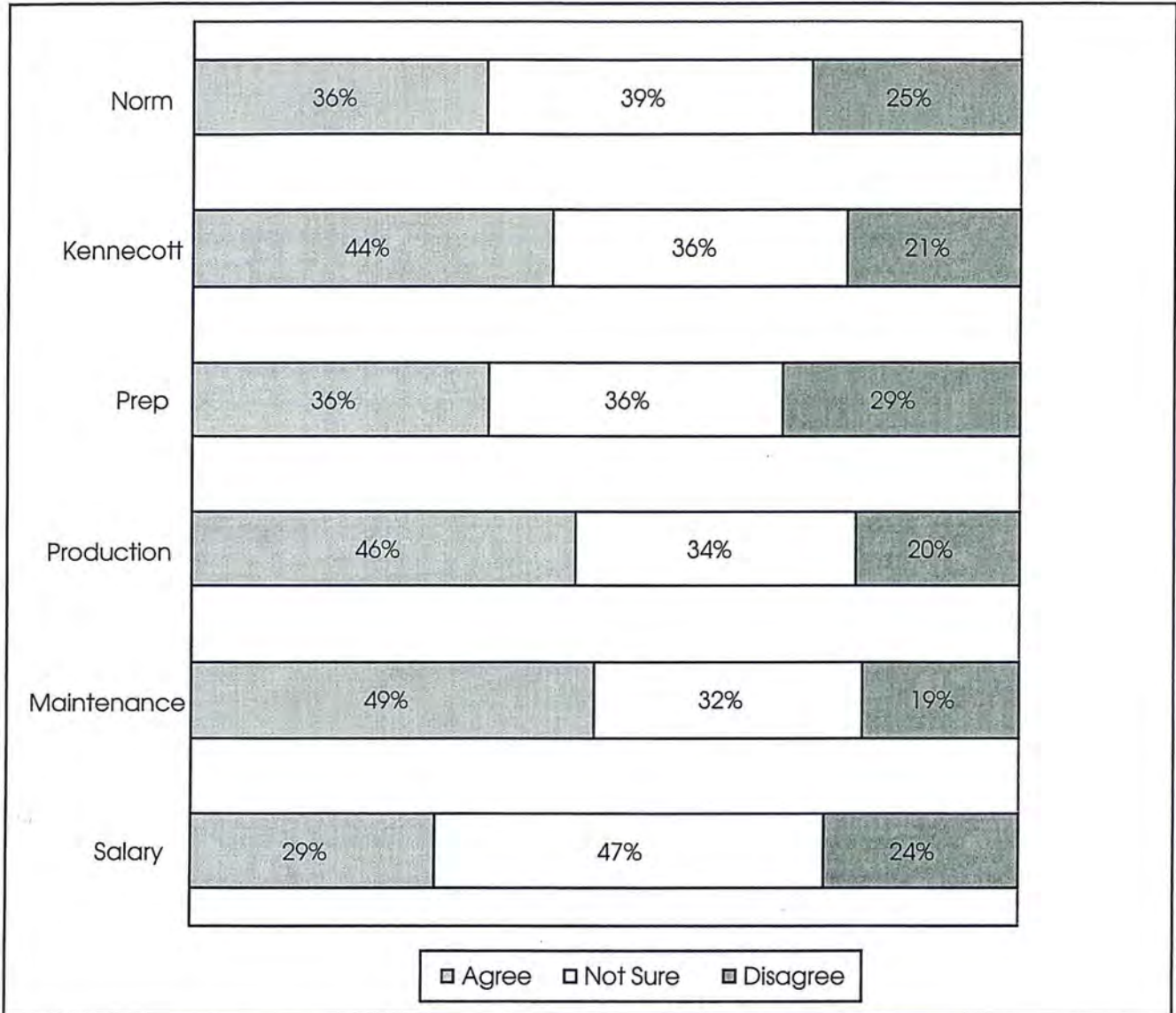
Rewards and Reinforcement by Question (continued)

97. Employees who work safely have a better chance for promotion than those who don't.



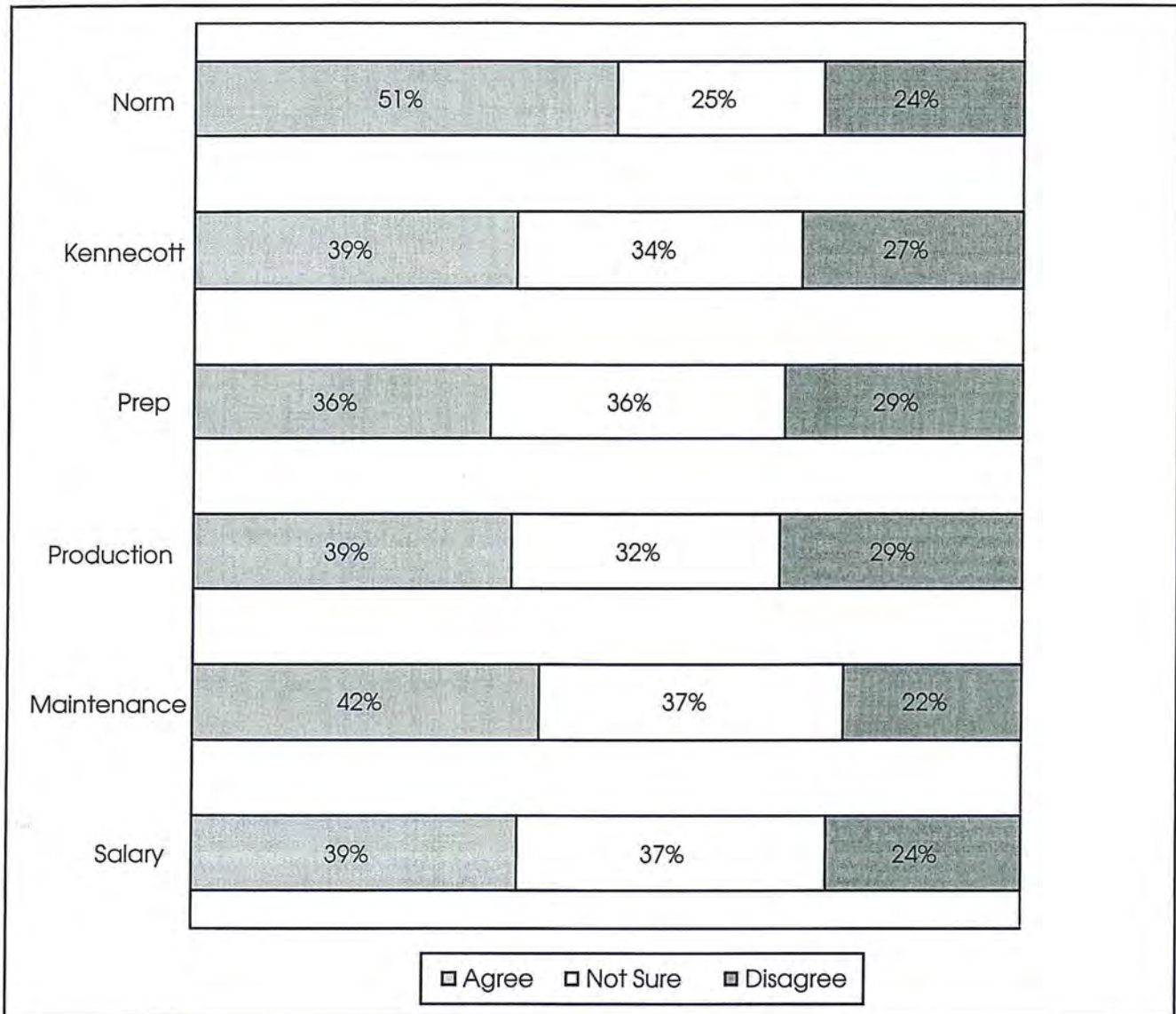
Rewards and Reinforcement by Question (continued)

91. An employee who gets injured will likely receive a poorer performance evaluation.



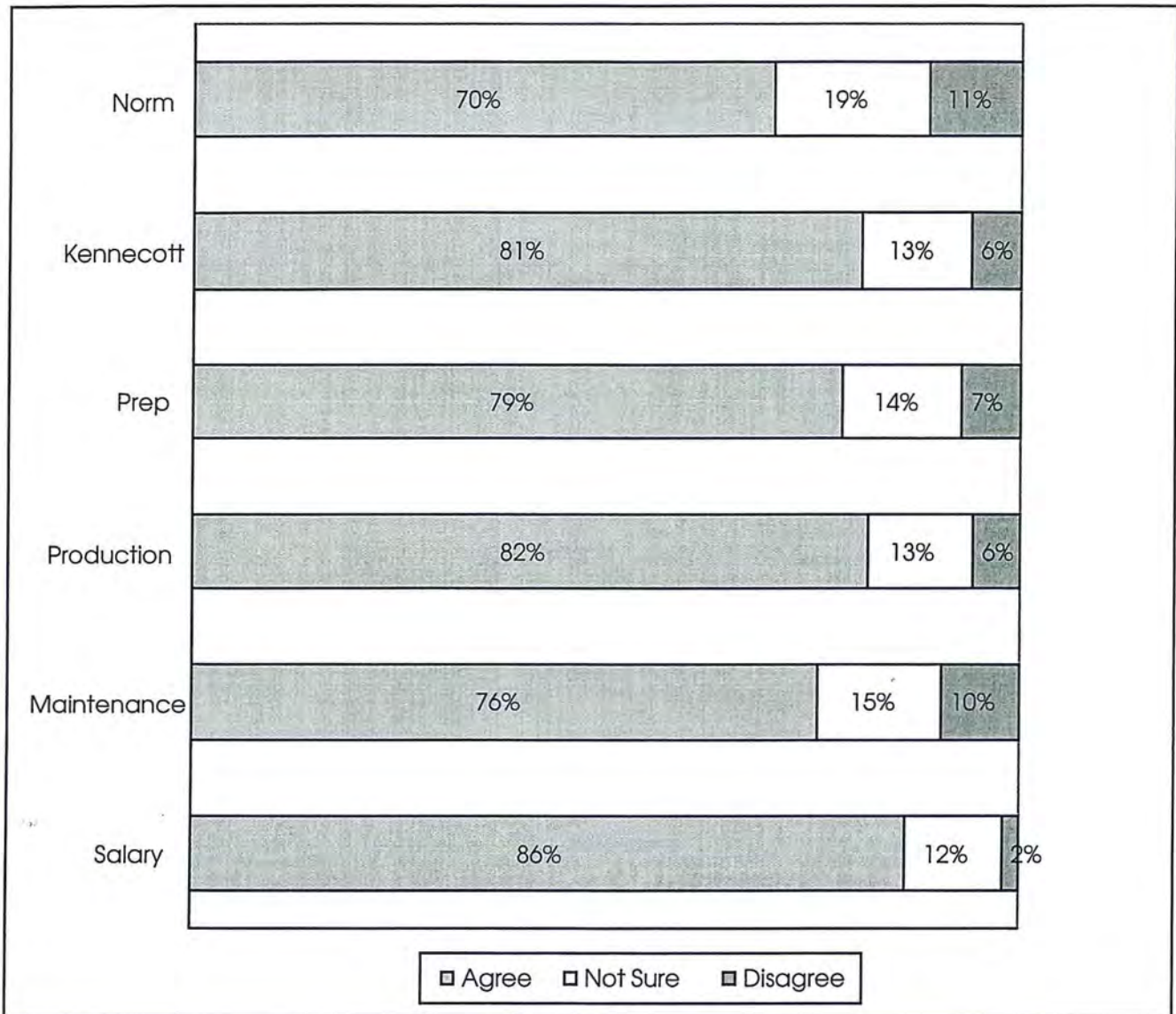
Hazards Identification and Correction by Question

131. Safety audits/inspections are conducted regularly in my department.



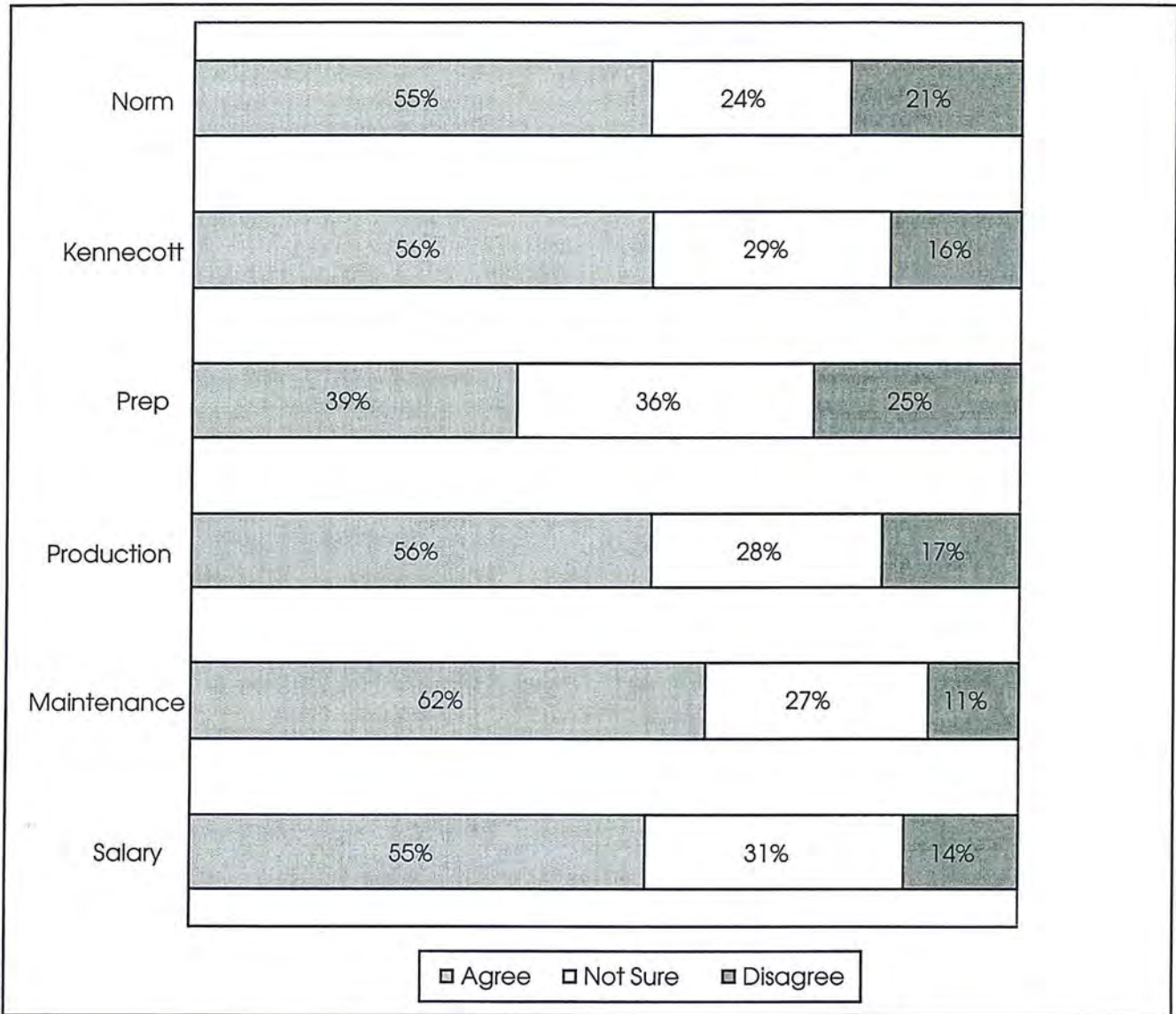
Hazards Identification and Correction by Question (continued)

49. Safety audits/inspections are effective in identifying and correcting safety hazards.



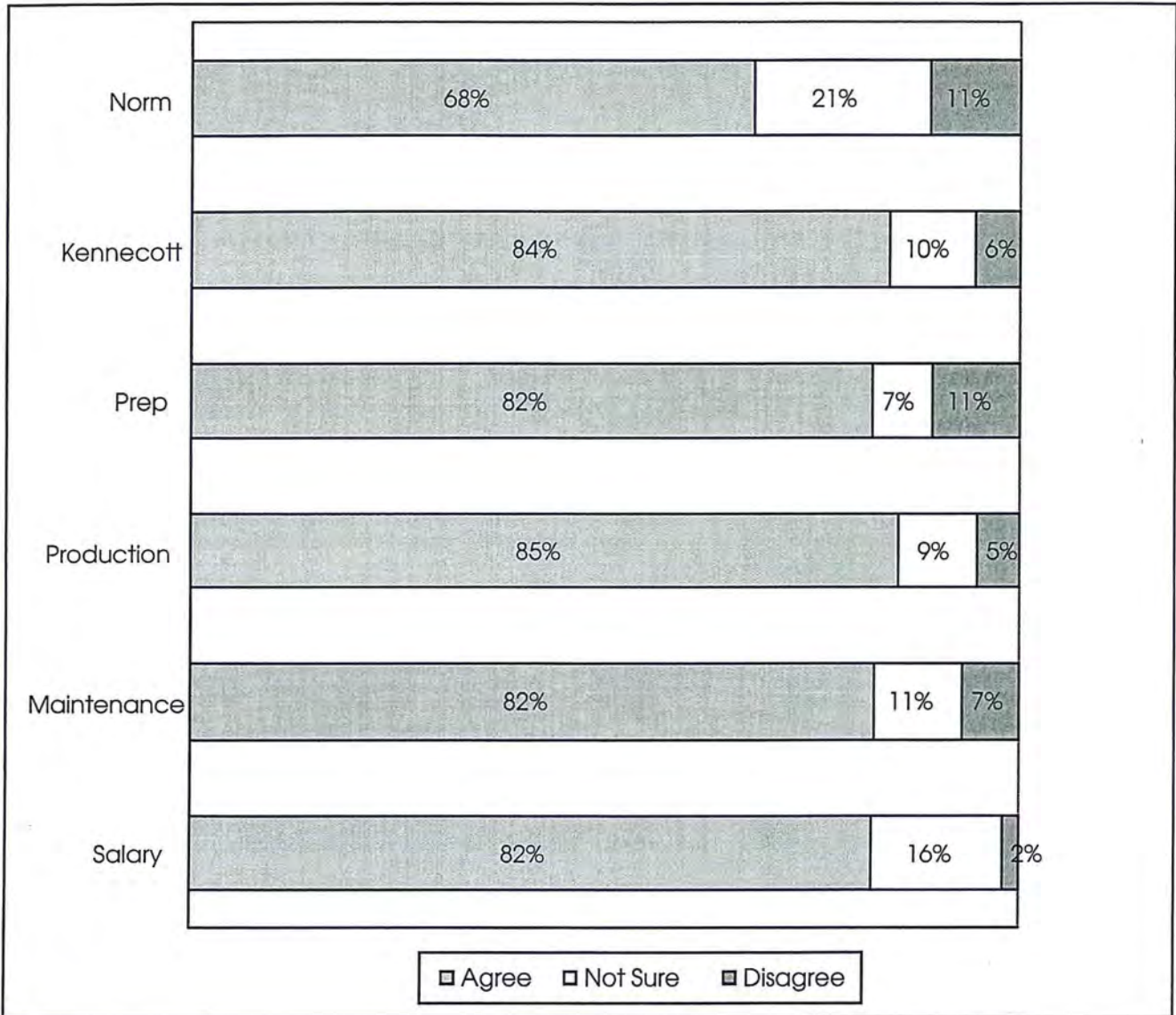
Hazards Identification and Correction by Question (continued)

13. Safety hazards found during inspections are usually followed-up on quickly.



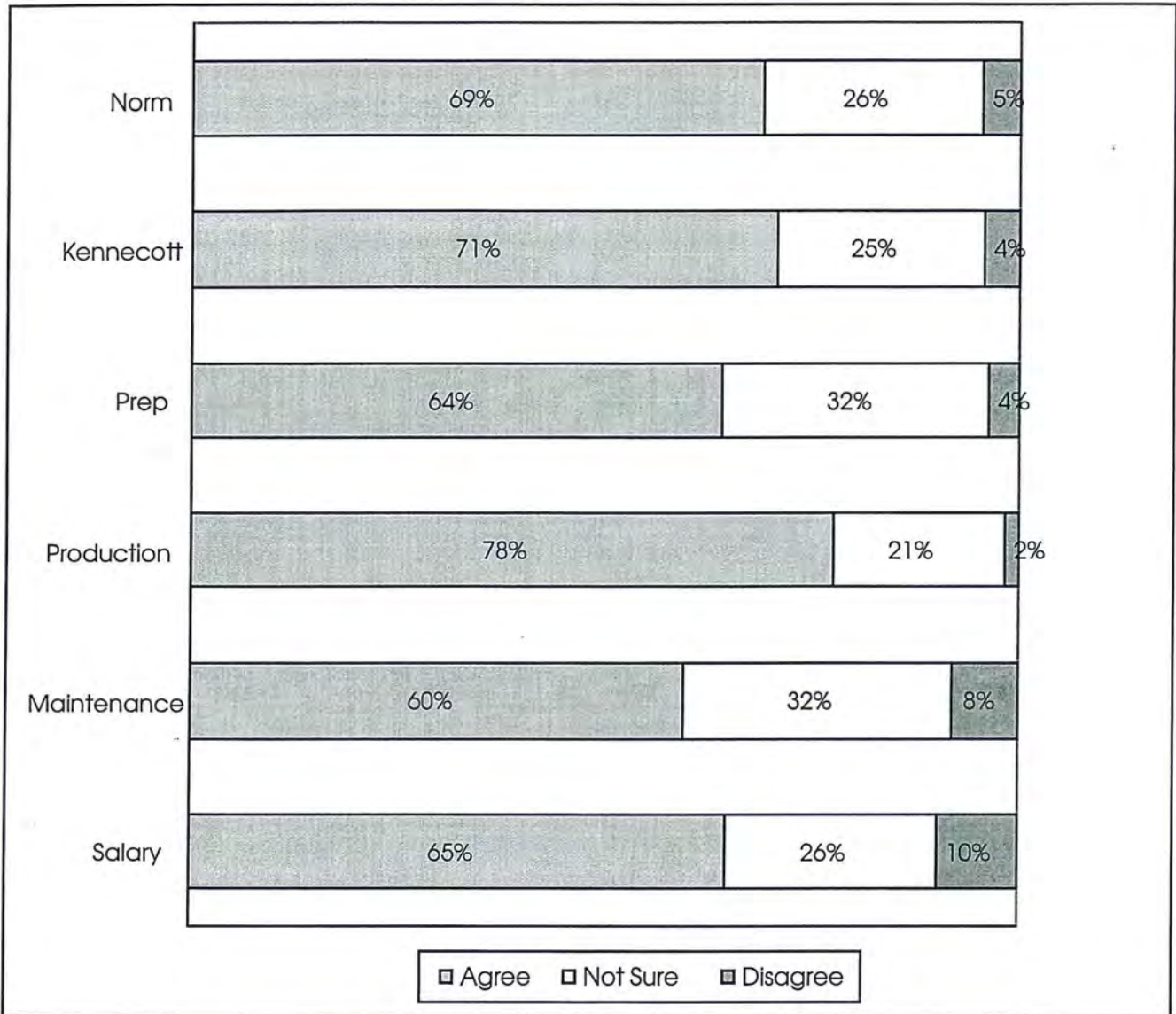
Hazards Identification and Correction by Question (continued)

45. Employees are encouraged to correct safety problems themselves wherever possible.



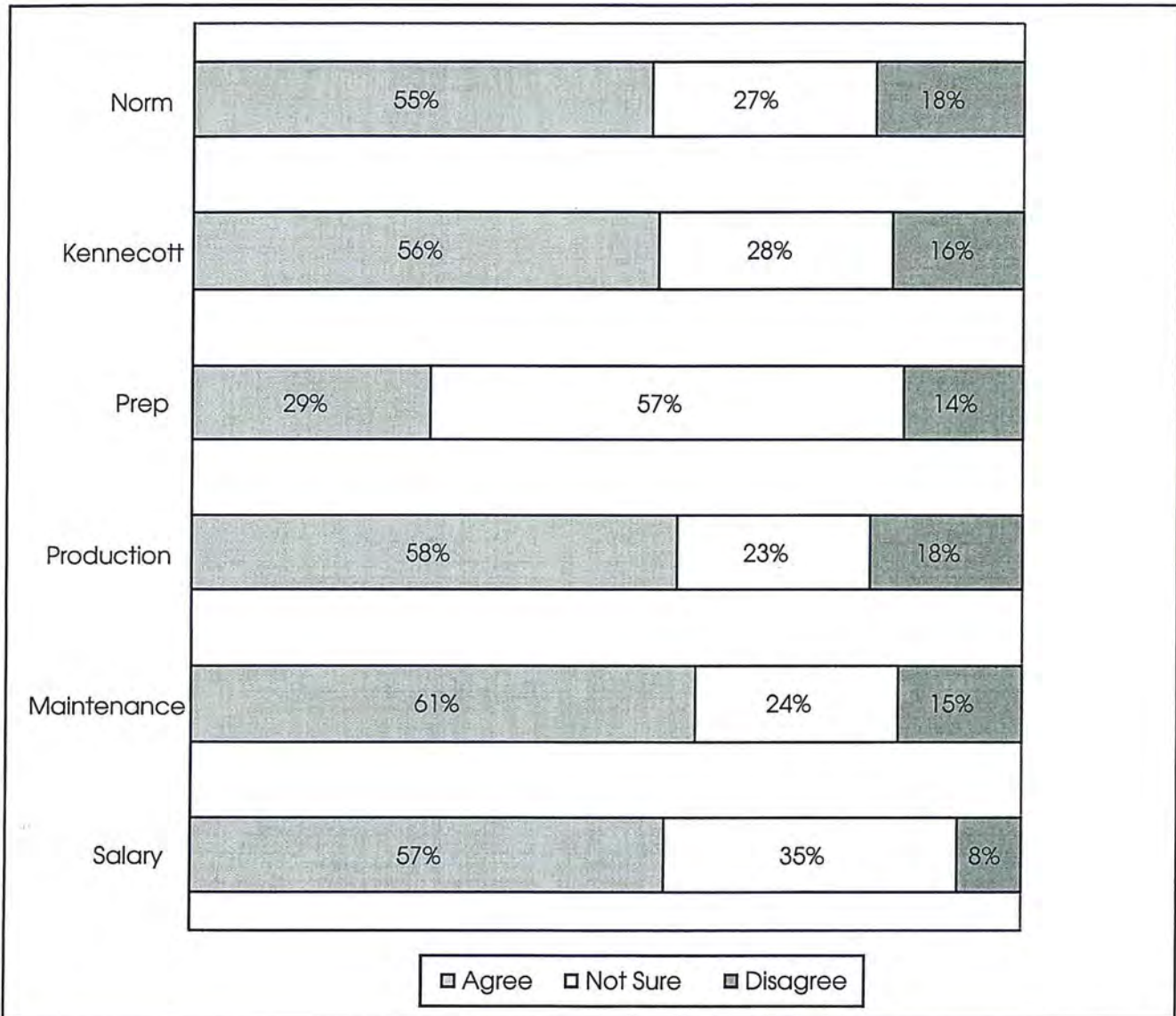
Employee Involvement by Question

105. Employees should be given more opportunities to become involved in safety improvement efforts.



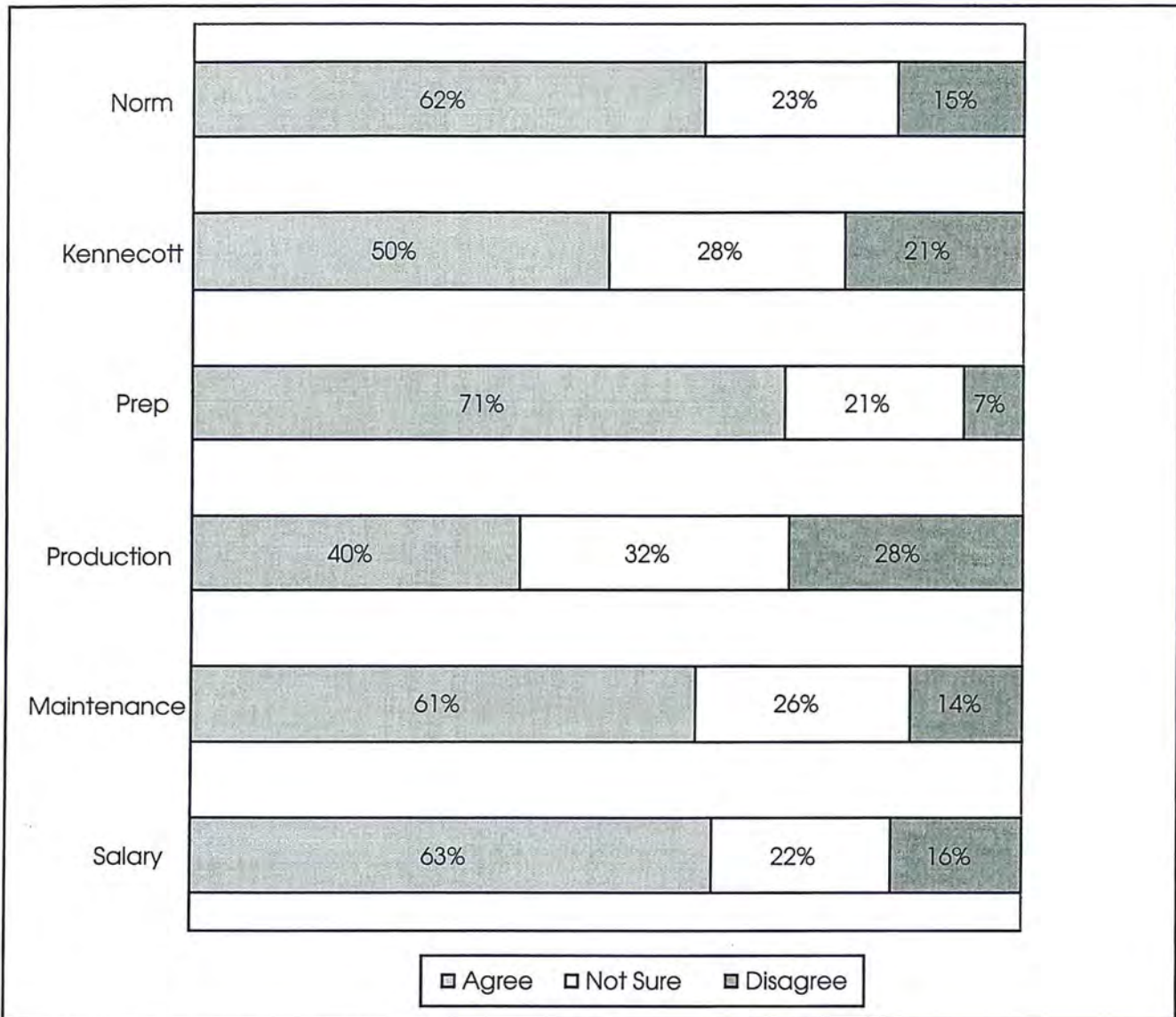
Employee Involvement by Question (continued)

112. Employees in my work group participate in defining safe work practices.



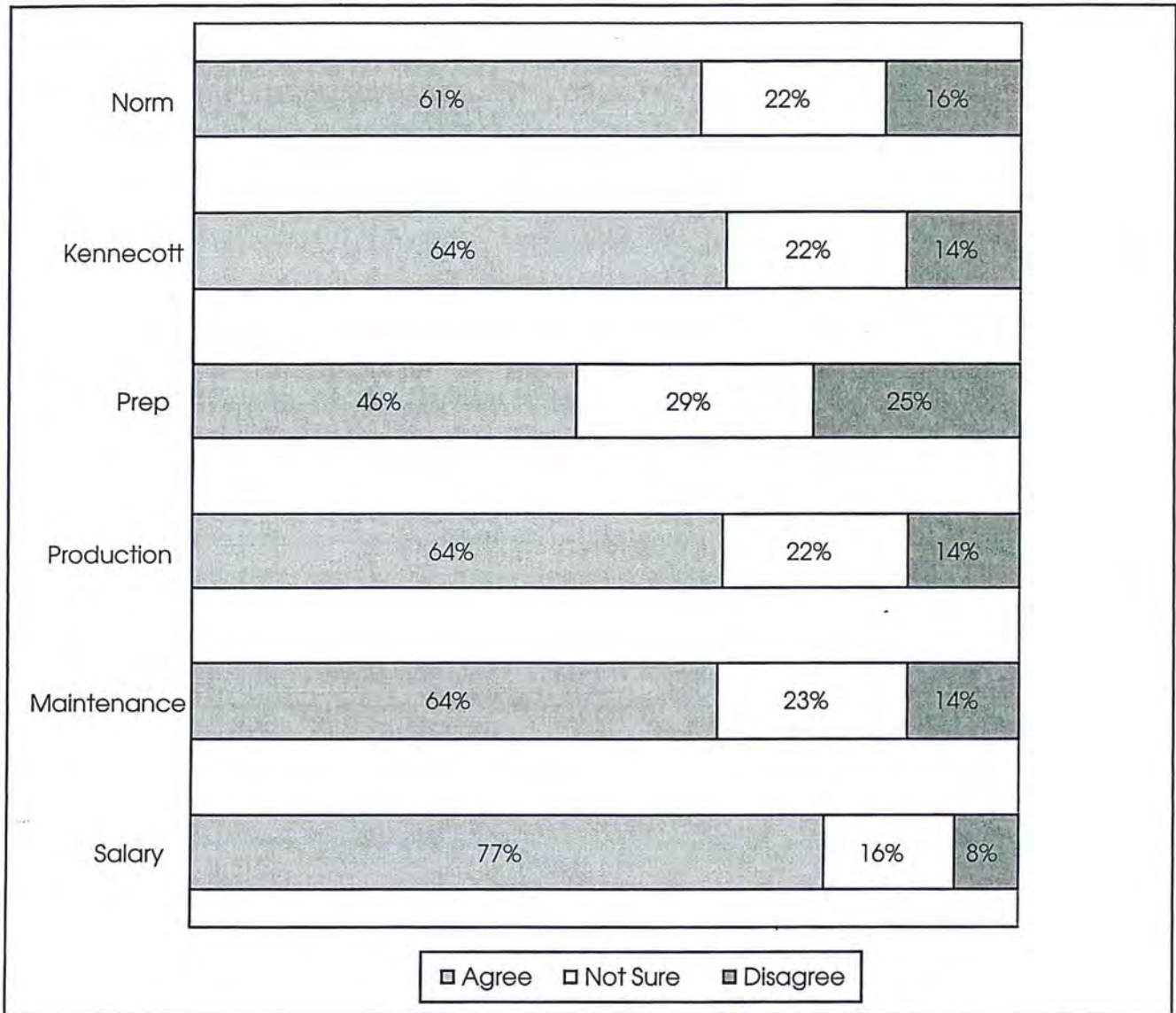
Employee Involvement by Question (continued)

107. Employees participate in inspections for potential hazards.



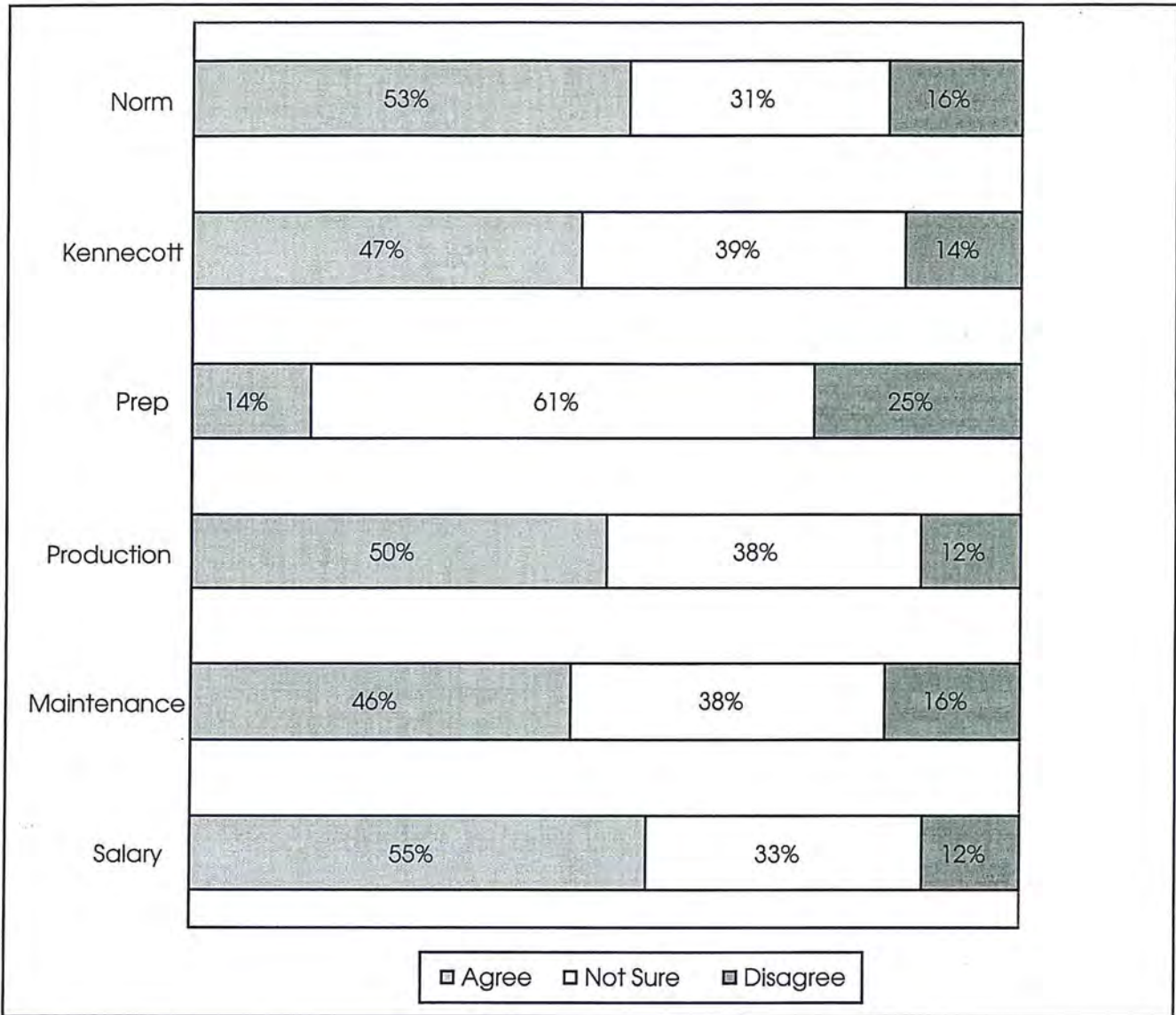
Other Safety Management Systems by Question

12. Safety meetings are effective at making this a safer place to work.



Other Safety Management Systems by Question (continued)

17. The safety committees' efforts are effective in improving safety.



Actively Caring

In a Total Safety Culture, employees not only feel a sense of responsibility for their own safety, they also feel a sense of responsibility of the safety of one another. Further, individuals are willing and able to act on that feeling of responsibility by “going beyond the call of duty” for the safety of a coworker. That is, they routinely *actively care* for the safety of others by performing behaviors which will directly or indirectly influence the safety of others. Actively Caring may be demonstrated through a variety of behaviors such as offering to assist a coworker lift a heavy load, performing housekeeping duties other than those assigned directly to you, cautioning a coworker about a potentially risky behavior, or recognizing coworkers for their safe work practices.

The Actively Caring Scale measures individual’s intentions and attitudes toward demonstrating Actively Caring behaviors for fellow employees. For each issue addressed, three separate questions are asked. Respondents are asked 1) if they feel employees *should* perform the specific behavior, 2) if they are *willing* to perform the behavior, and 3) if they currently *do* perform the behavior. Specific survey items are listed below:

- Employees should praise each other for working safely.
- I am willing to praise my coworkers for working safely.
- When I see a coworker working safely, I praise him/her.

- Employees should caution their coworkers when they are observed working unsafely.
- I am willing to caution my coworkers about working unsafely.
- When I see a coworker working unsafely, I caution him/her.

- Employees should observe the work practices of their coworkers in order to provide them with safety-related feedback.
- I am willing to observe the work practices of my coworkers in order to provide them with safety-related feedback.
- I observe the work practices of coworkers in order to provide them with safety-related feedback.

- Besides performing their own jobs safely, employees should do other things to help improve workplace safety.
- Besides working safely myself, I am willing to do other things to help improve workplace safety.
- Besides working safely myself, I do other things to help improve workplace safety.

- When an employee sees a potential safety hazard, they should correct it themselves if possible.
- When I see a potential safety hazard, I am willing to correct it myself if possible.
- When I see a potential safety hazard, I correct it myself if possible.

- If an employee gets down or depressed, that person's coworkers should try to make him/her feel better.
- If a coworker gets down or depressed, I am willing to try to make that person feel better.
- When I see a coworker looking down or depressed, I try to make that person feel better.

The typical data for these survey items illustrate employees agree in concept to the idea of Actively Caring (*Employees should ...*). Most even report a willingness to perform the specific Actively Caring behaviors addressed (*I am willing to...*). However, far fewer employees report performing the Actively Caring behaviors on a regular basis. Although most have the necessary values and intentions, their reported behaviors are not consistent. That is not to say that if an individual sees a fellow coworker in imminent danger, most would not intervene immediately. However, when the potential impact on the coworker's safety is not so readily apparent, individuals are often hesitant to go out of their way to intervene. Being willing to provide a coworker feedback about an observed at-risk behavior or cleaning-up a spill caused by another individual are examples of behaviors which are prone to this pattern. Although very complex in nature, there are several influences which predominantly account for this tendency.

First, individual behavior is governed by the consequences that follow it, and one of the most influential consequences is peer acceptance and support. Therefore, unless the organizational culture promotes and encourages an Actively Caring environment, even well-intentioned, caring individuals may pass up opportunities to intervene on behalf of another's safety. One method for creating a culture which supports key Actively Caring behaviors is to put in place processes which formalize the conduct of those desirable behaviors. For example, a behavioral observation and feedback process systematically promotes and encourages peer feedback. Over time, peer feedback is likely to become more and more accepted, eventually becoming a natural part of even informal interactions among coworkers. In addition, management must, through their own individual practices, foster an Actively Caring environment. They must themselves demonstrate Actively Caring behaviors and consciously reinforce others who do so. Finally management systems and processes must support a culture which encourages, recognizes, and reinforces Actively Caring, rather than act to subdue such behaviors. Specific systems and their influence on the organizational safety culture are discussed in a separate section of this report; "Safety Management Systems."

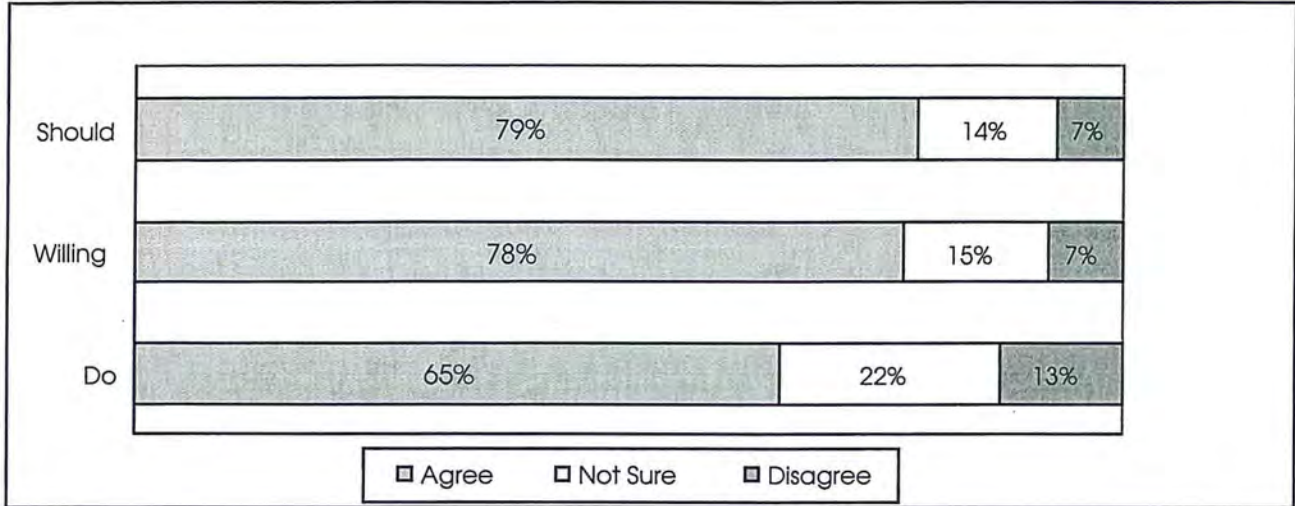
An individual's likelihood to demonstrate Actively Caring behaviors is also influenced by personal characteristics; to actively care for others requires an individual have sufficient levels of several key internal person states. That is, research has shown individuals with a healthy sense of self-esteem, a strong sense of group belonging, and a true feeling of empowerment (as measured by feelings of self-effectiveness, optimism, and personal control) are more likely to actively care for others than those with depreciated levels of these five person states. Another important distinction is that these person factors are states, rather than traits. That is, they fluctuate over time, largely as a result of our interactions with others and the organizational environment, rather than being permanent characteristics of our personalities. Practices and policies within an organization can serve to either build or destroy these states within its members. The final scale of the Safety Culture Survey (i.e., the Person Factors Scale) which measures individuals' levels of each of these five person factors follows along with a discussion

of ways in which organizations can ensure they are positively rather than negatively influencing employees' propensity to actively care for the safety of others.

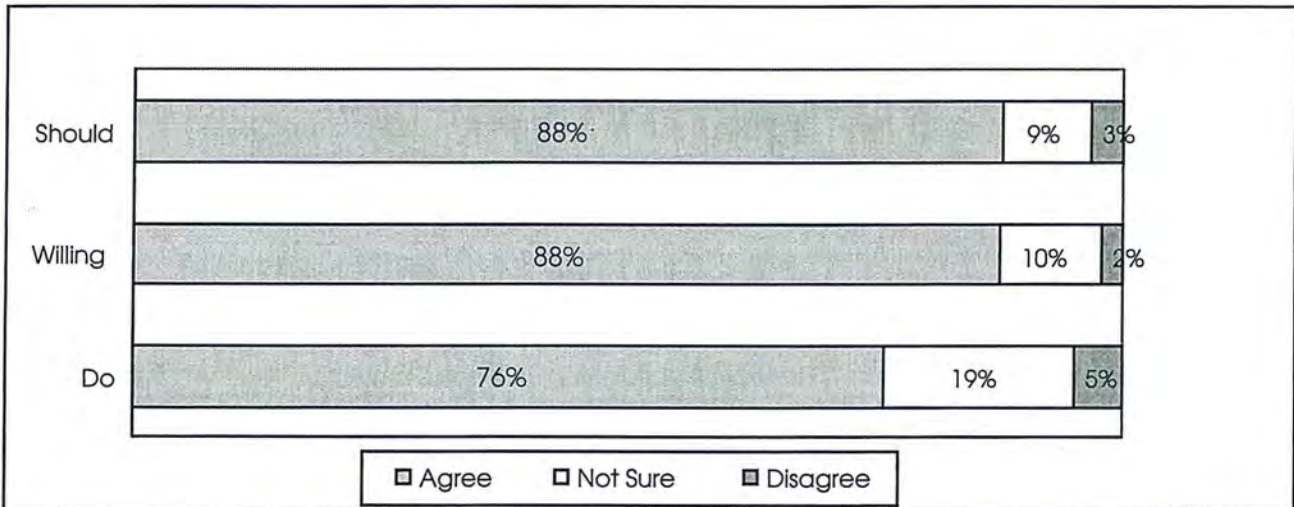
To create a culture in which individuals hold safety as a value, feel a sense of responsibility for the safety of others, and are willing and able to act on that sense of responsibility by routinely demonstrating Actively Caring behaviors is the ultimate goal of Total Safety Culture efforts. Therefore, following efforts to improve an organization's safety culture, a re-administration of the survey typically demonstrates changes in responses to the Actively Caring scale items. While the level of "should" and "willing" responses often rise, the "do" responses show the most significant improvement, demonstrating the organization's efforts are resulting in not only attitude but actual behavior change.

Overall Actively Caring by Position

Norm

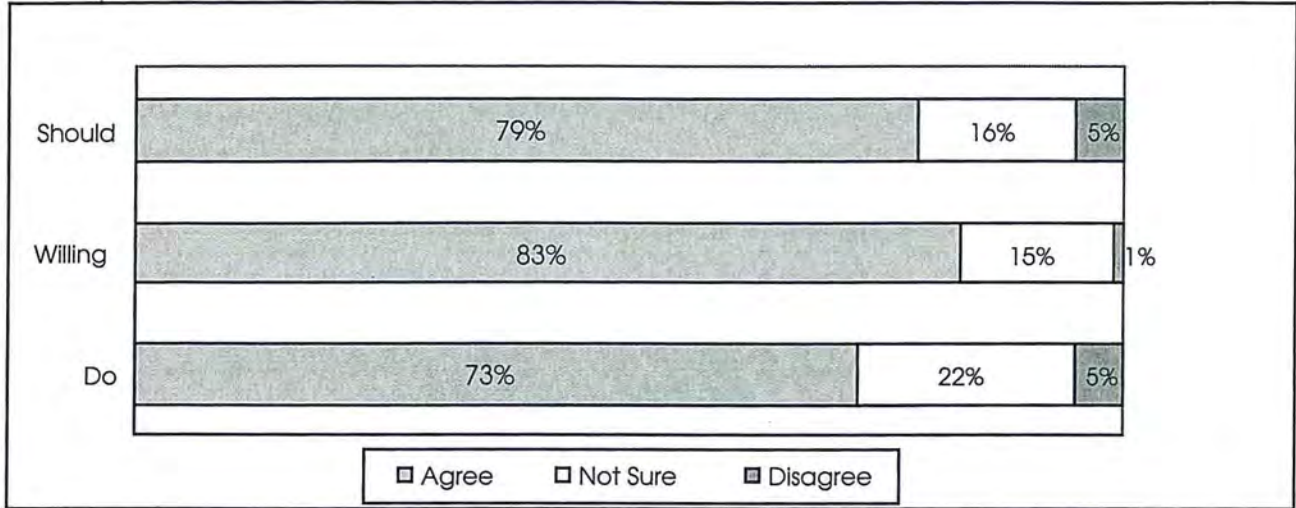


Site Energy

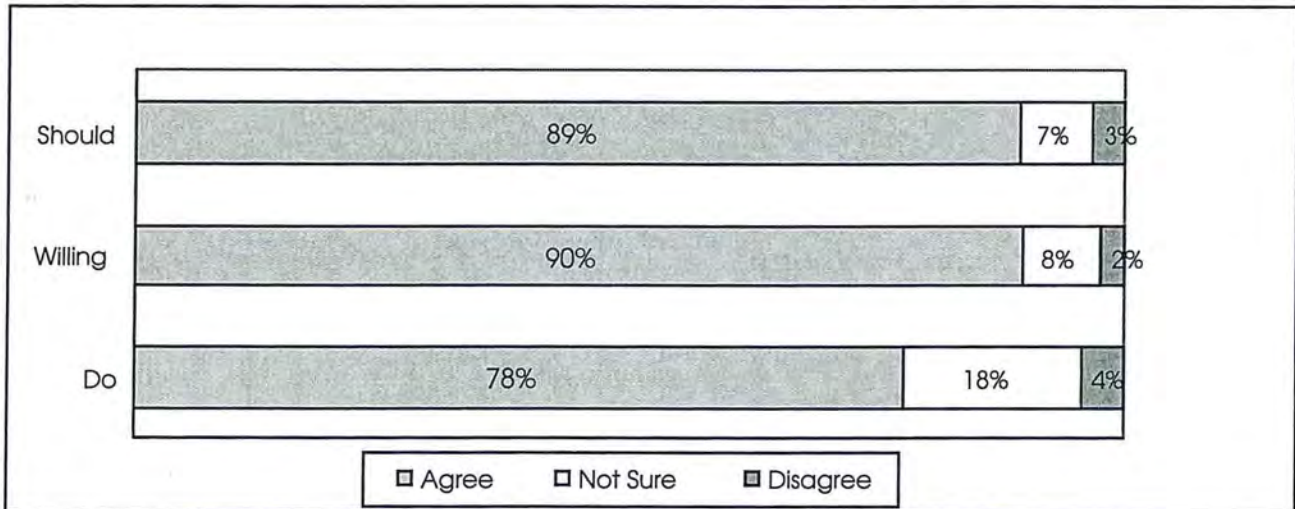


Overall Actively Caring by Position (continued)

Prep

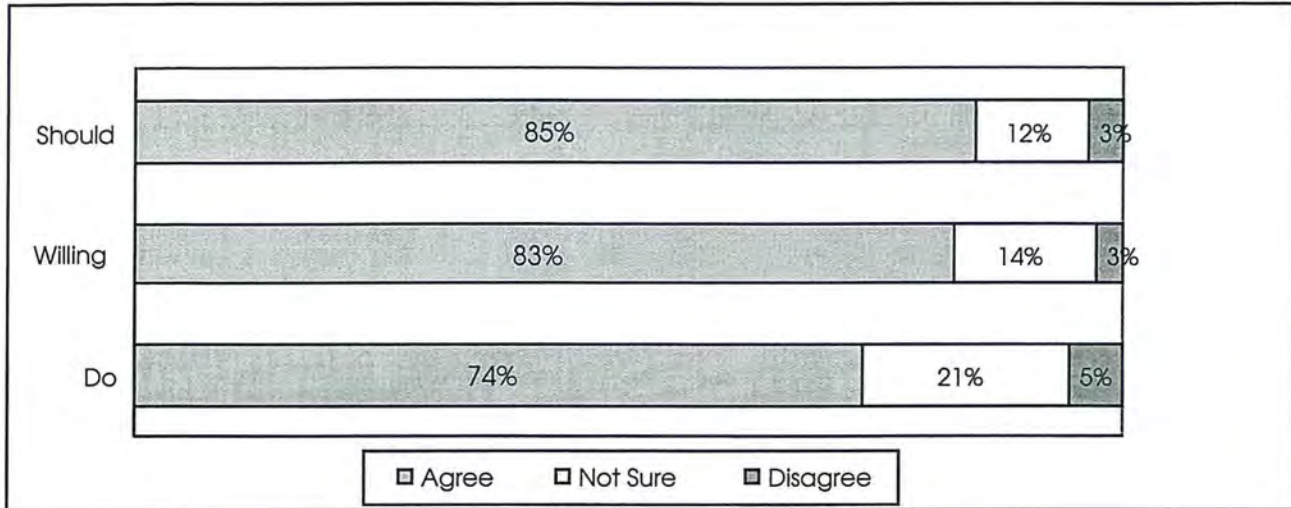


Production

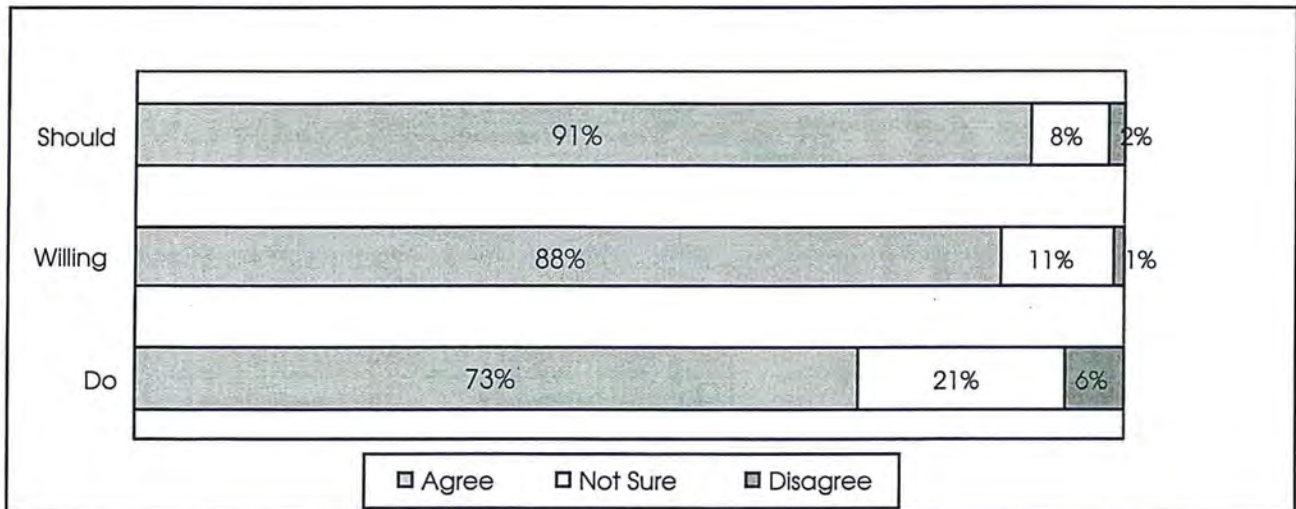


Overall Actively Caring by Position (continued)

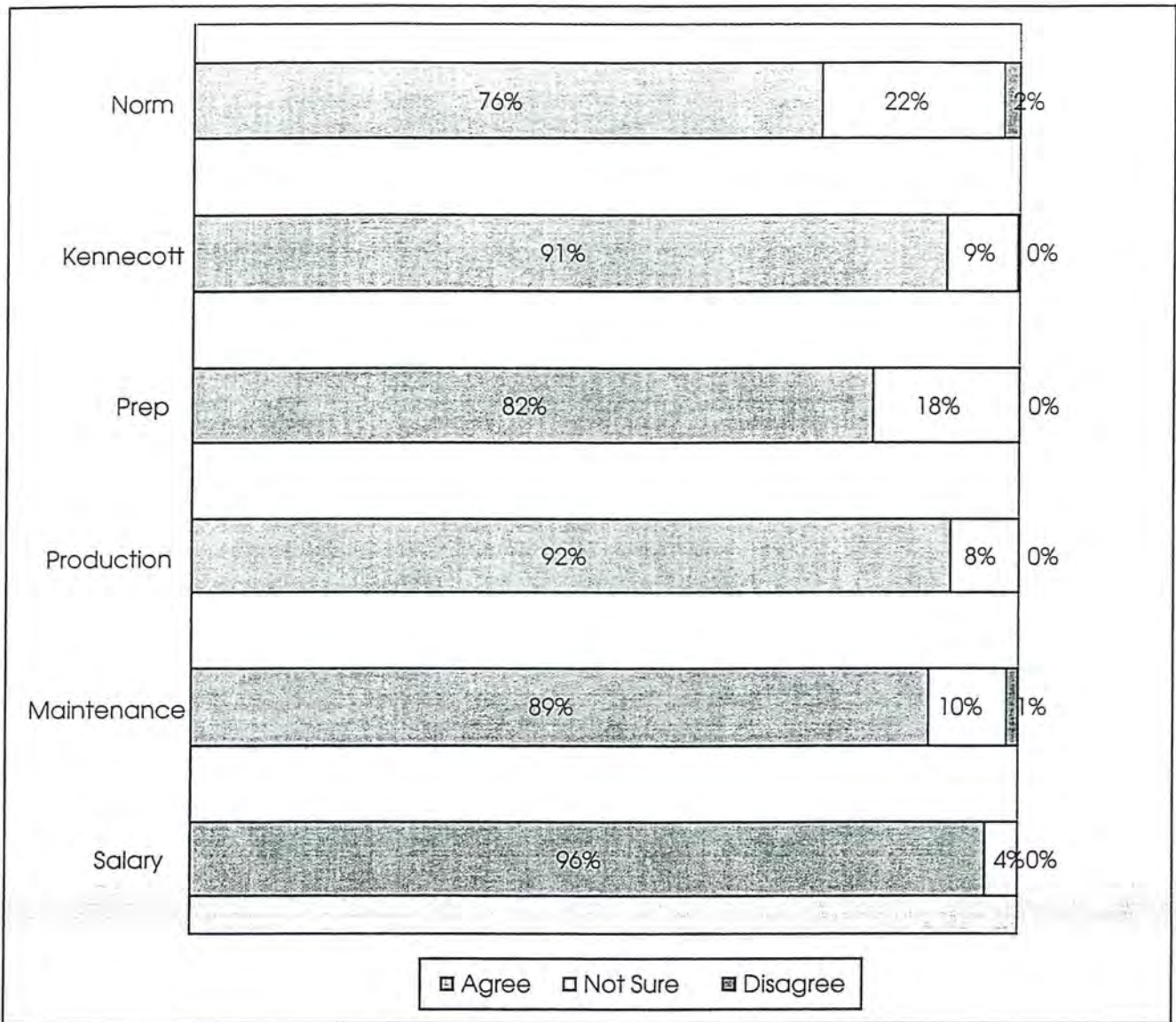
Maintenance



Salary

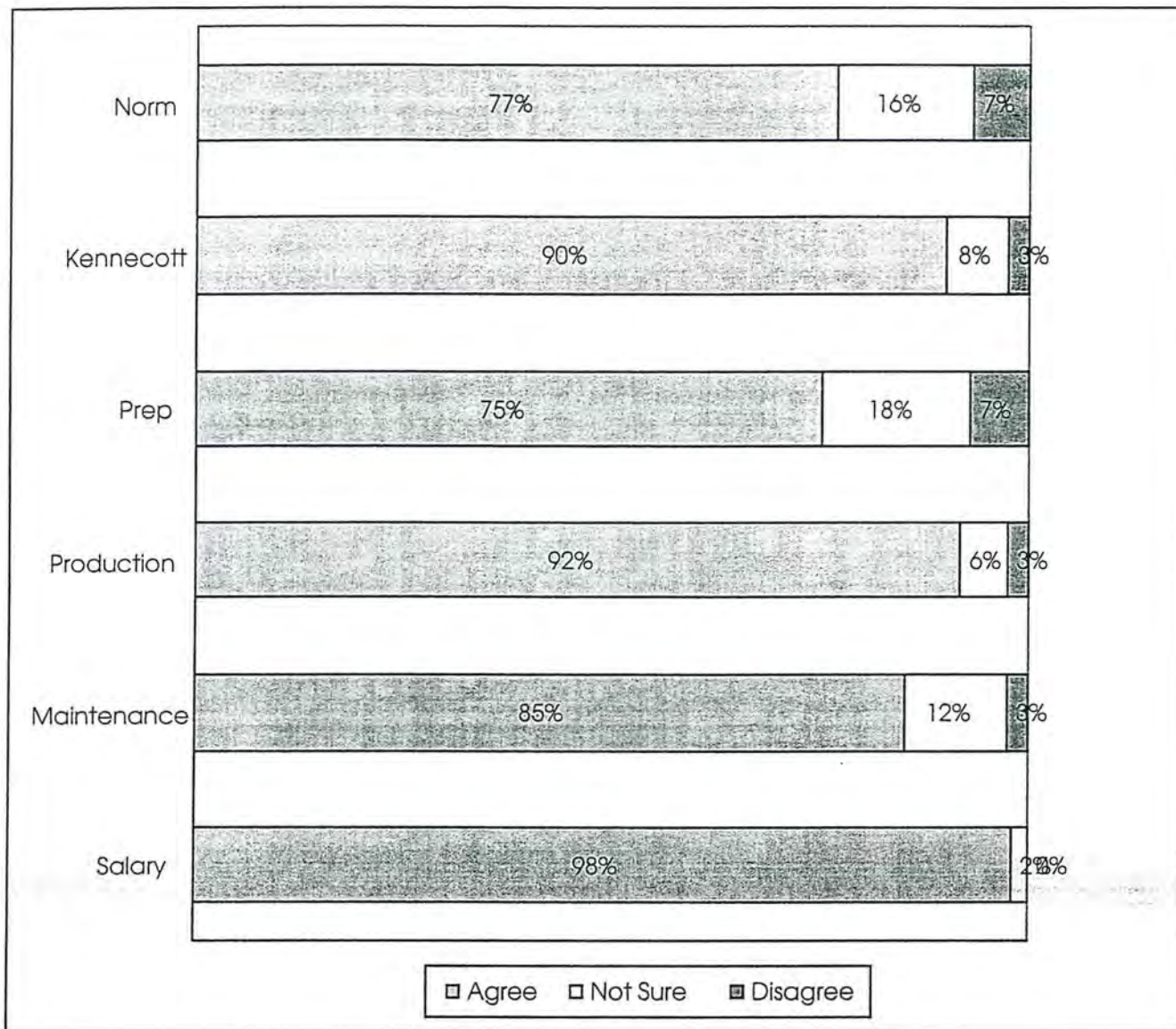


Actively Caring by Position



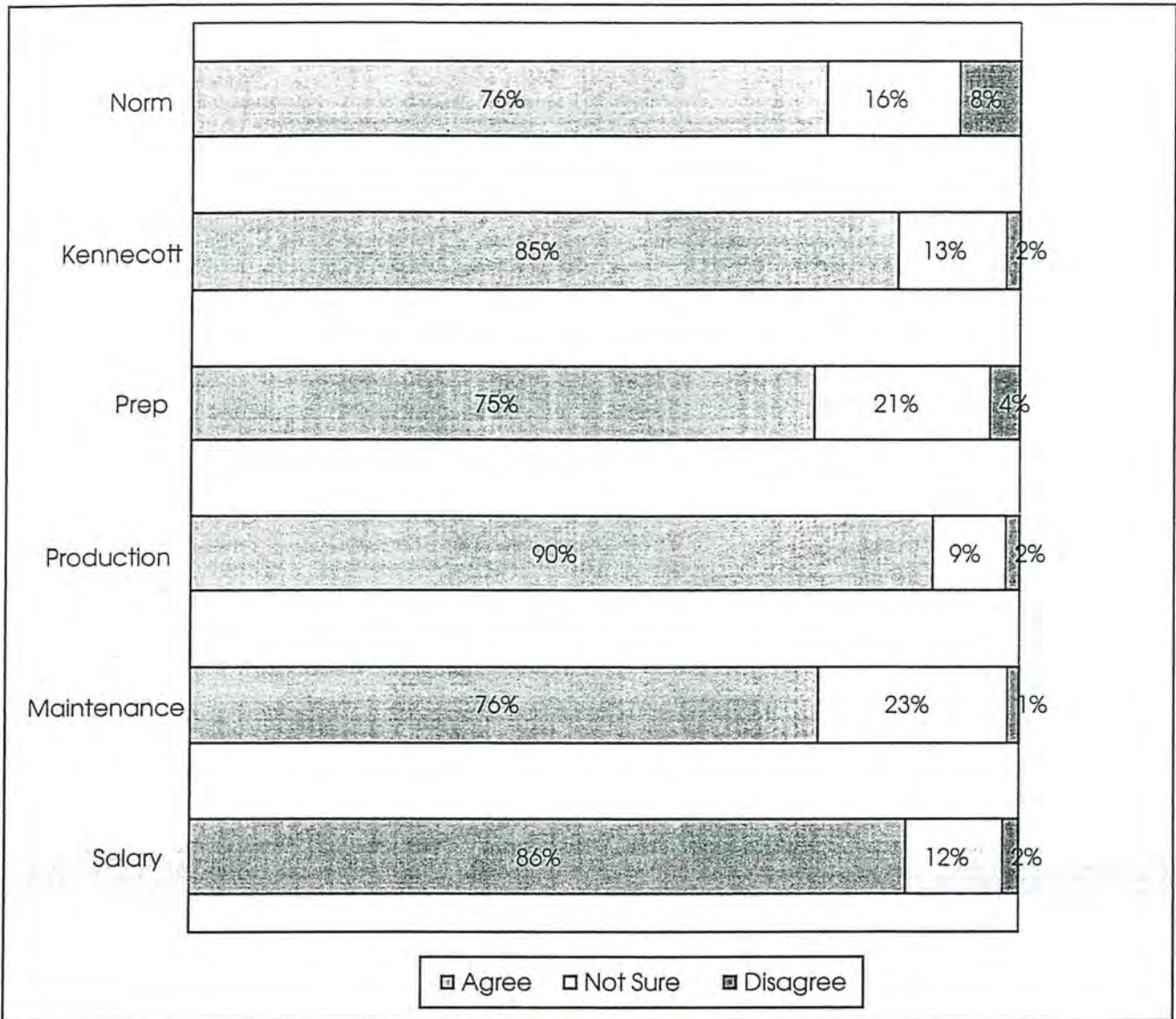
Actively Caring by Question

50. Employees should praise each other for working safely.



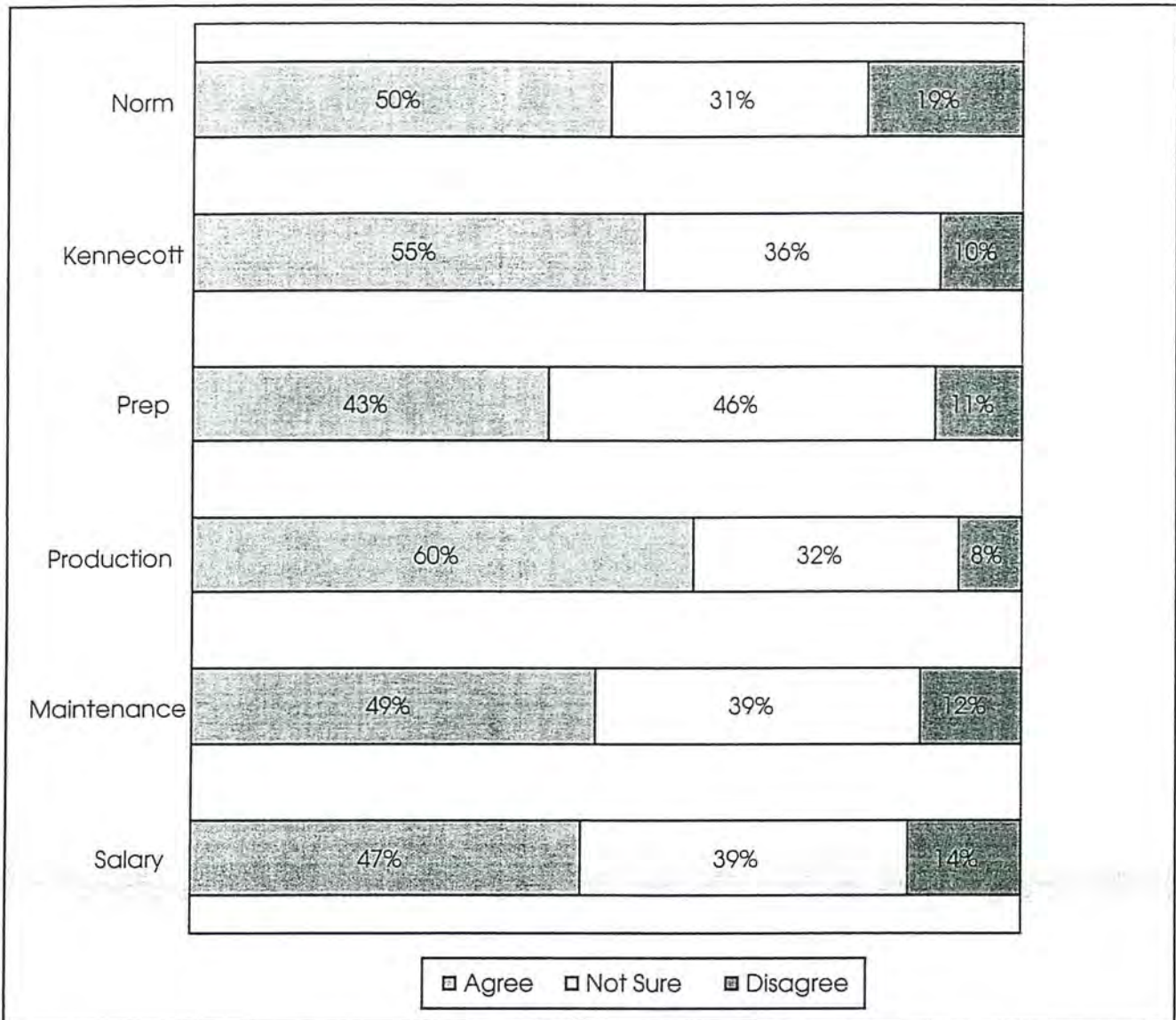
Actively Caring by Question (continued)

85. I am willing to praise my coworkers for working safely.



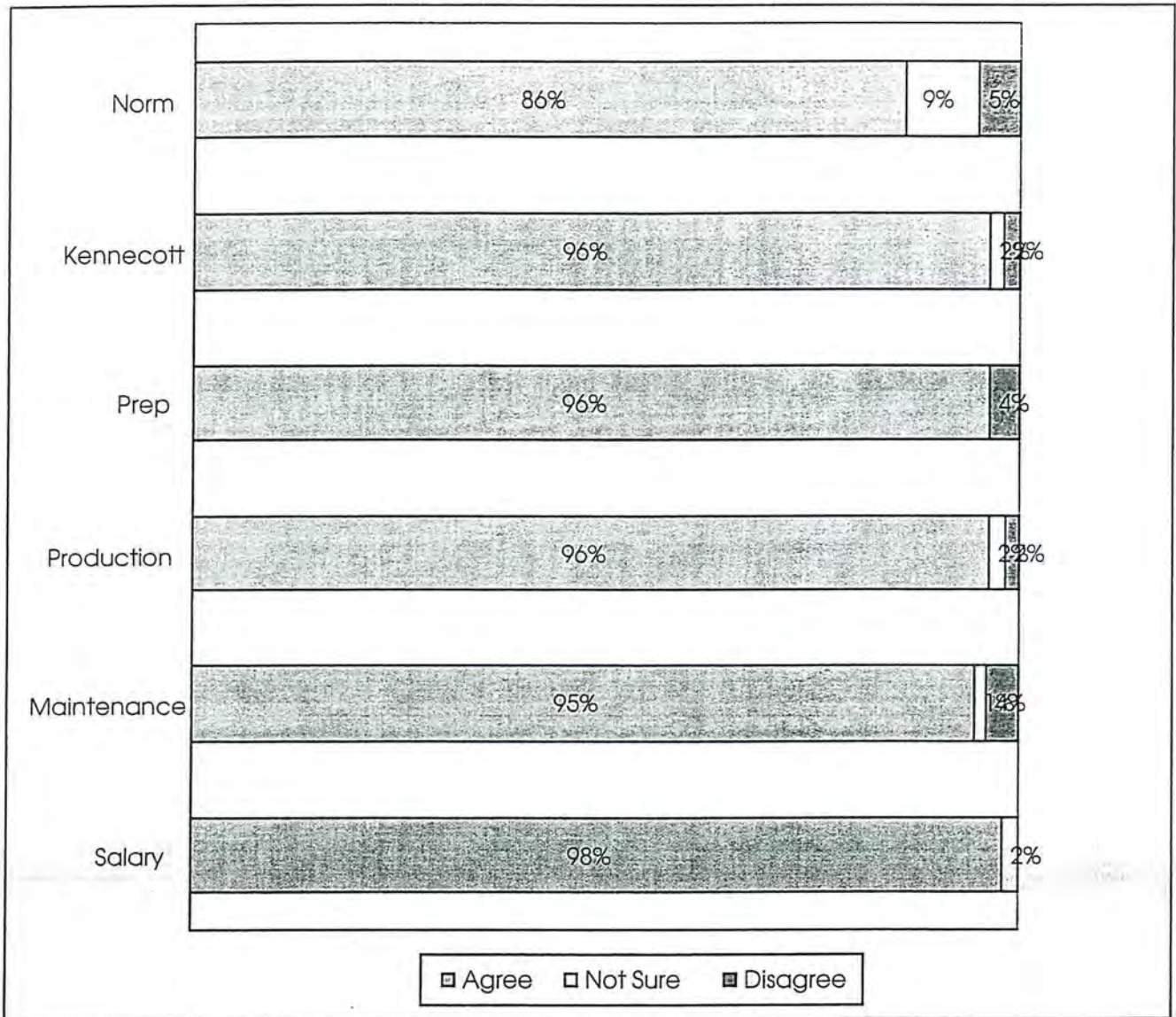
Actively Caring by Question (continued)

132. When I see a coworker working safely, I praise him/her.



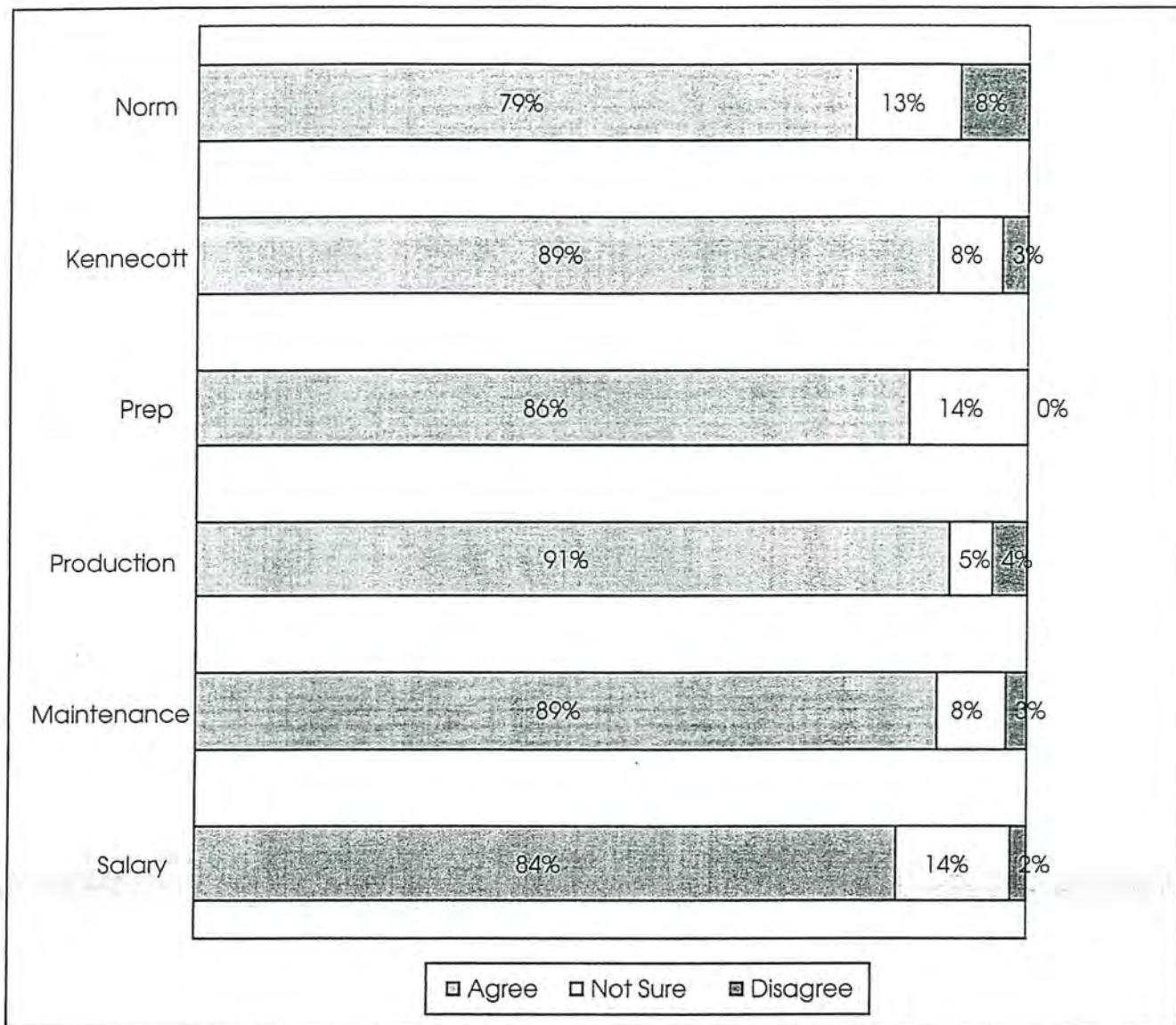
Actively Caring by Question (continued)

25. Employees should caution their coworkers when they are observed working unsafely.



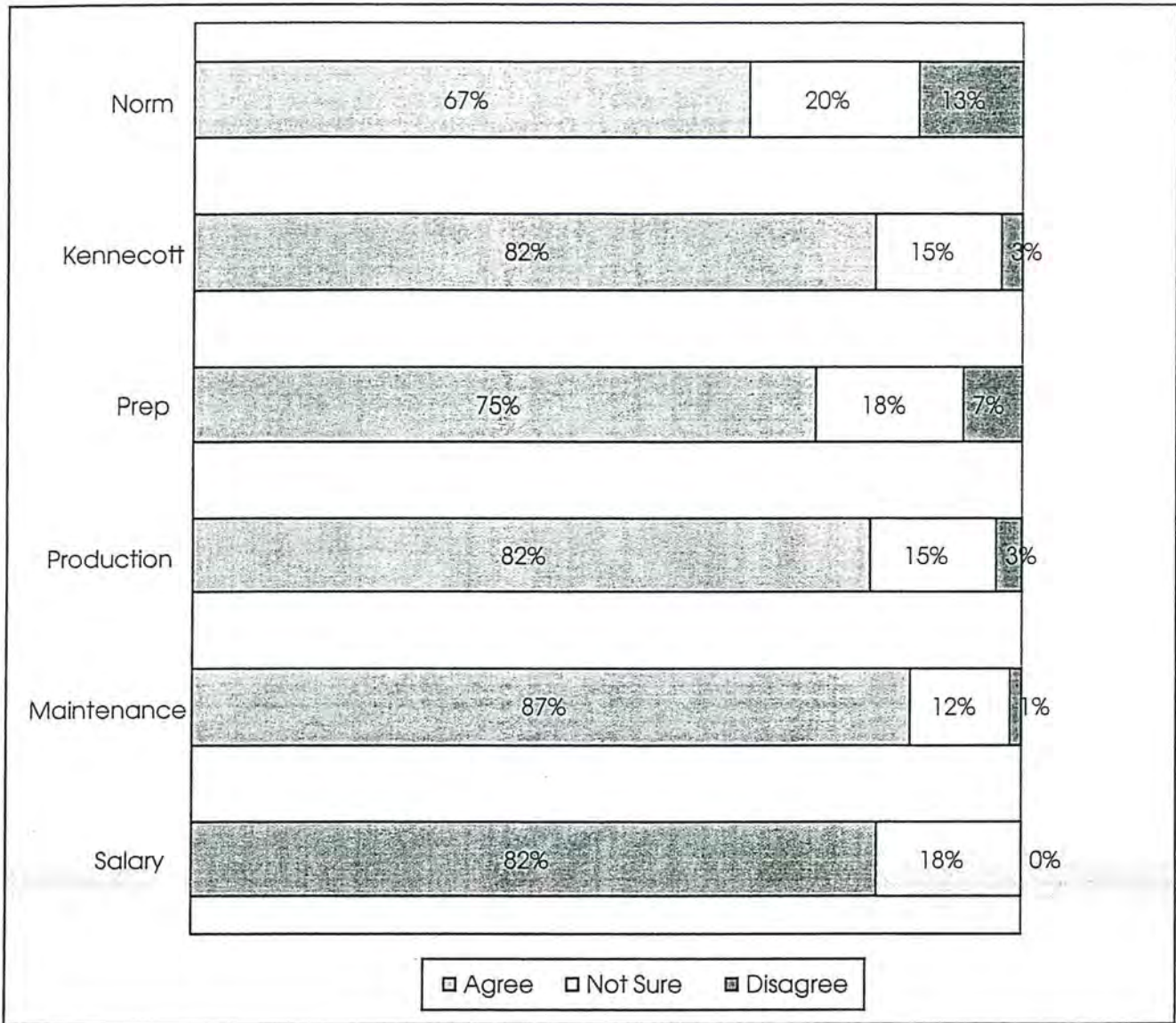
Actively Caring by Question (continued)

68. I am willing to caution my coworkers about working unsafely.



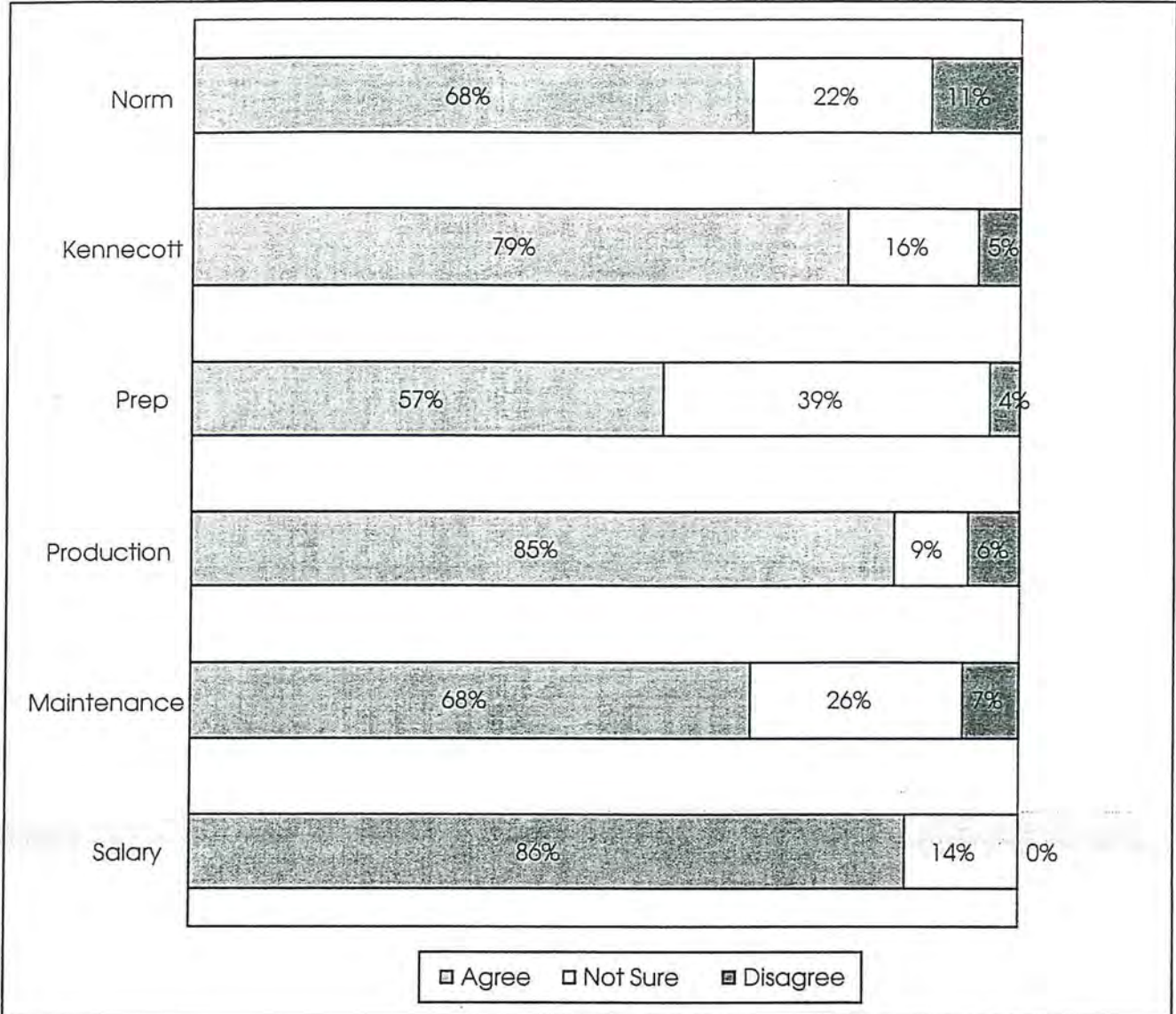
Actively Caring by Question (continued)

92. When I see a coworker working unsafely, I caution him/her.



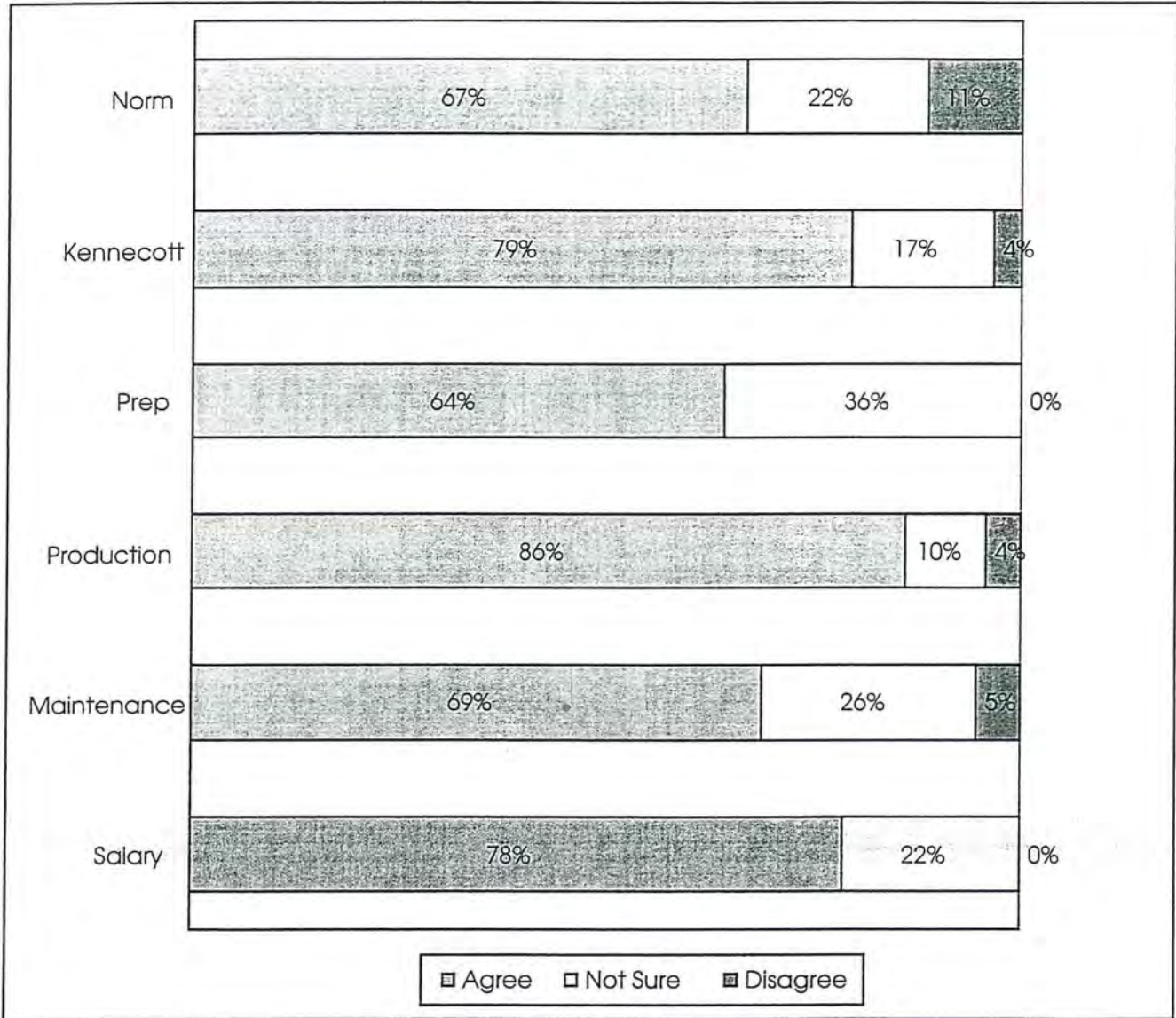
Actively Caring by Question (continued)

76. Employees should observe the work practices of their coworkers in order to provide them with safety-related feedback.



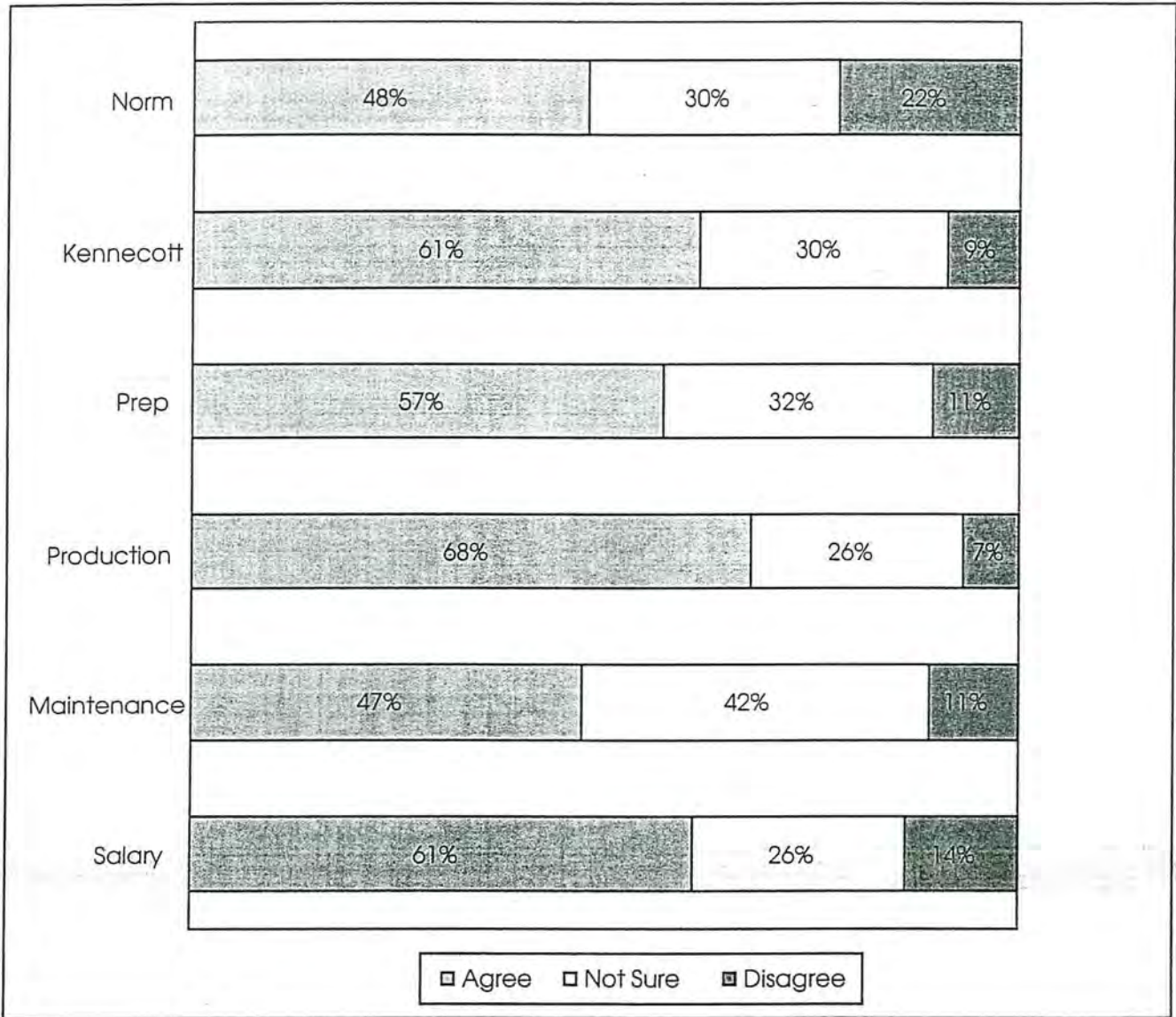
Actively Caring by Question (continued)

98. I am willing to observe the work practices of my coworkers in order to provide them with safety-related feedback.



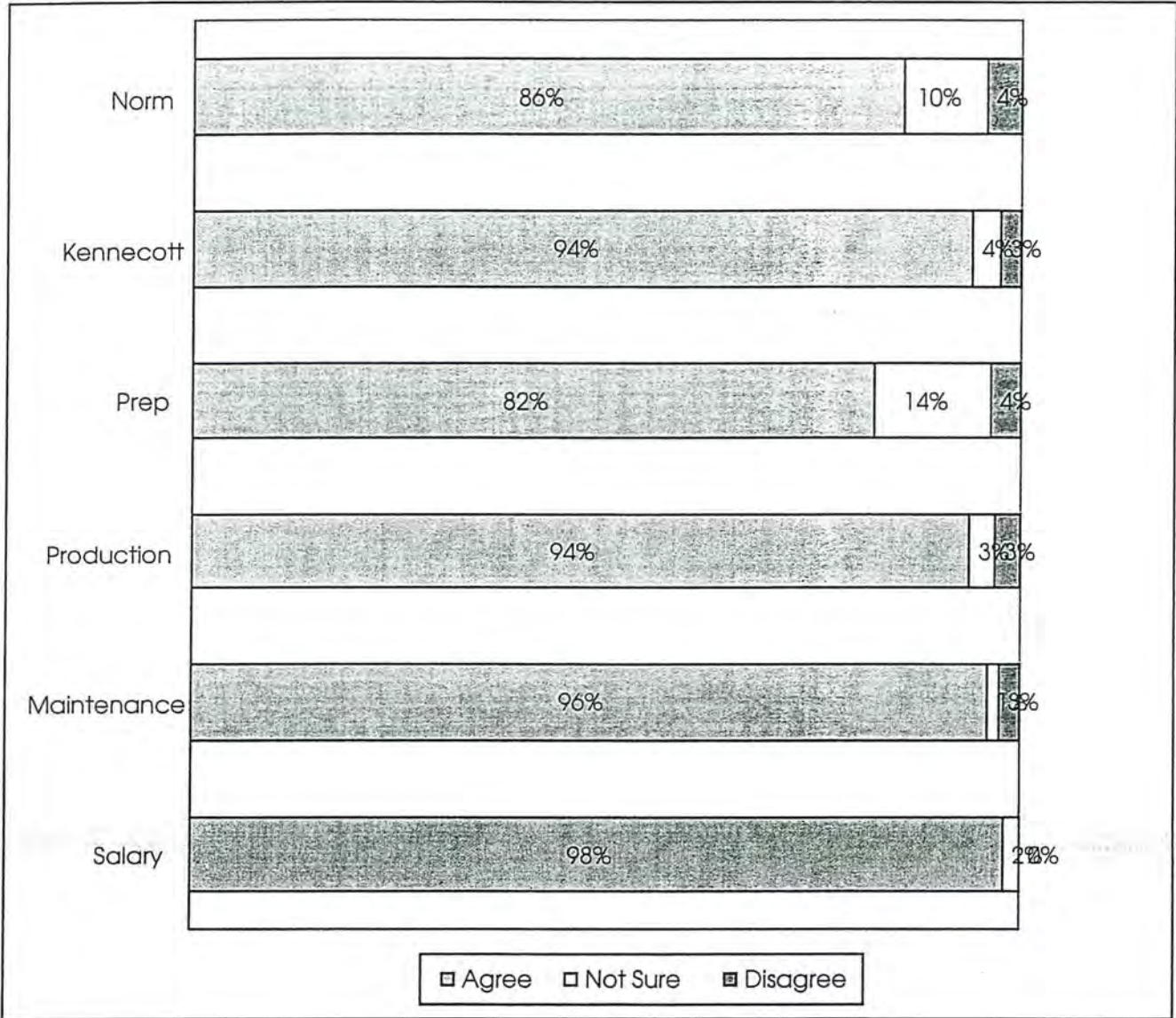
Actively Caring by Question (continued)

22. I observe the work practices of coworkers in order to provide them with safety-related feedback.



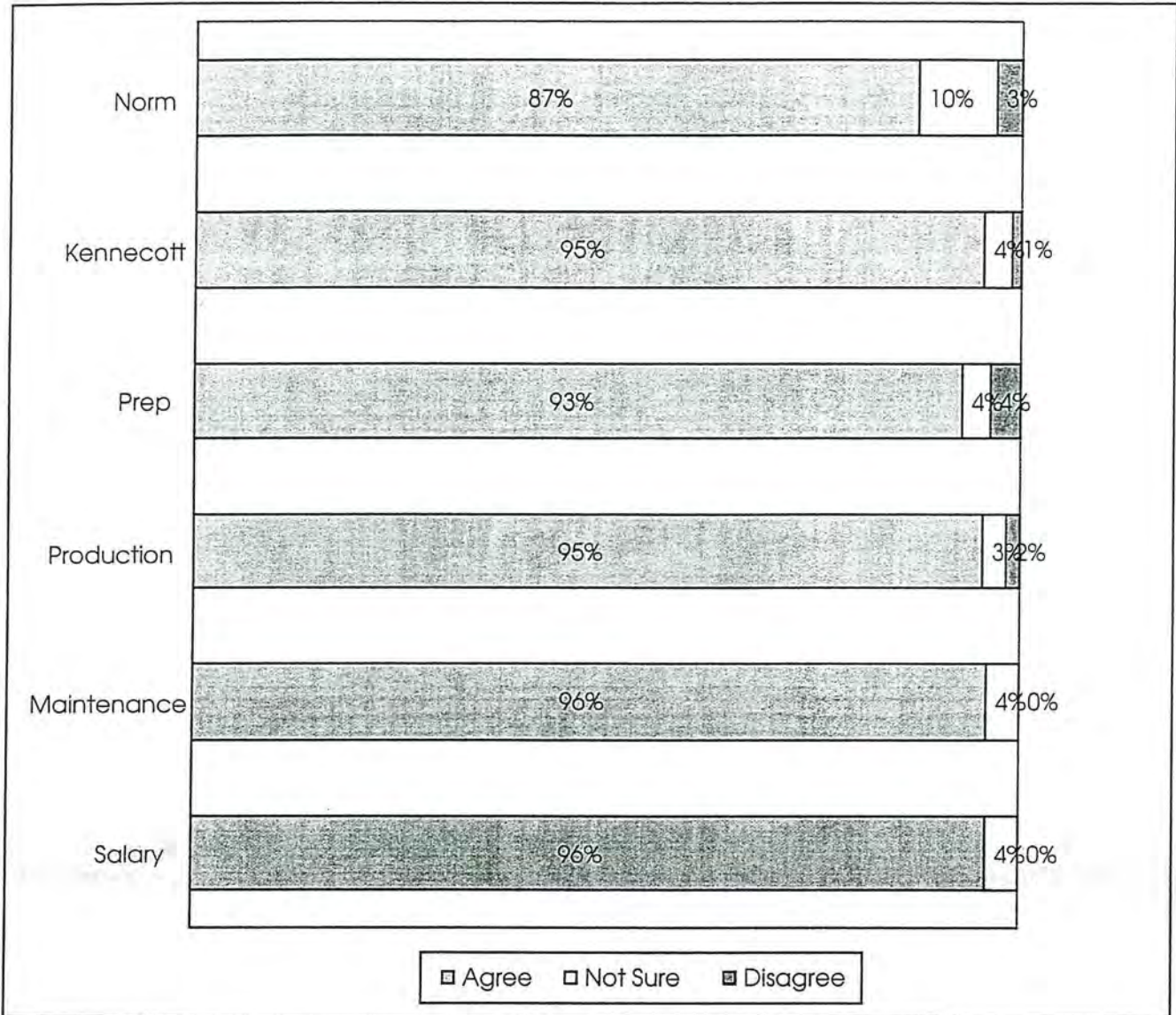
Actively Caring by Question (continued)

14. Besides performing their own jobs safely, employees should do other things to help improve workplace safety.



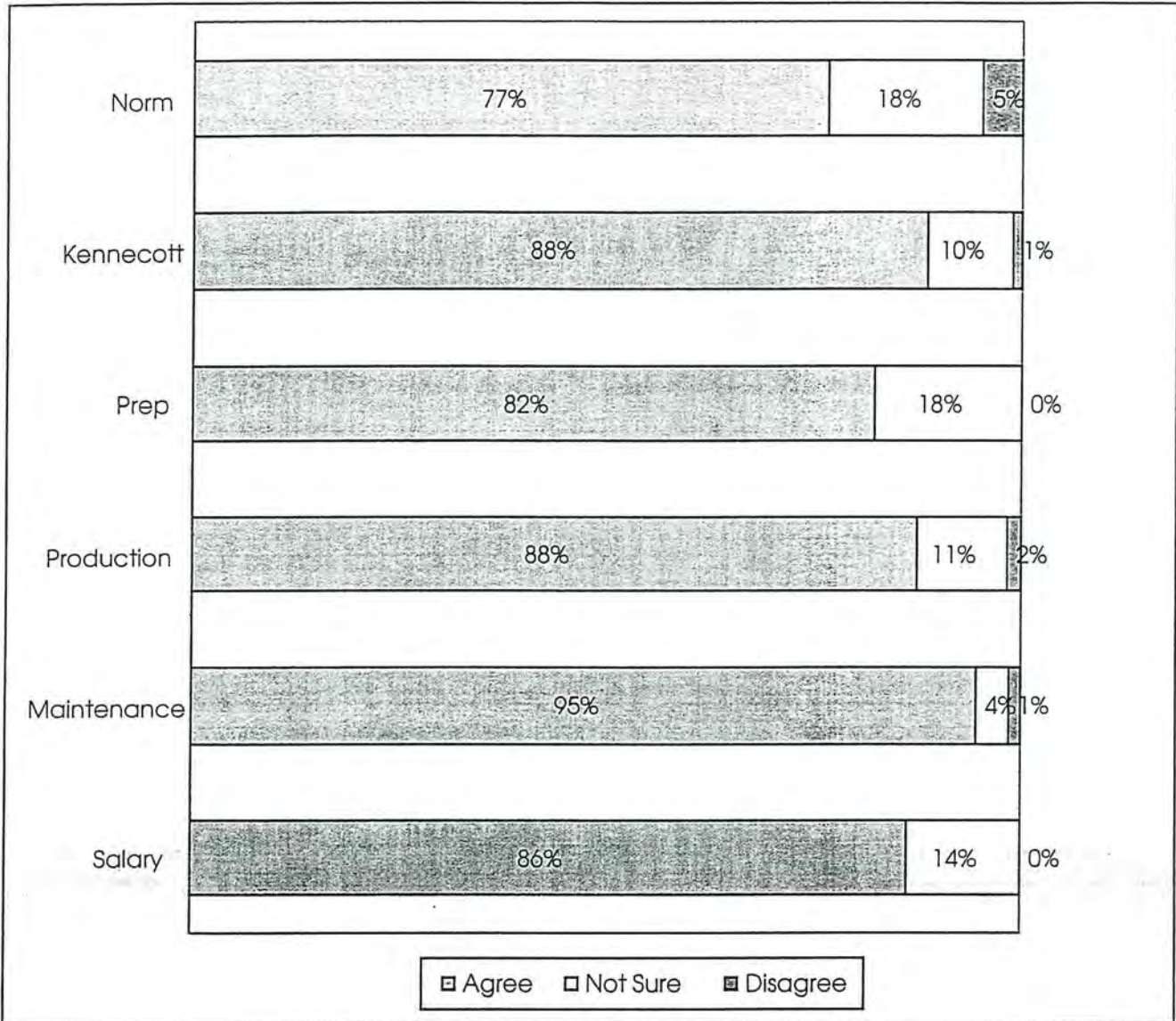
Actively Caring by Question (continued)

60. Besides working safely myself, I am willing to do other things to help improve workplace safety.



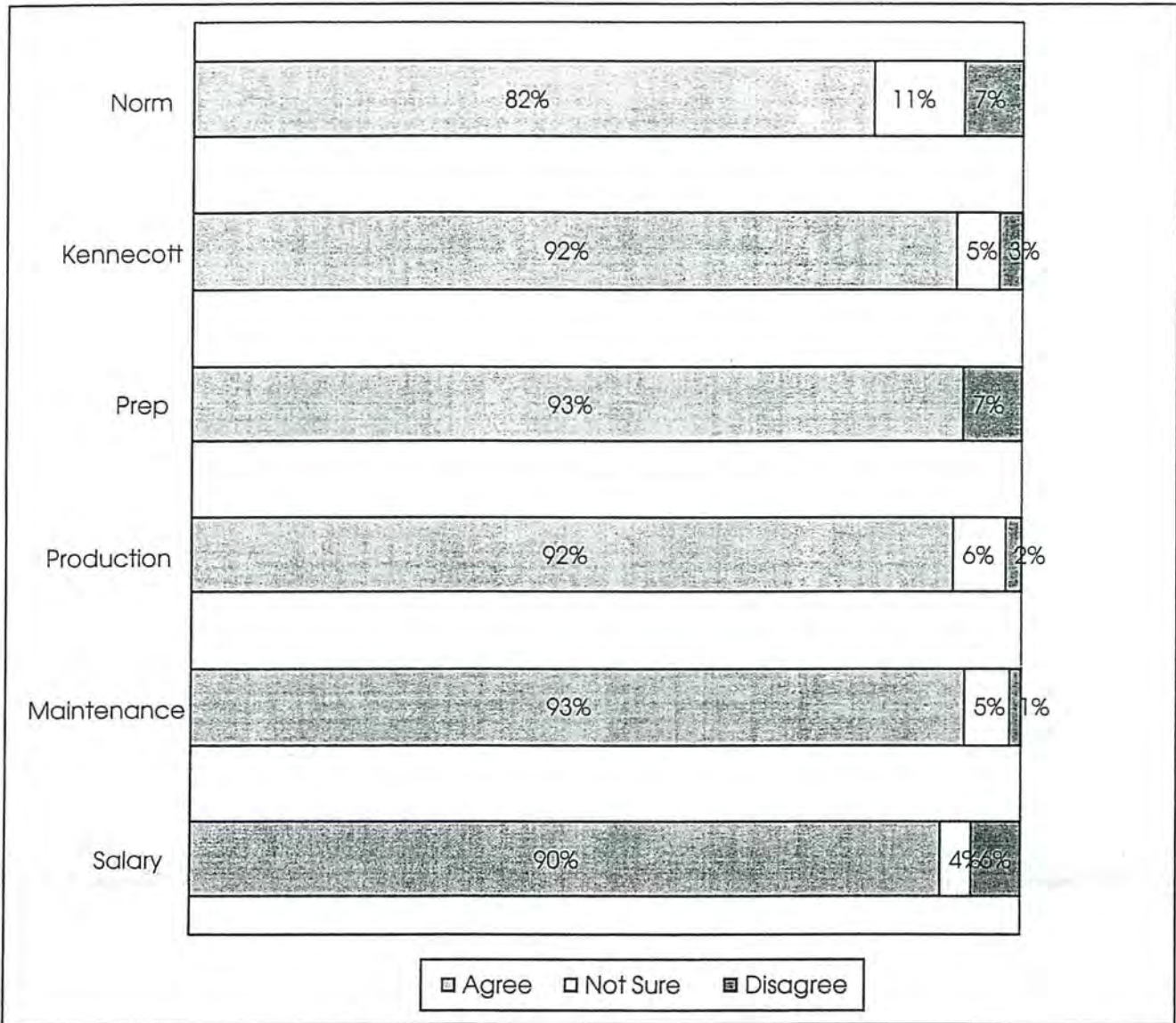
Actively Caring by Question (continued)

63. Besides working safely myself, I do other things to help improve workplace safety.



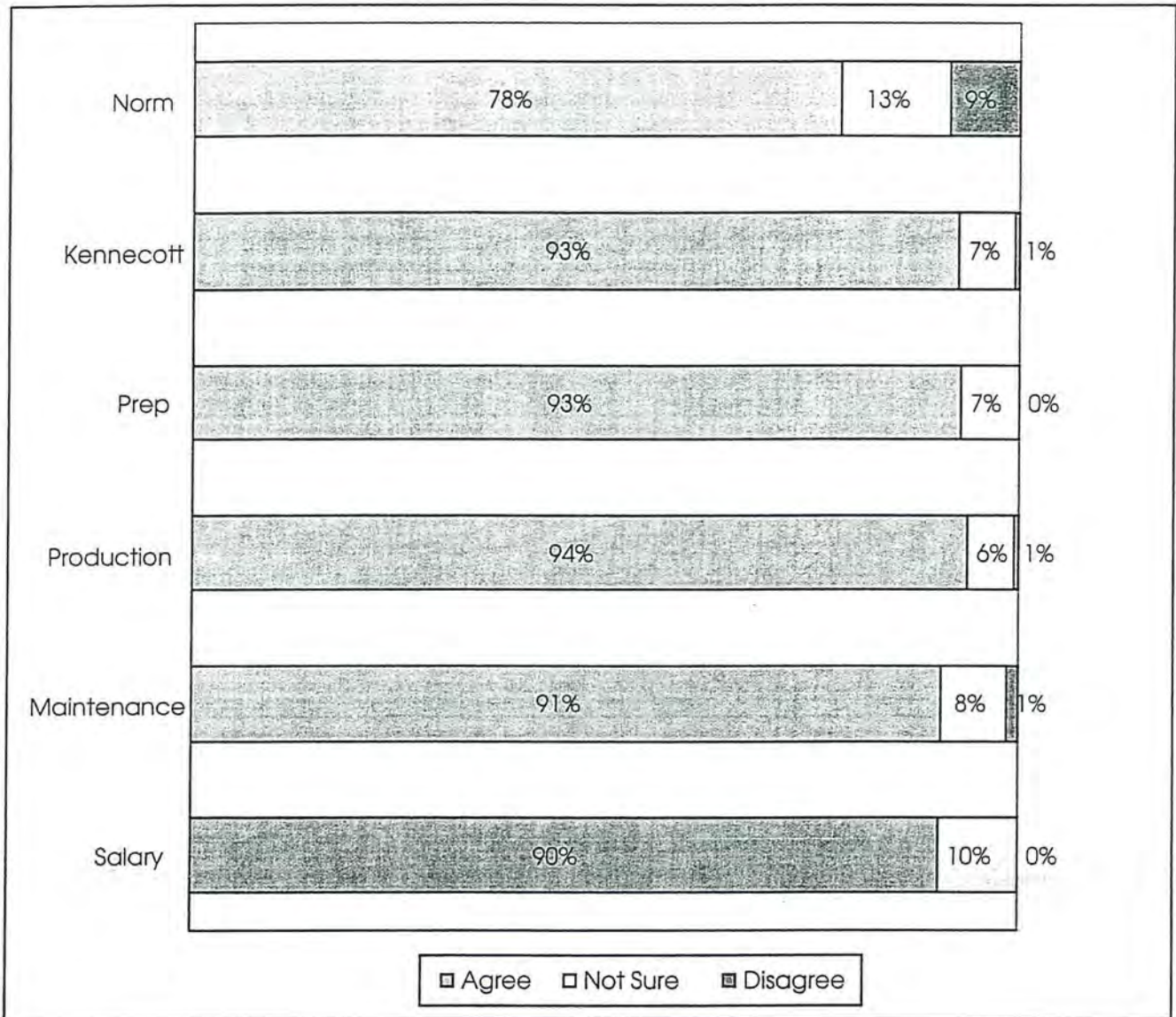
Actively Caring by Question (continued)

33. When an employee sees a potential safety hazard, they should correct it themselves if possible.



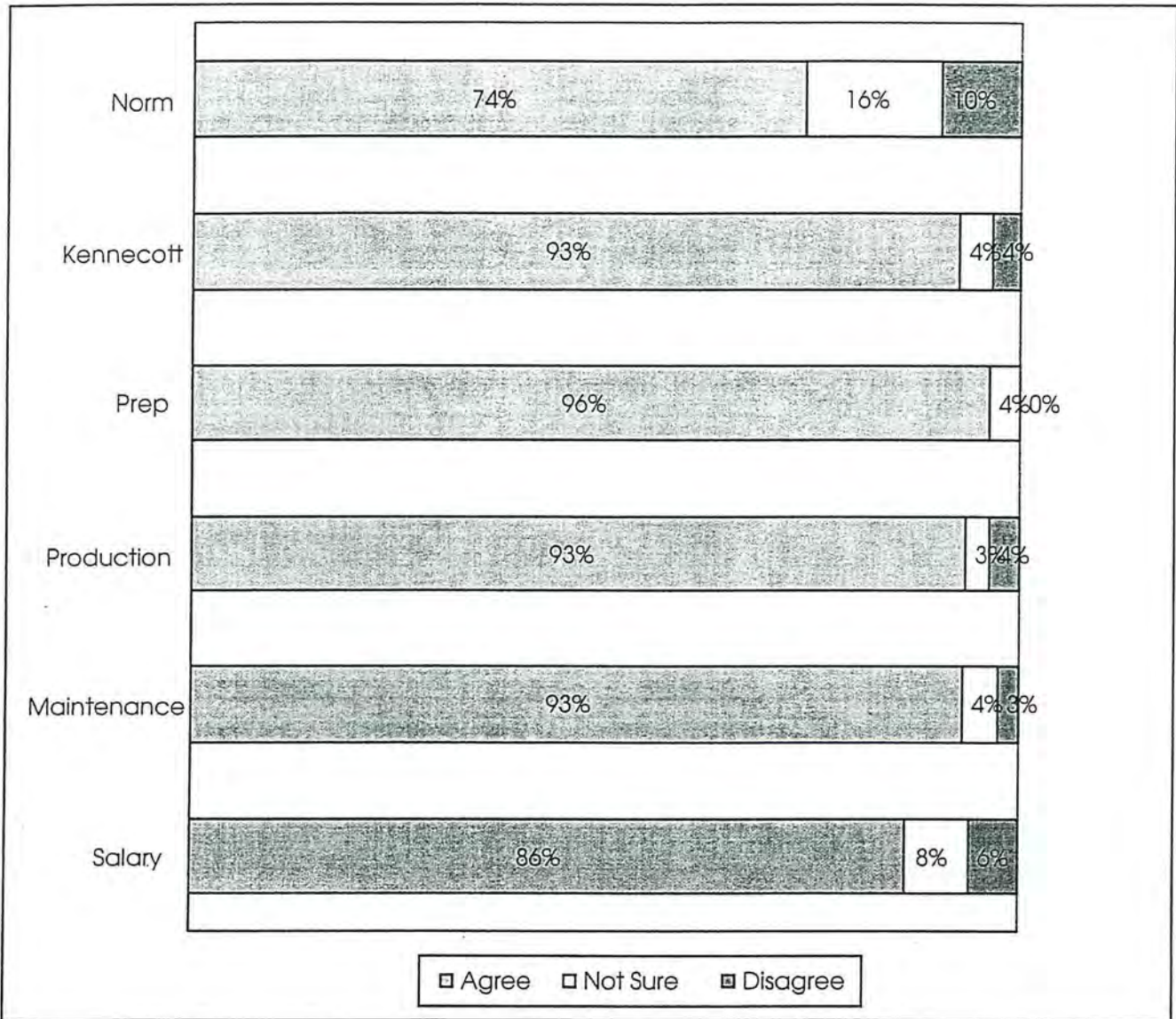
Actively Caring by Question (continued)

121. When I see a potential safety hazard, I am willing to correct it myself if possible.



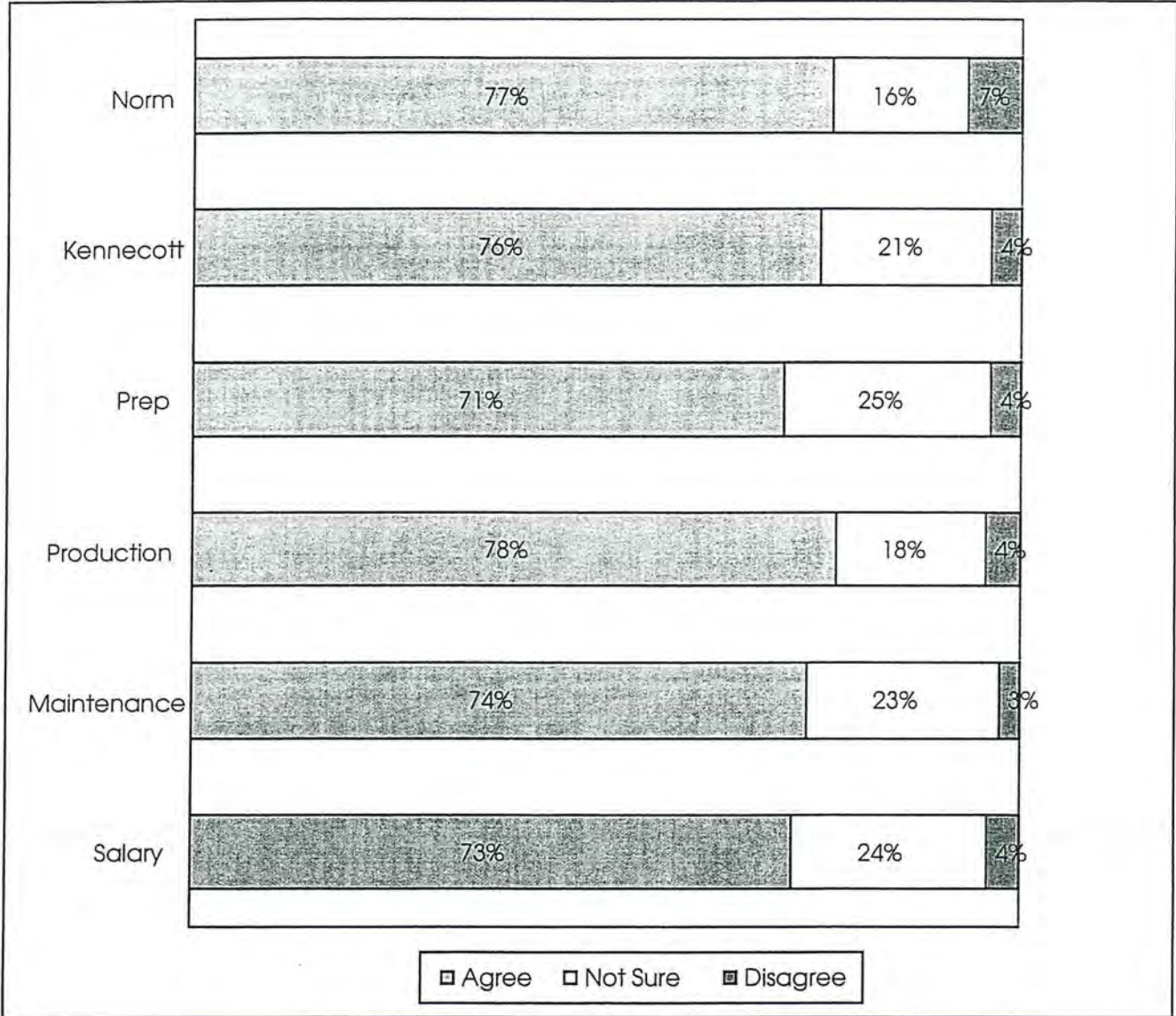
Actively Caring by Question (continued)

87. When I see a potential safety hazard, I correct it myself if possible.



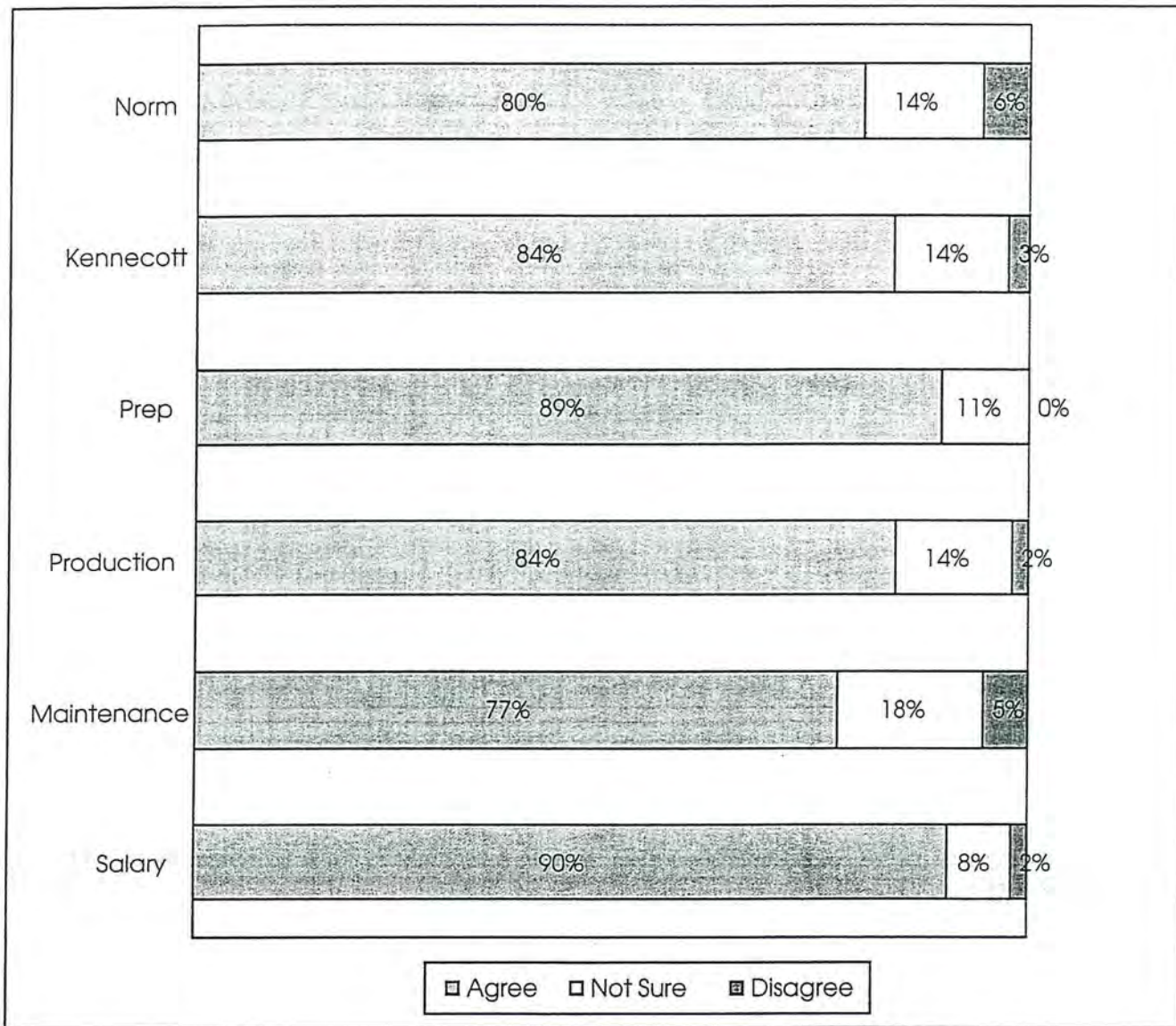
Actively Caring by Question (continued)

114. If an employee gets down or depressed, that person's coworkers should try to make him/her feel better.



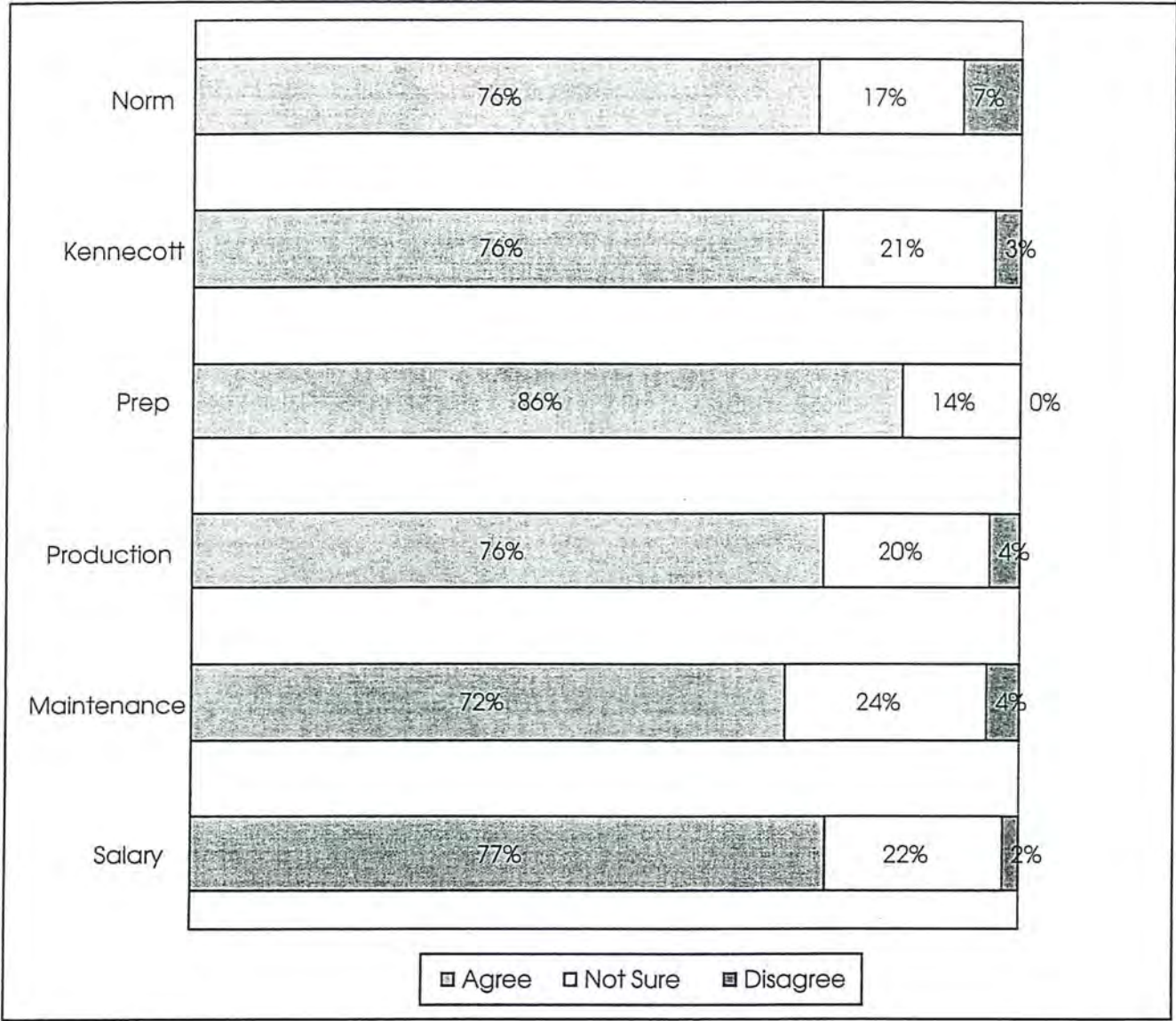
Actively Caring by Question (continued)

72. If a coworker gets down or depressed, I am willing to try to make that person feel better.



Actively Caring by Question (continued)

108. When I see a coworker looking down or depressed, I try to make that person feel better.



Person Factors

As indicated in the discussion of the previous scale, an individual's likelihood to demonstrate Actively Caring behaviors is influenced by several characteristics. Research shows that five key factors (self-esteem, belonging, personal control, self-effectiveness, and optimism) have a significant impact on an individual's willingness to become actively involved in safety improvement efforts. That is, research shows that individuals with a high sense of self-esteem, a strong sense of group belonging, and a true feeling of empowerment (as measured by feelings of self-effectiveness, optimism, and personal control) are more likely to actively care for others than those with depreciated levels of these five person states. The Person Factors Scale measures these five person factors which are most strongly related to the likelihood of Actively Caring for the safety of others.

Self Esteem. Self esteem is the general evaluation of self worth an individual makes about him- or herself. This evaluation indicates the extent to which a person feels capable, significant, important, and valuable. When individuals do not feel valuable, they are unlikely to feel they have anything valuable to offer others, and hence are not likely to intervene on behalf of someone else's safety. The Self Esteem Sub-scale includes the following questions:

- I feel I have a number of good qualities.
- I am able to do things as well as most other people.
- At times, I think I am no good at all.
- I feel I don't have much to be proud of.
- I certainly feel useless at times.
- I wish I had more respect for myself.

Optimism. Optimism is the learned expectation that things will go well and the anticipation of positive outcomes from one's actions. People high in optimism are more likely to demonstrate Actively Caring behaviors because they believe that their assistance will actually lead to improvements. The Optimism Sub-scale includes the following questions:

- I hardly ever expect things to go my way.
- In uncertain or difficult times, I usually expect the best to happen.
- I rarely count on good things happening to me.
- If anything can go wrong for me, it probably will.
- I always look on the bright side of things.
- Things never work out the way I want them to.

Self-effectiveness. Self-effectiveness relates to ones judgments of personal competence and skill levels in dealing with the situations around them. Those high in self-effectiveness are more likely to attempt new behaviors, exert more effort, and persist in the face of adversity. Individuals high in self-effectiveness are also less likely to relinquish responsibility to others ("I don't need to do it because someone else will") or use the reactions of others to interpret events ("I'll give my support only after I see others doing so"). Feelings of self-effectiveness require both knowledge (education) and some success experiences from which to base personal confidence. The Self-Effectiveness Sub-scale includes the following questions:

- I give up on things before completing them.
- One of my problems is that I cannot get down to work when I should.
- When trying to learn something new, I soon give up if I am not initially successful.
- I do not seem capable of dealing with most problems that come up in life.
- I avoid trying to learn new things when they look too difficult for me.

Personal Control. Personal control refers to a general expectancy regarding the location of control in a person's life. Those with an *internal locus of control* feel as if they have direct personal control over the things that happen to them, through their knowledge, skills, and abilities. In contrast, persons with an *external locus of control* believe things like chance, luck or fate play important roles in their lives. Those high in personal control are more likely to intervene to assist others. The Personal Control Sub-scale includes the following questions:

- People's injuries result from their own carelessness.
- I am directly responsible for my own safety.
- Whenever someone is injured, it's usually due to something he/she has done or has not done.
- People can change what might happen tomorrow by what they do today.
- If people follow safe practices, they can avoid many unnecessary injuries.
- Most incidents that result in injuries are largely preventable.

Belonging. Group belonging or cohesion refers to the feeling of solidarity or closeness with a group. Five main consequences result from a strong sense of group cohesion: 1) high quantity and quality of communication, 2) high member loyalty and satisfaction, 3) enforcement of group norms, 4) increased directing and focusing of group goals, and 5) a strong group culture, including special behavioral routines. Furthermore, people are not only more likely to help individuals who they feel are part of their group, but are more likely to help others outside the group. The Belonging Sub-scale includes the following questions:

- My coworkers do many helpful things for each other.
- I feel close to my coworkers.
- I enjoy being with my coworkers.
- I trust my coworkers.
- I feel like I belong to my work group.
- My coworkers are not very close at all.
- My coworkers share much in common.

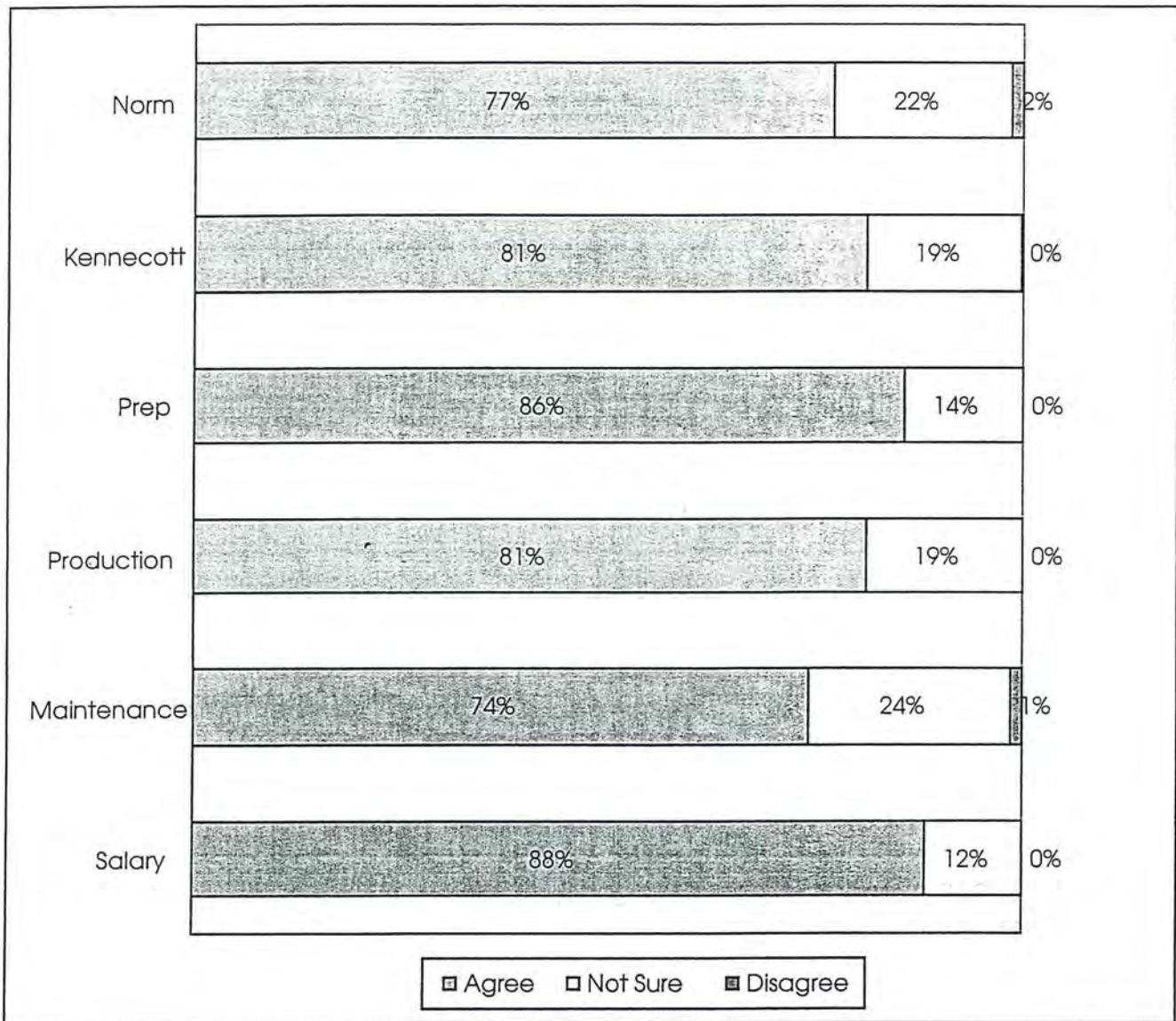
It is important to note that unlike traits these person factors are states which fluctuate over time, changing from situation to situation. Although individuals may tend toward higher or lower levels of a given factor, each is highly influenced by interactions with both other individuals and with the overall organizational environment. Practices and policies within an organization can serve to either build or destroy these states within its members. Efforts to increase these critical person factors can take many forms. To bring out self-esteem, people should be recognized and complimented on a job well-done. They must be given an opportunity and an avenue through which to add their input or express their opinions. Belonging and teamwork can be promoted by recognizing group safety efforts, as well as individual achievement. Group goals and group feedback should be implemented, and group celebrations should occur as goals are reached.

Teams should be enabled to develop through empowering experiences, rather than lectures, mandates, or top-down policy.

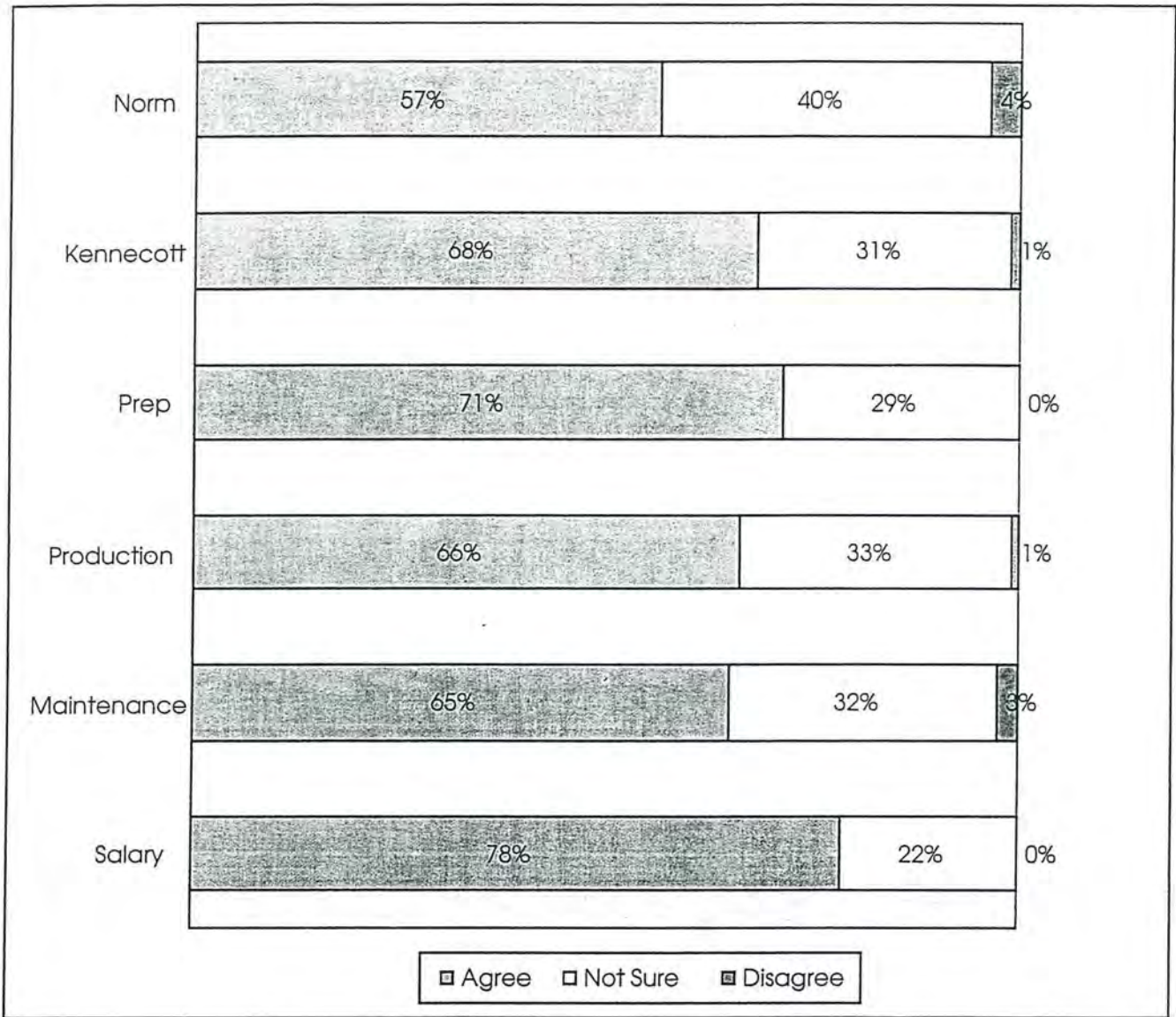
Self-effectiveness, personal control, and optimism contribute to feeling empowered--the personal feeling that "I can make a difference." Self-effectiveness can be increased by giving employees sufficient resources (including skills, time and personnel) to do the task at hand. A person's sense of "being in control" can also be developed; people need responsibility, the freedom to make mistakes, and the training to know how to do assignments correctly. They also need to believe the beneficial consequences they're experiencing are the result of their own effort. Optimism can be increased by recognizing the "small wins" in life, the little successes that can help to "shape" performance and add up to big achievements. Good planning also leads to optimism; giving people a sense that "we know how we're going to do this."

Finally, it is also important to recognize that stable changes in these person factors are usually not realized as readily as are behaviors. And, in fact, it is much more difficult to *measure* changes in these person factors than in objective, observable behaviors. However, because of their influential relationship with safety-related and Actively Caring behaviors, attention must be directed at assessing and improving the organizational influences on these critical person factors in order for lasting safety improvements to be possible.

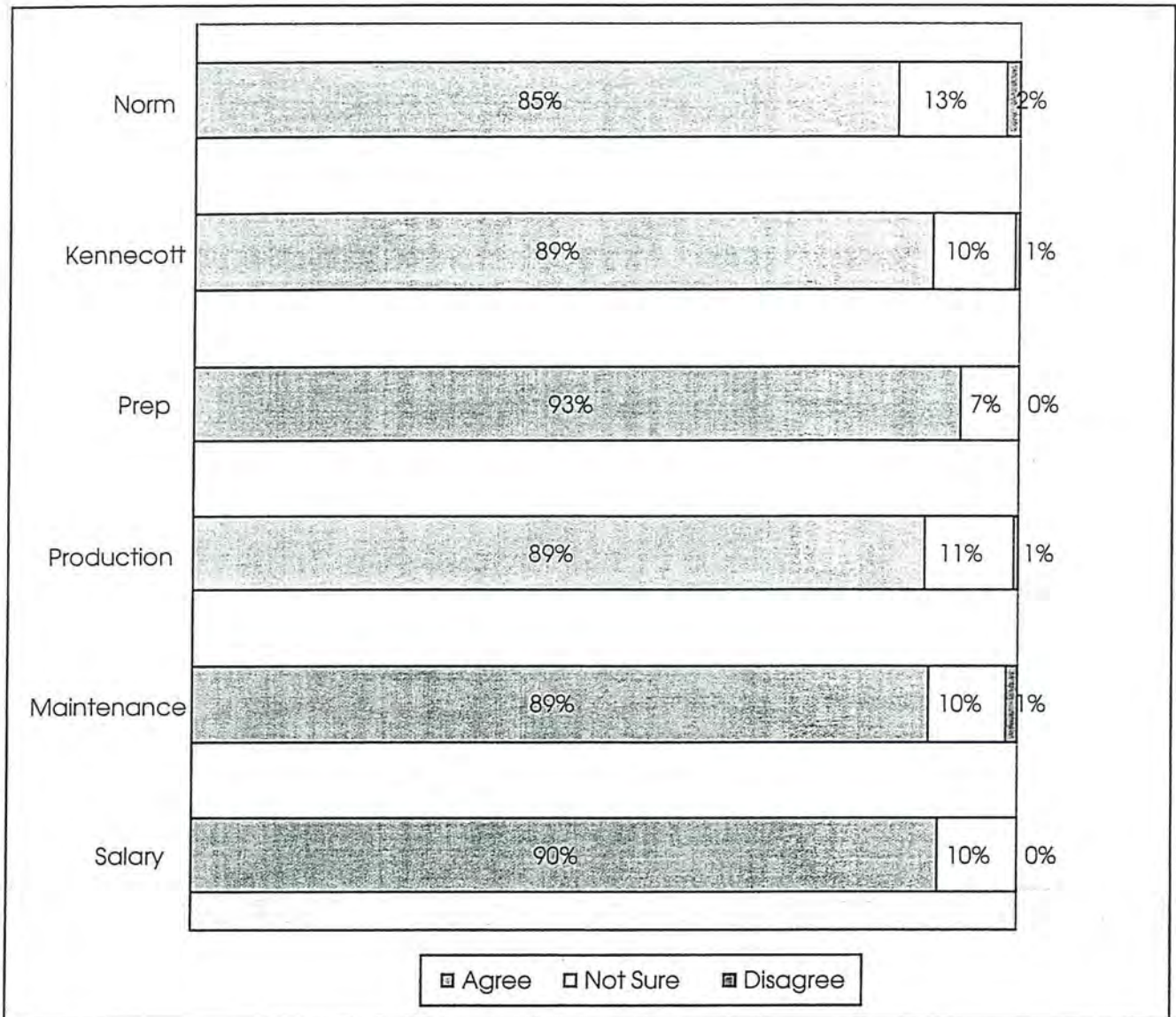
Self-Esteem by Position



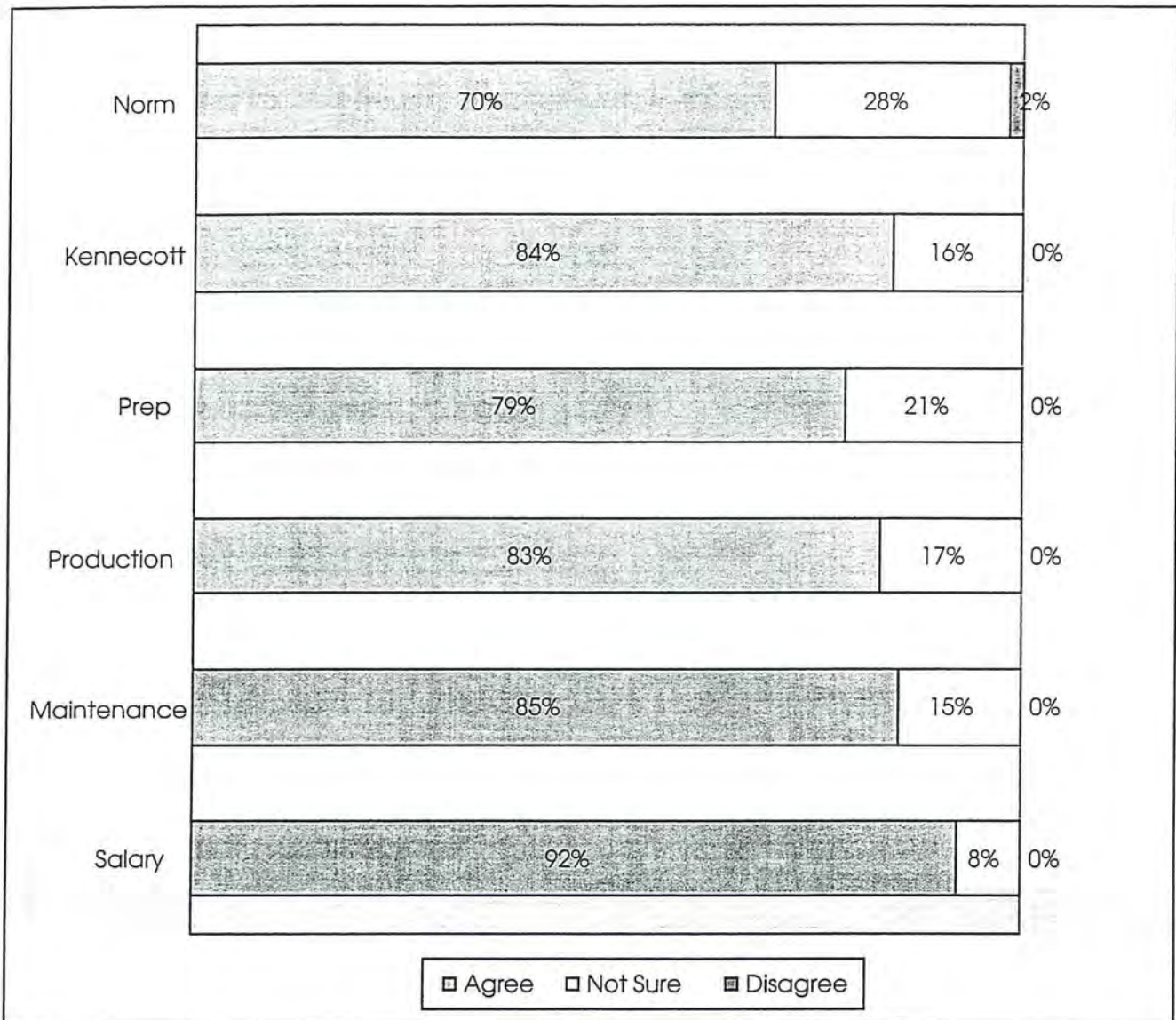
Optimism by Position



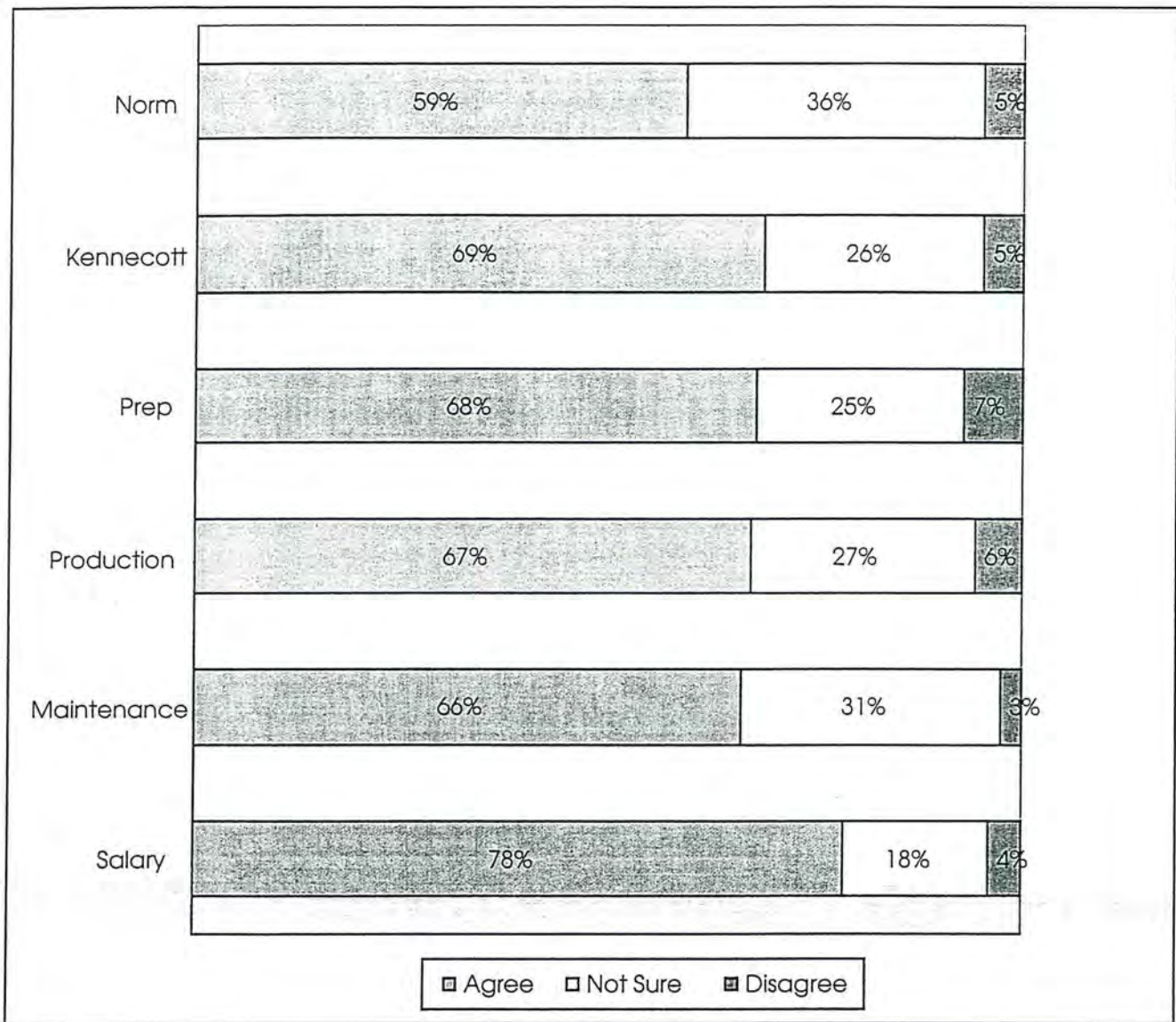
Self-Effectiveness by Position



Personal Control by Position



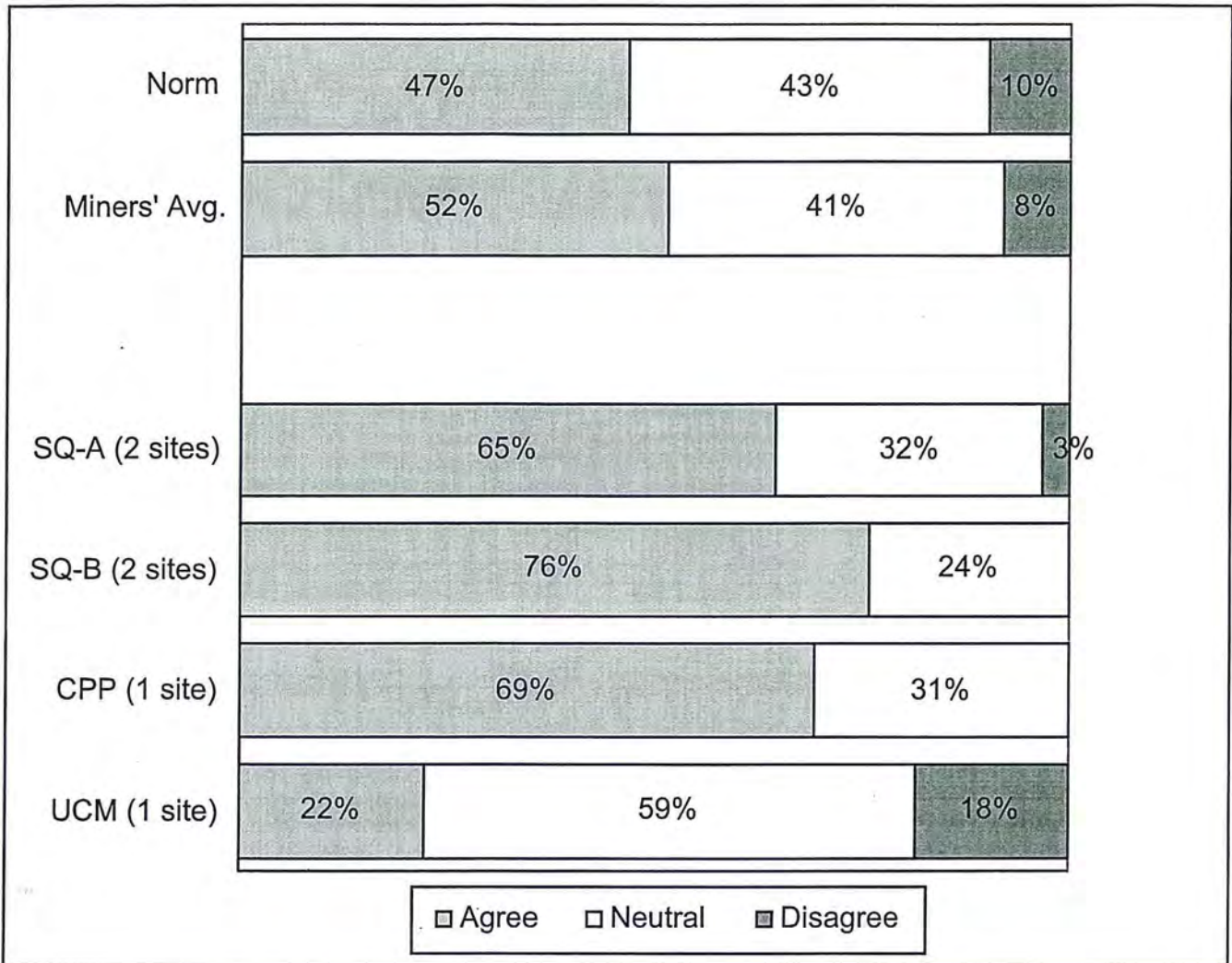
Belonging by Position



Appendix I: Safety Culture Survey Results for Study 5

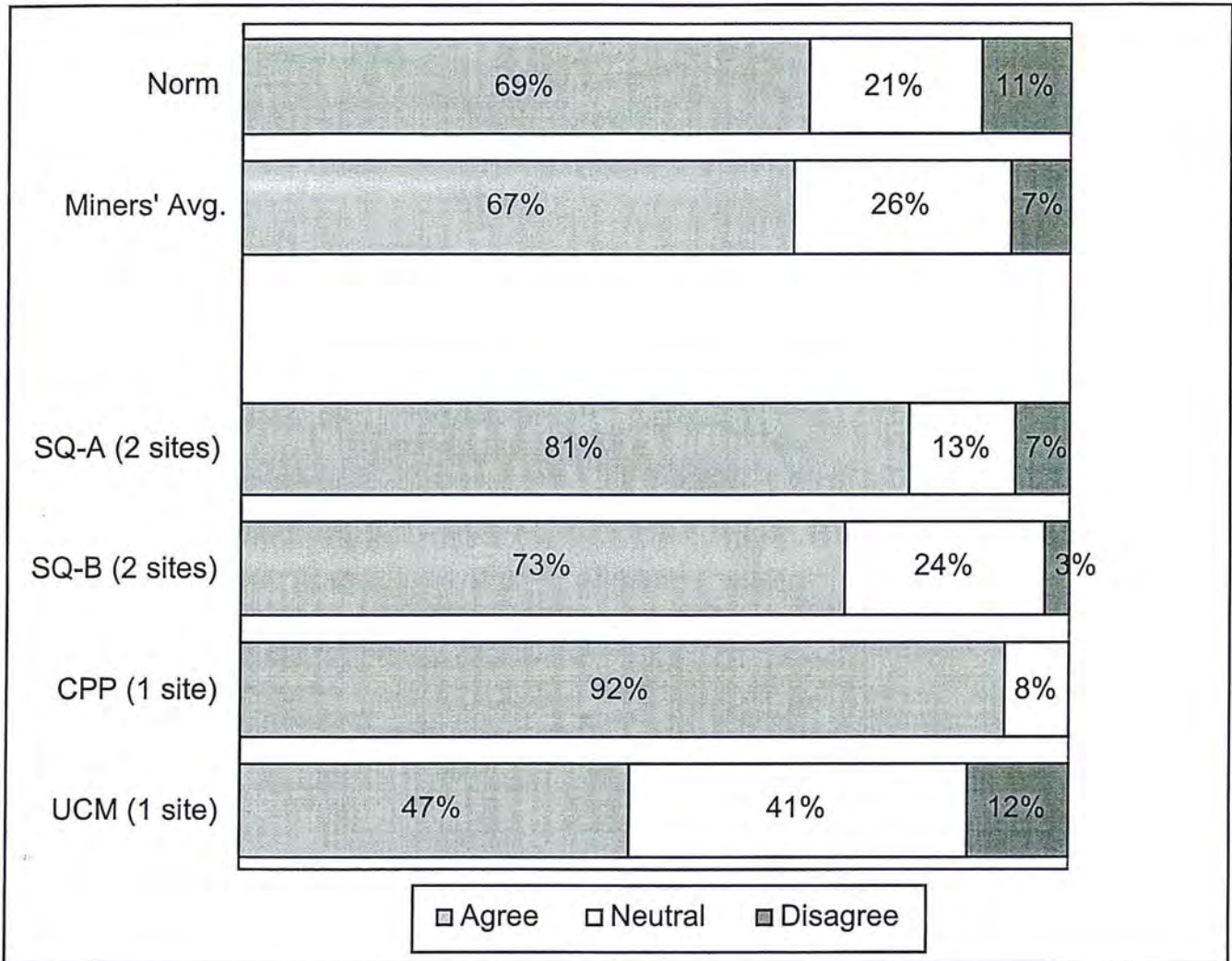
Management Support for Safety

Overall Management Support for Safety by Company



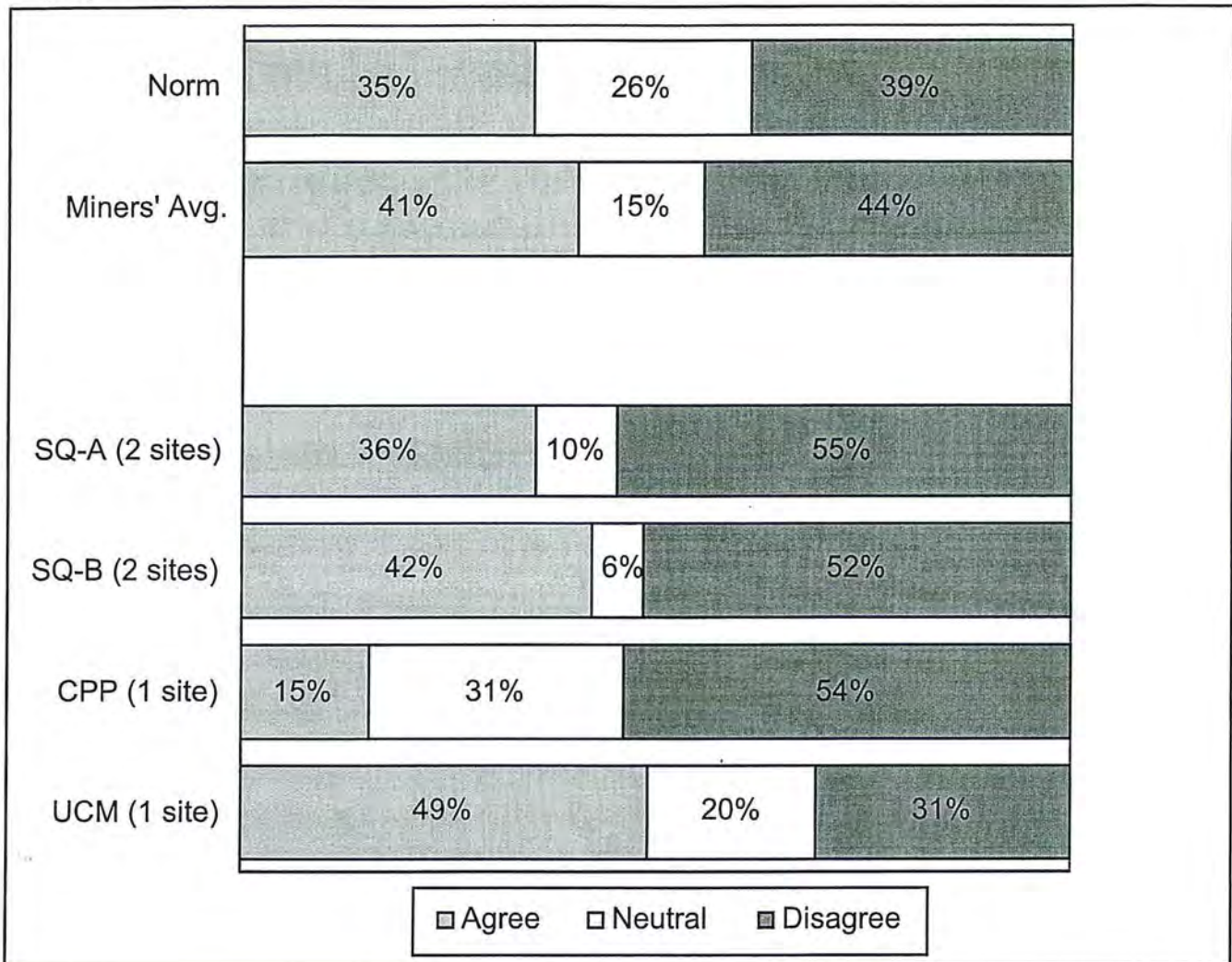
Management Support for Safety by Question

83. Management here seems genuinely interested in reducing injuries.



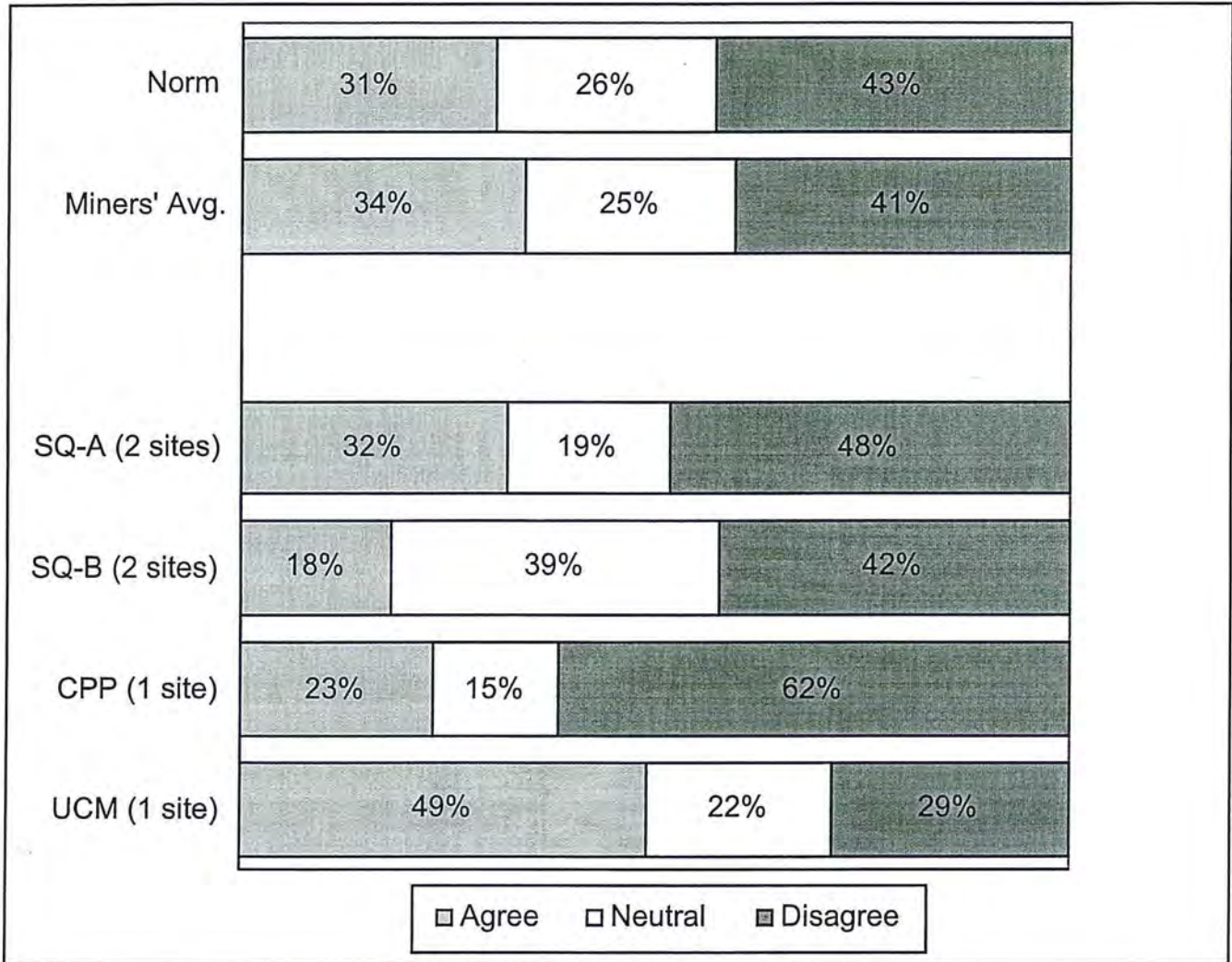
Management Support for Safety by Question (continued)

79. Management is more concerned about keeping the injury statistics low than with truly keeping people safe.



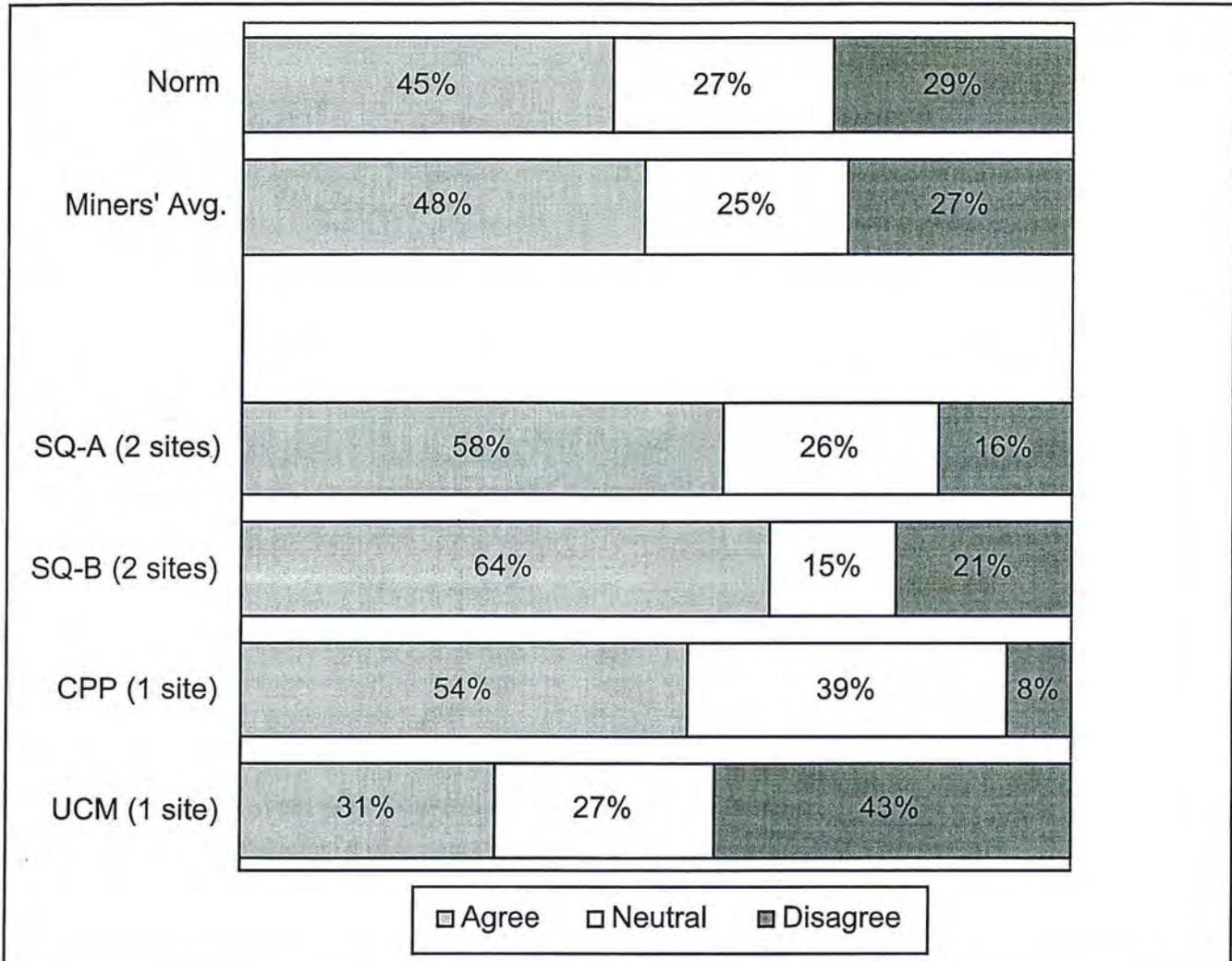
Management Support for Safety by Question (continued)

124. At my workplace, work productivity and quality usually have a higher priority than work safety.



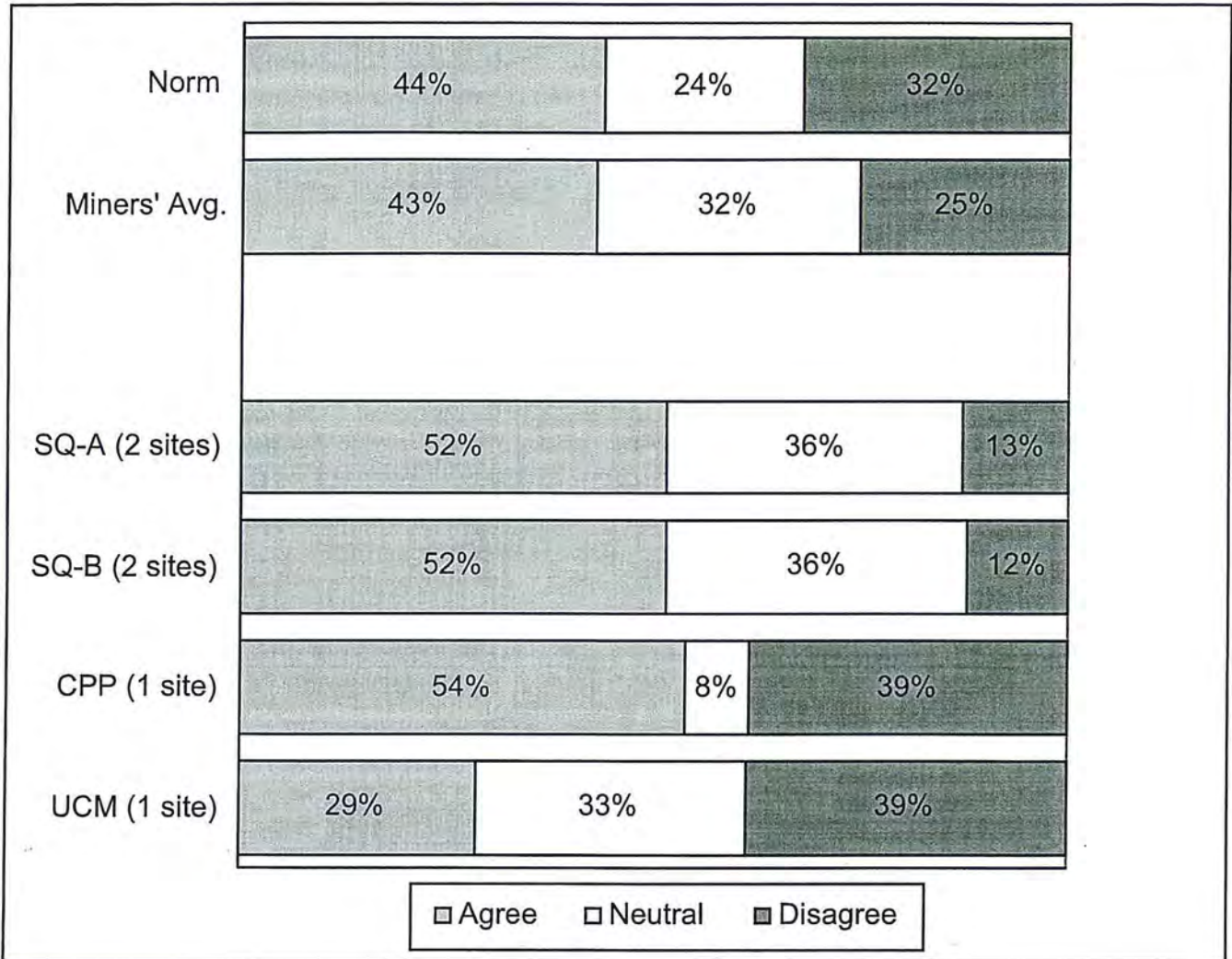
Management Support for Safety by Question (continued)

93. Production demands do not override supervisors' concern for safety.



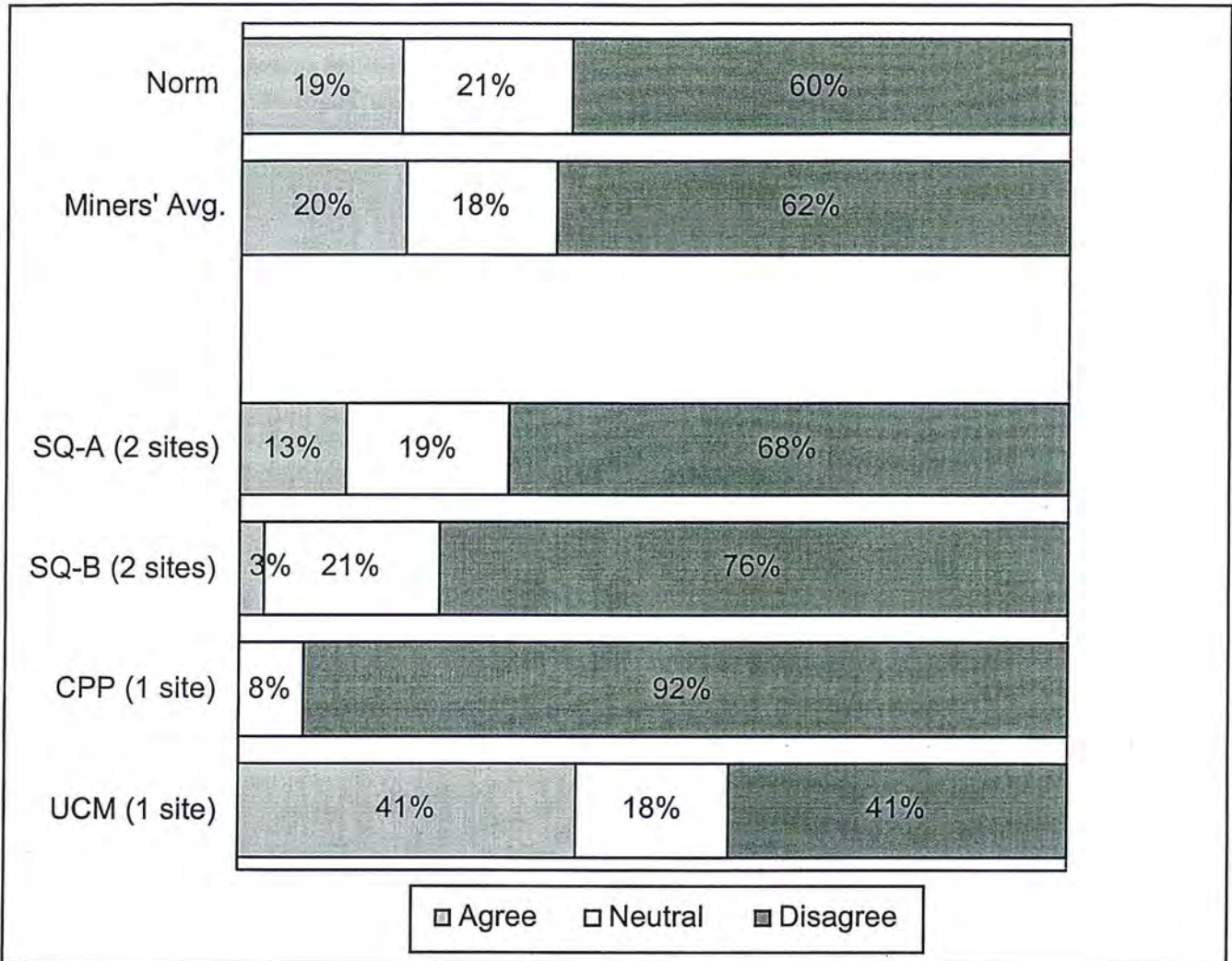
Management Support for Safety by Question (continued)

27. Production demands do not override senior management's concern for safety.



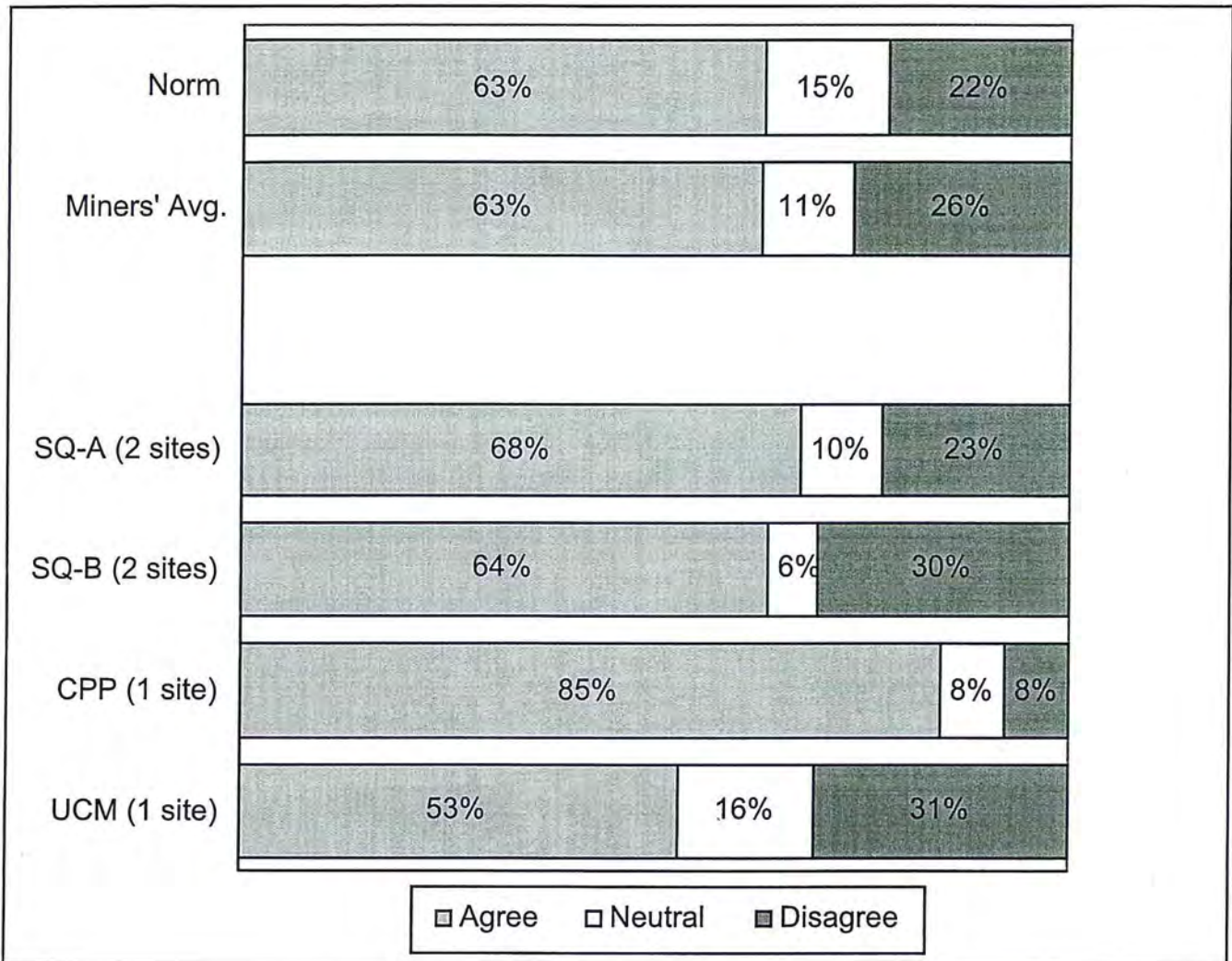
Management Support for Safety by Question (continued)

75. Supervisors sometimes encourage employees to overlook hazards to get the job done.



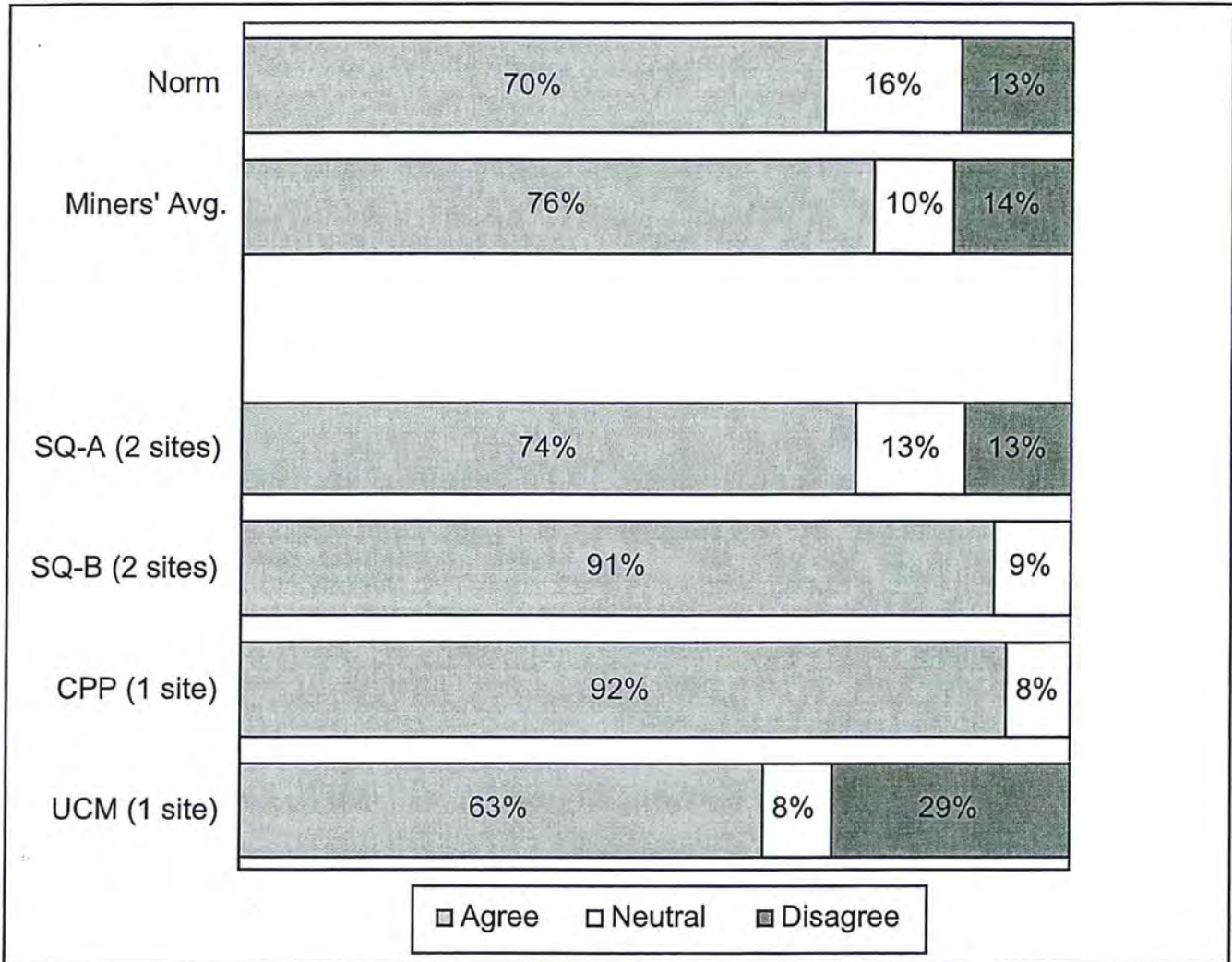
Management Support for Safety by Question (continued)

56. I have never been forced to perform a task which I said I thought was unsafe.



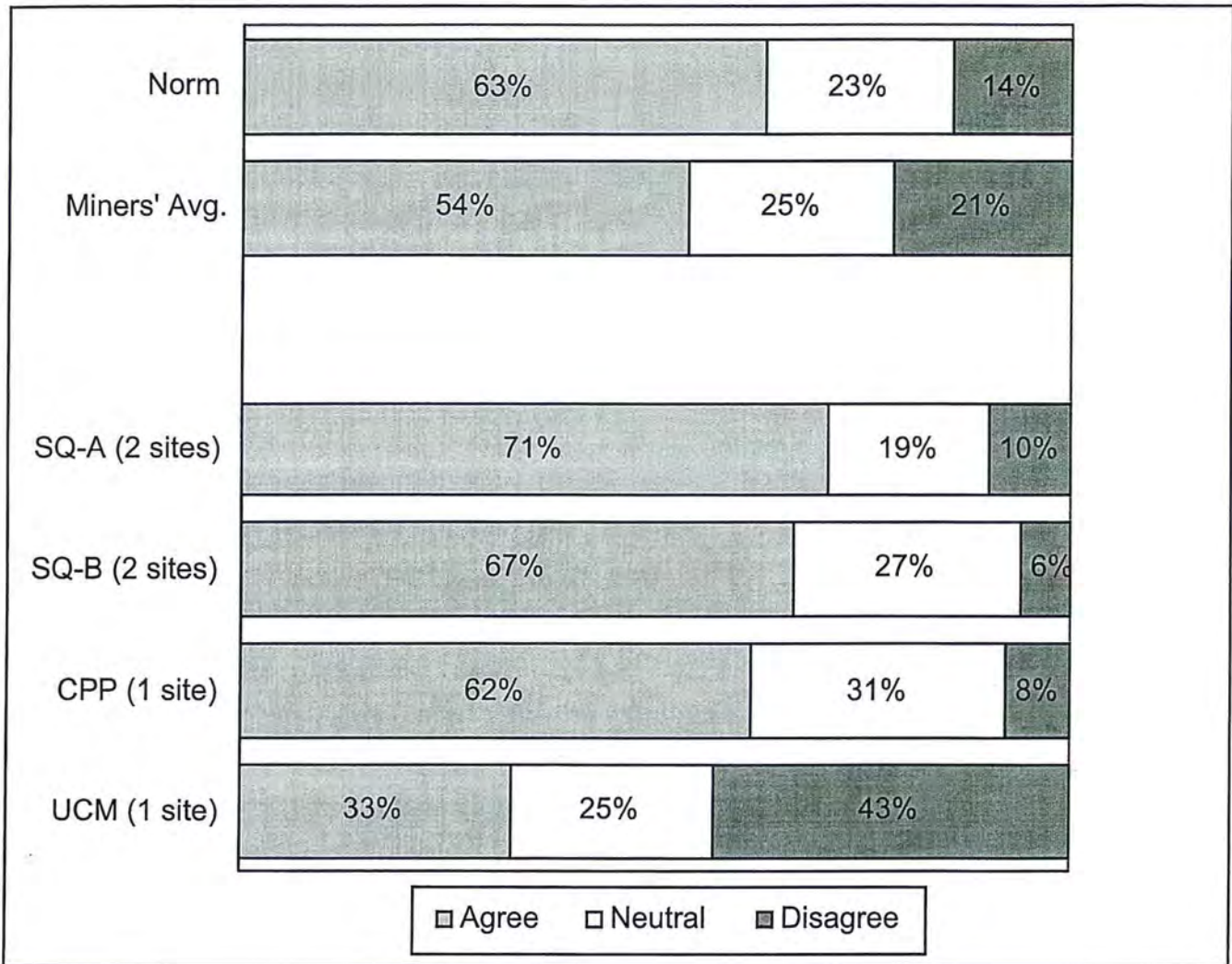
Management Support for Safety by Question (continued)

26. I am encouraged to stop a job if a safety hazard is identified.



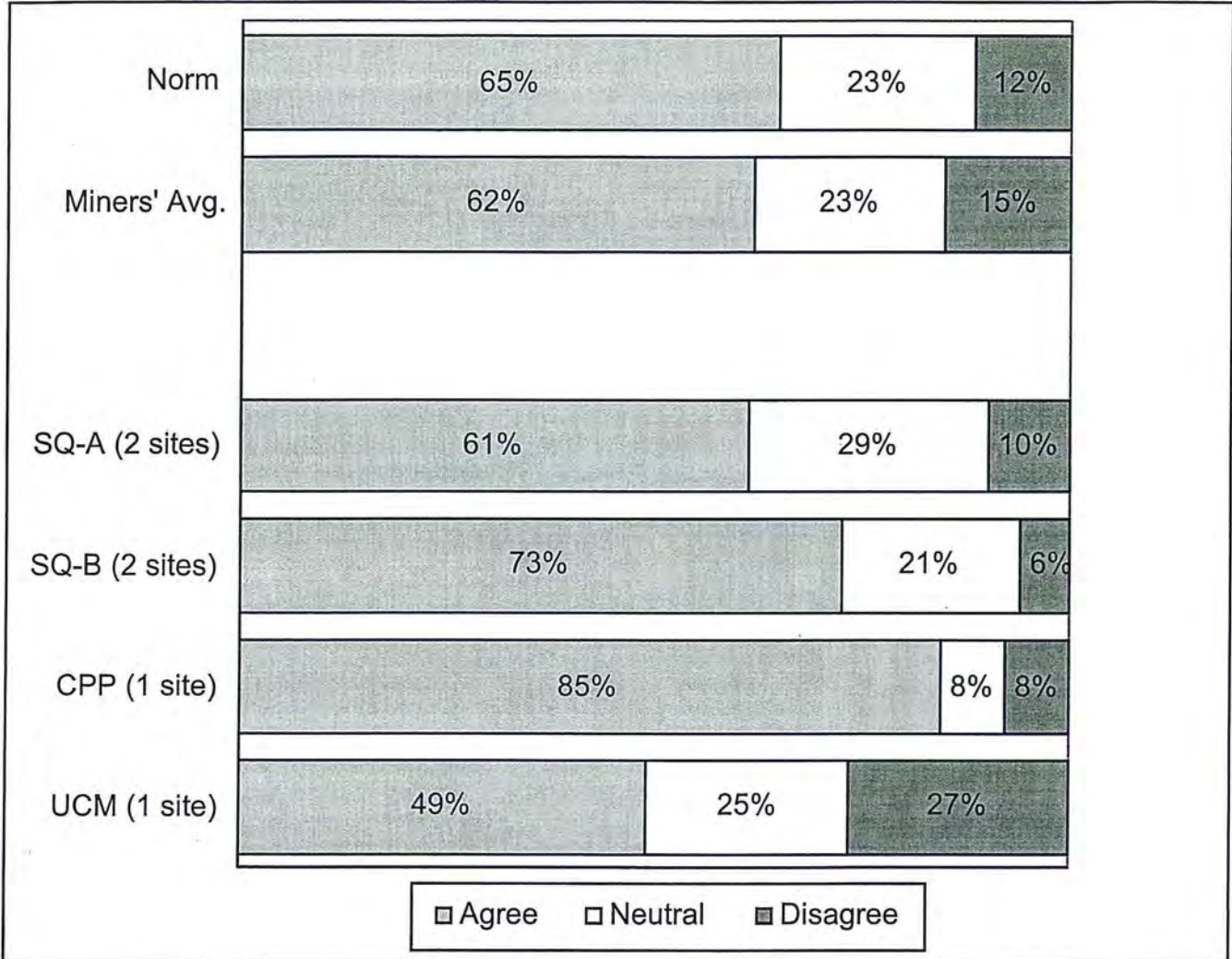
Management Support for Safety by Question (continued)

77. Management is willing to invest money and effort to improve our safety performance.



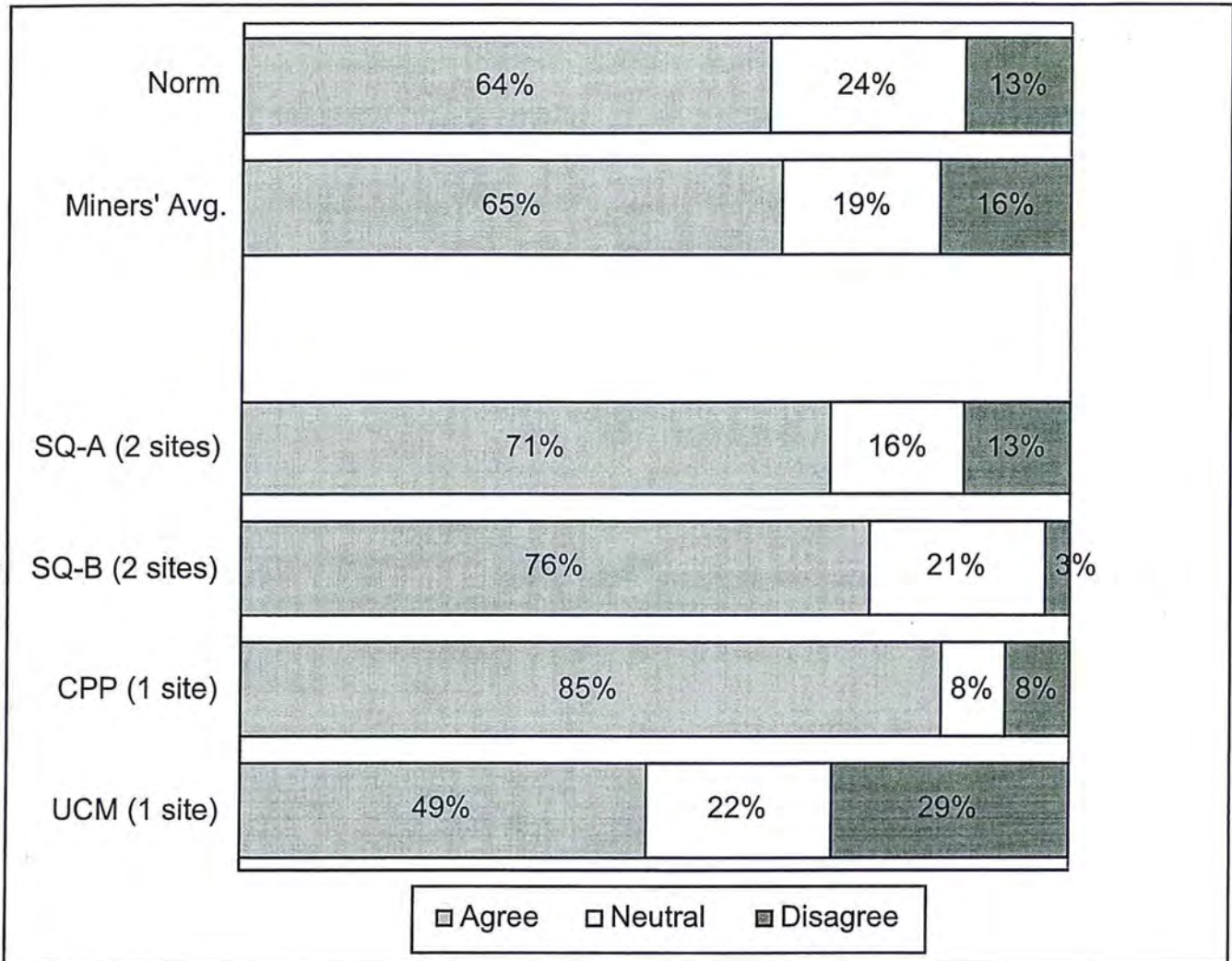
Management Support for Safety by Question (continued)

64. When told about safety hazards, my immediate supervisor is appreciative and tries to correct them quickly.



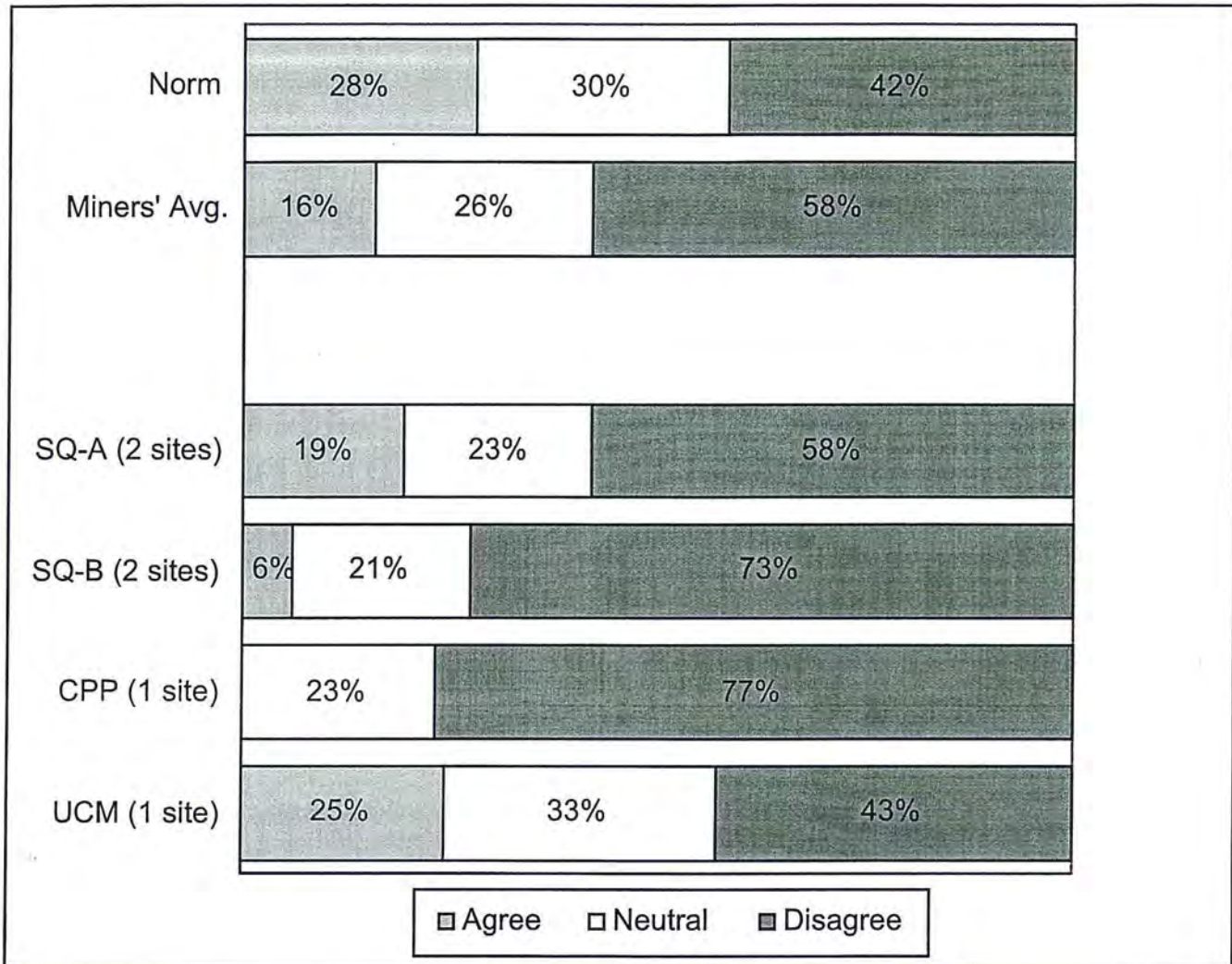
Management Support for Safety by Question (continued)

23. My immediate supervisor is well informed about relevant safety issues.



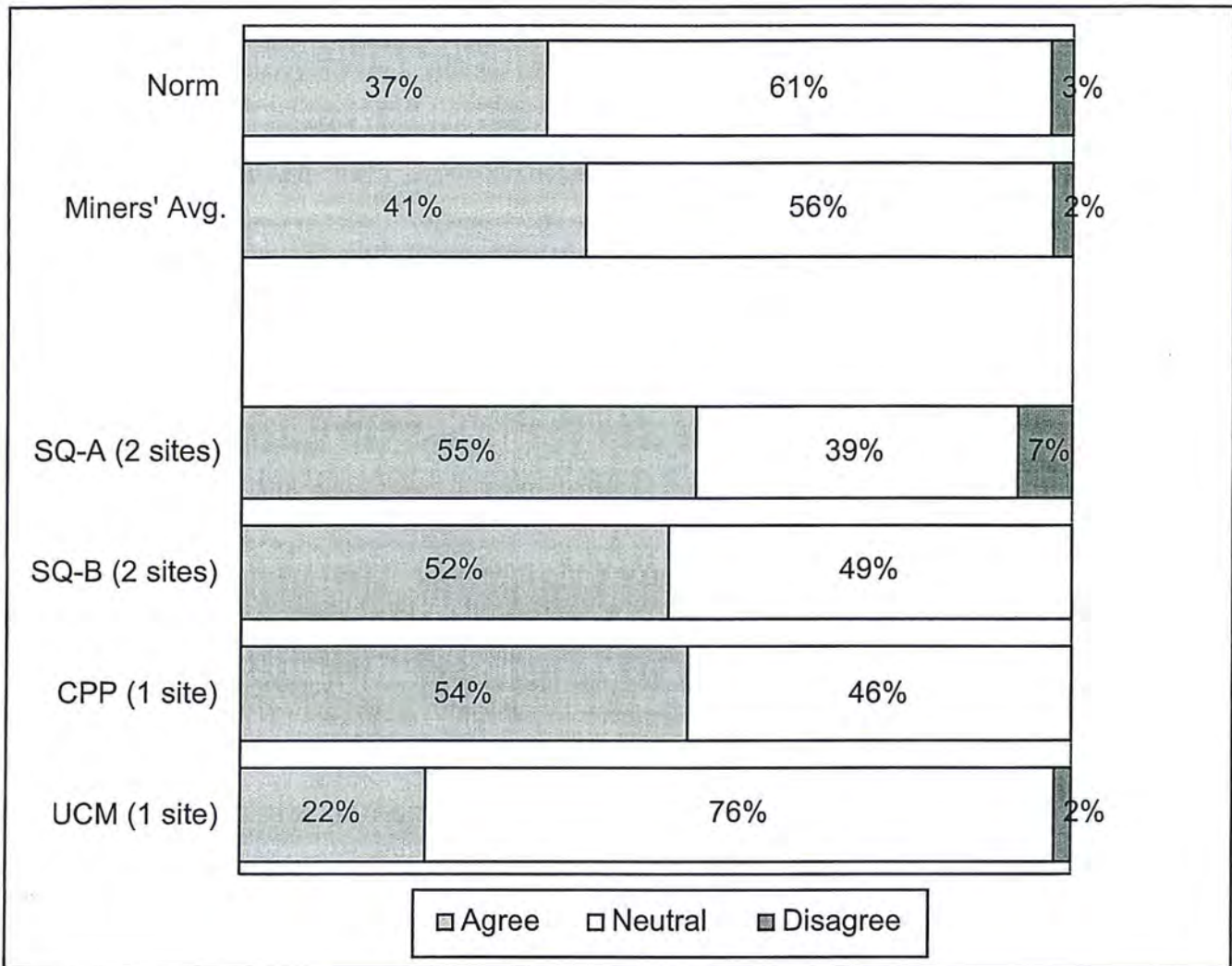
Management Support for Safety by Question (continued)

80. Management does not fully understand the real safety issues within the plant.



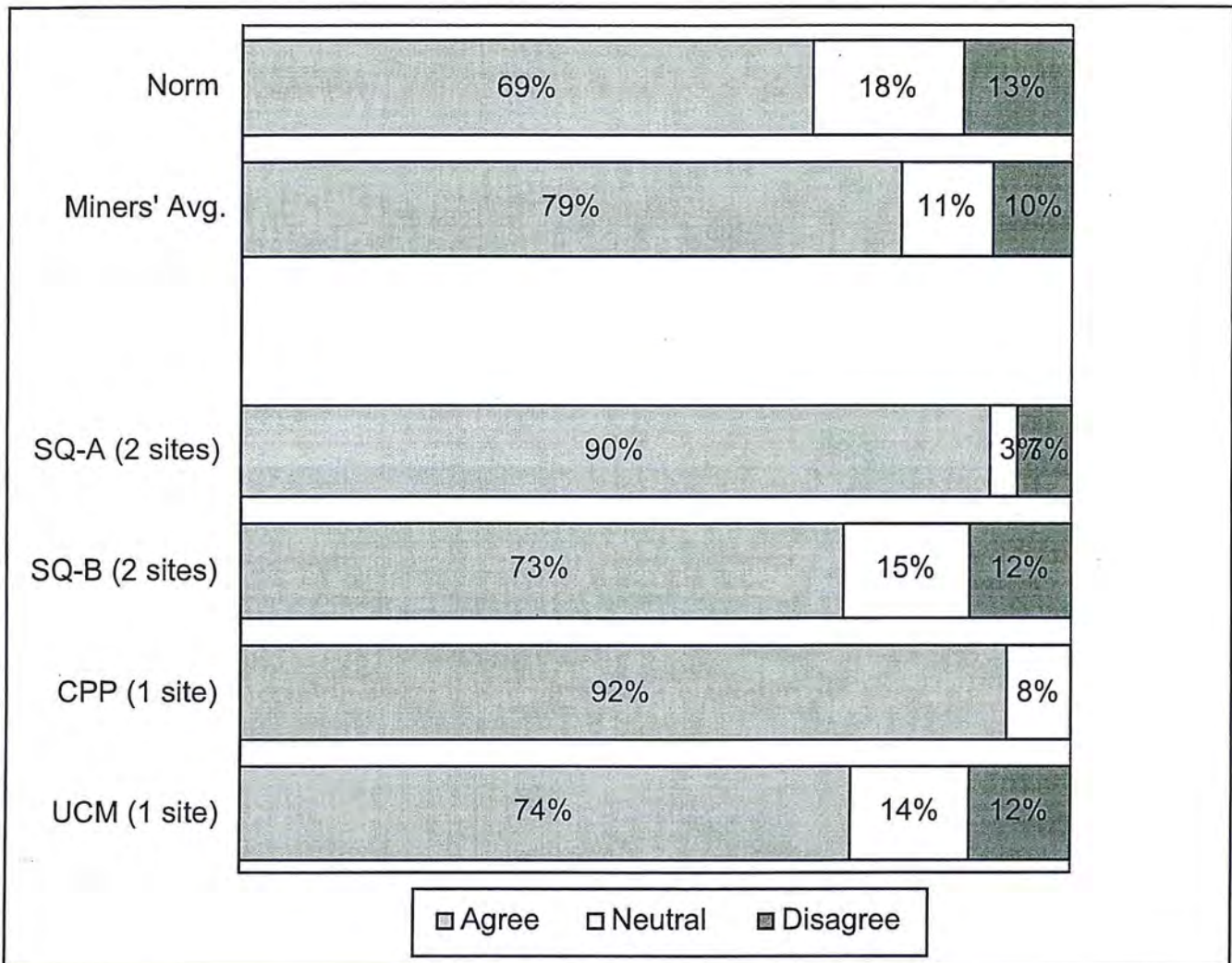
Peer Support for Safety

Overall Peer Support for Safety by Company



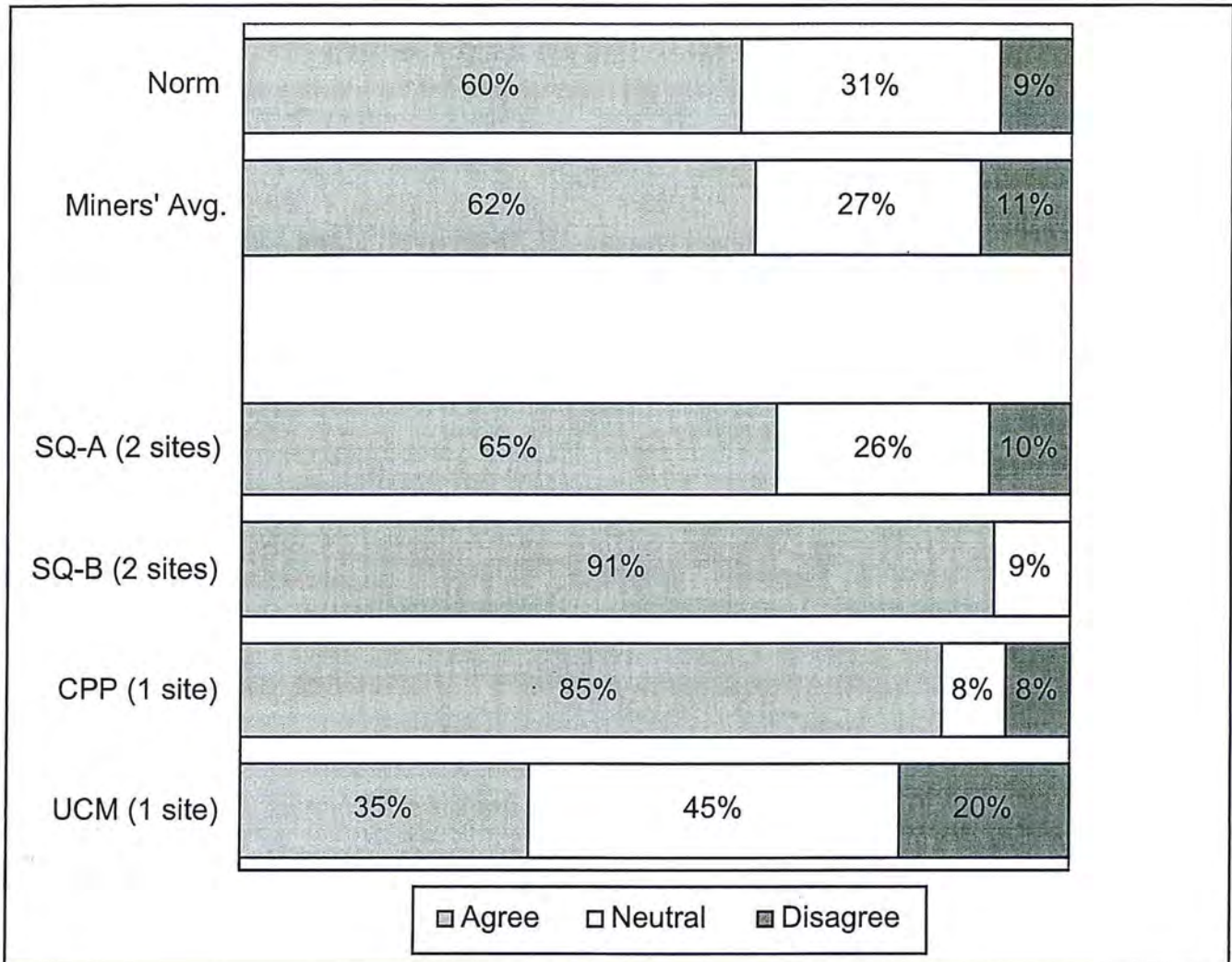
Peer Support for Safety by Question

6. Employees in my work area caution each other about unsafe behaviors.



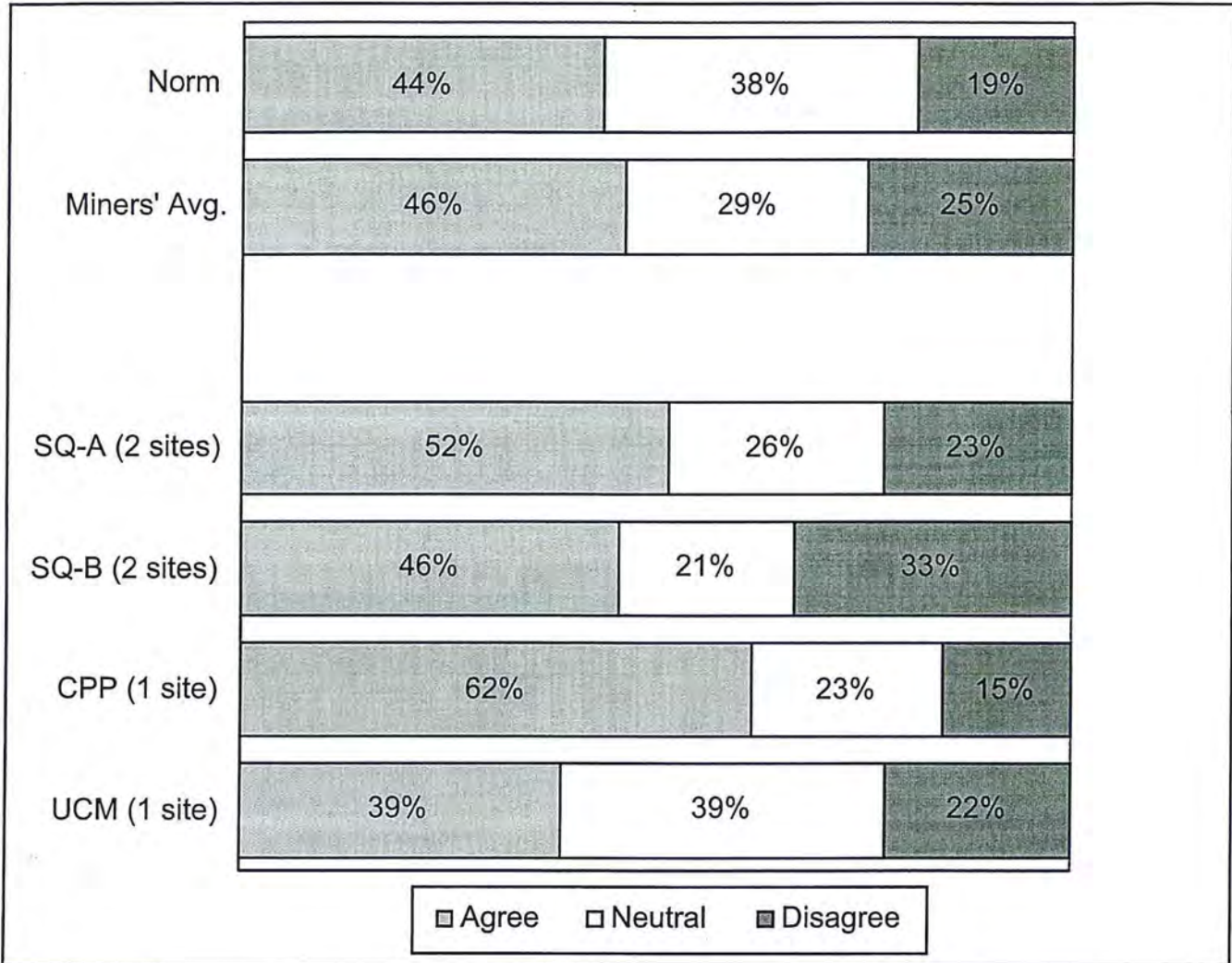
Peer Support for Safety by Question (continued)

67. When employees in my work area are cautioned about working unsafely, they begin working more safely.



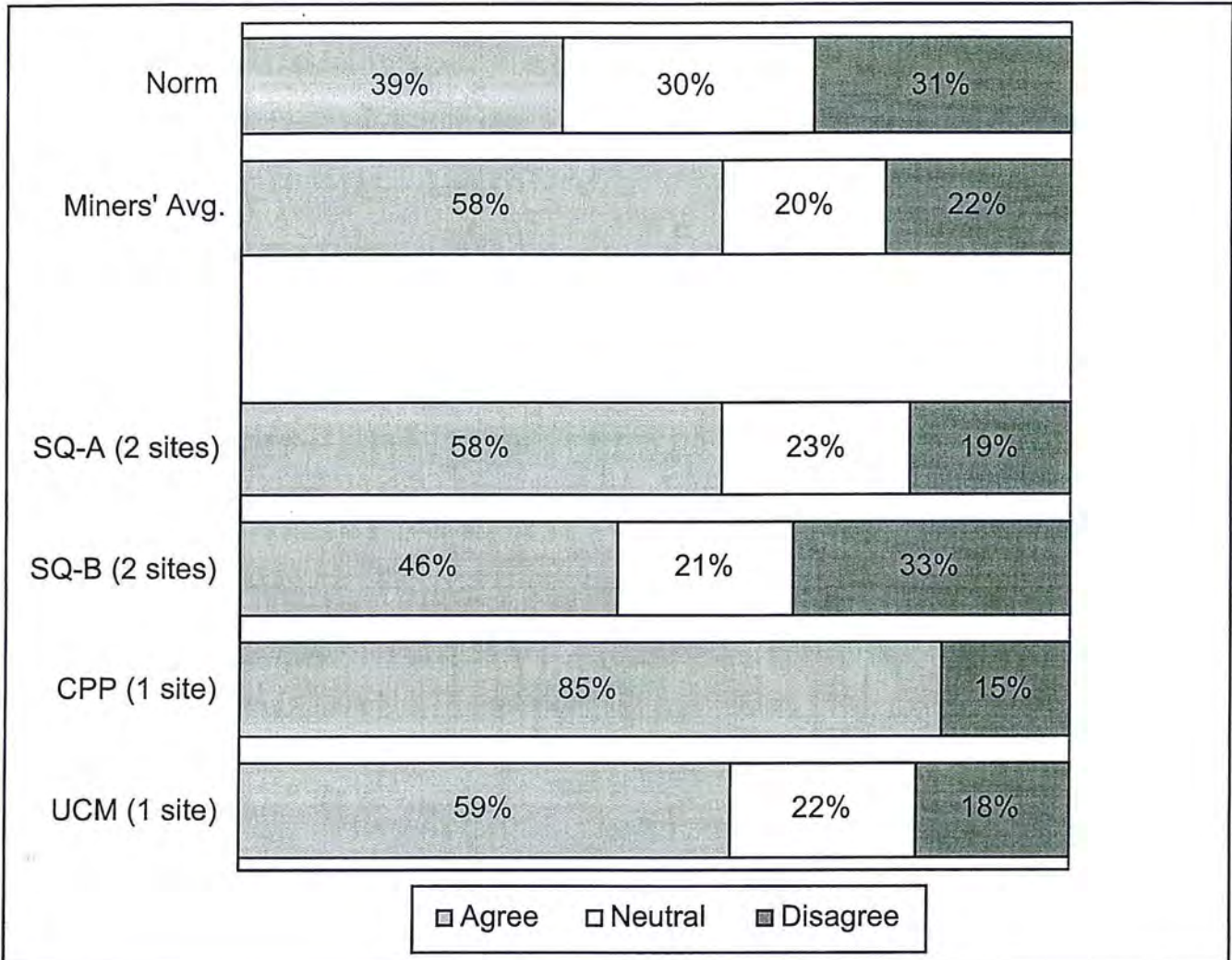
Peer Support for Safety by Question (continued)

127. Employees appreciate receiving feedback from their coworkers about their safe behaviors.



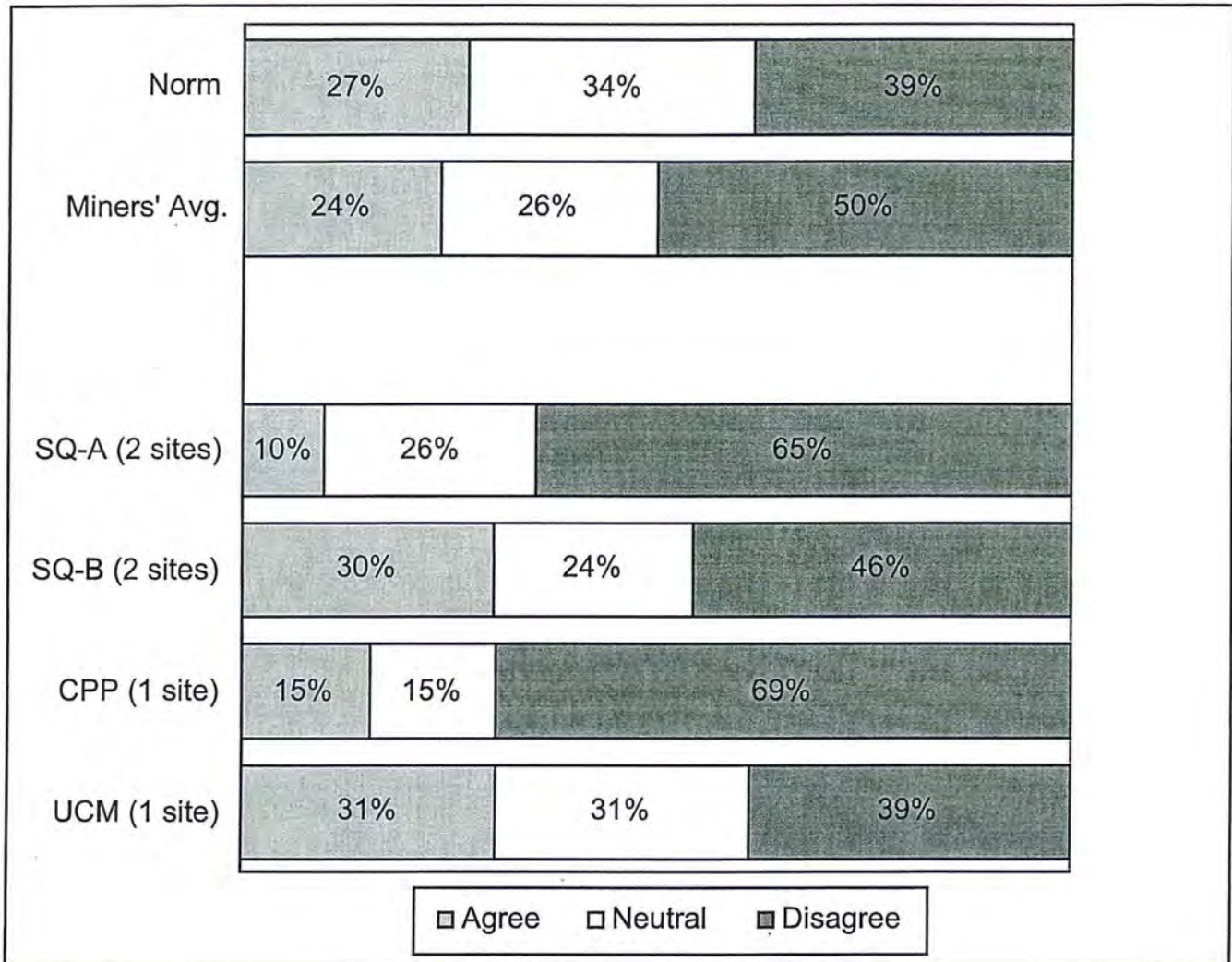
Peer Support for Safety by Question (continued)

4. Employees appreciate receiving feedback from their coworkers about their unsafe behaviors.



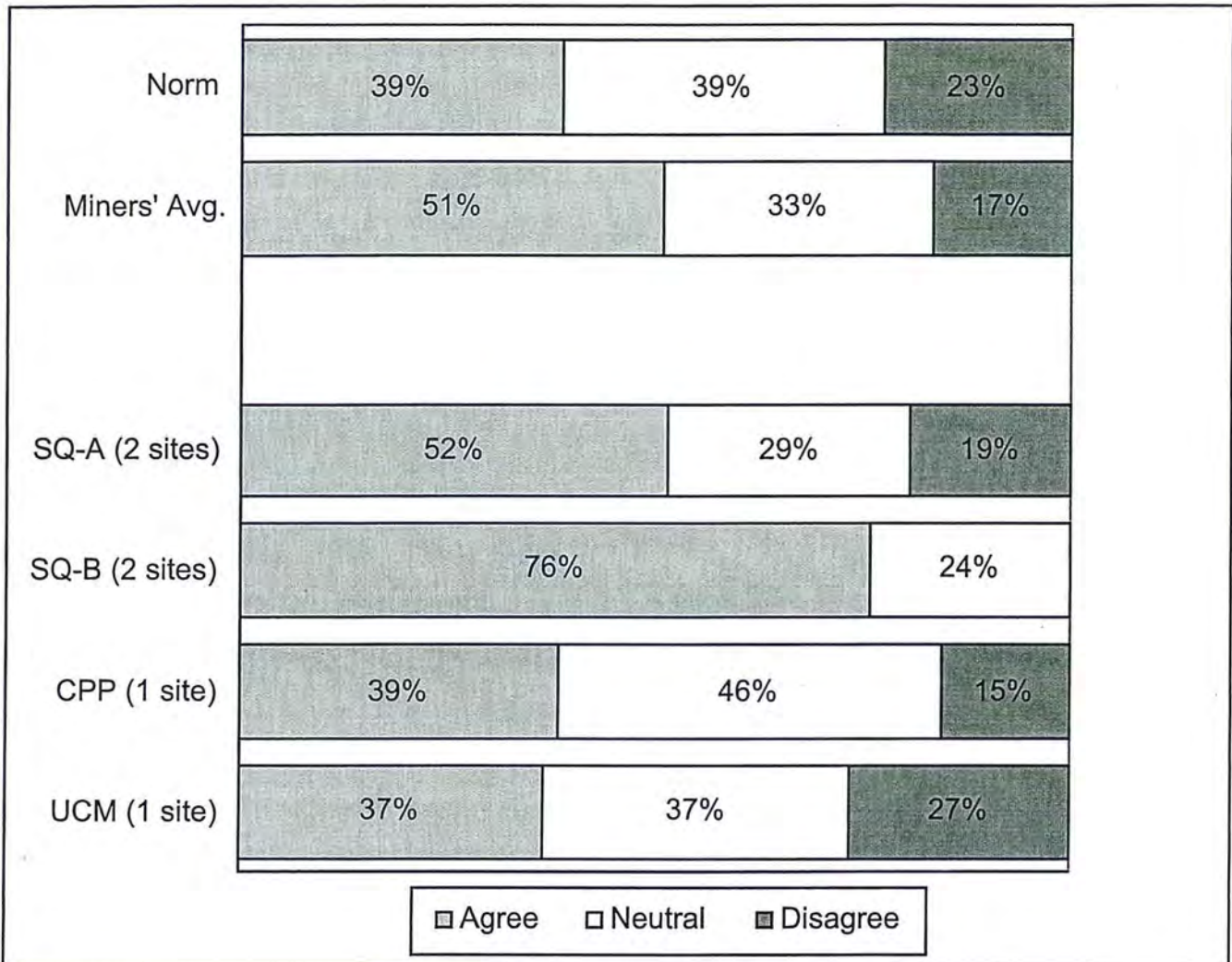
Peer Support for Safety by Question (continued)

59. If I approach my coworkers about their unsafe behaviors, they will react negatively.



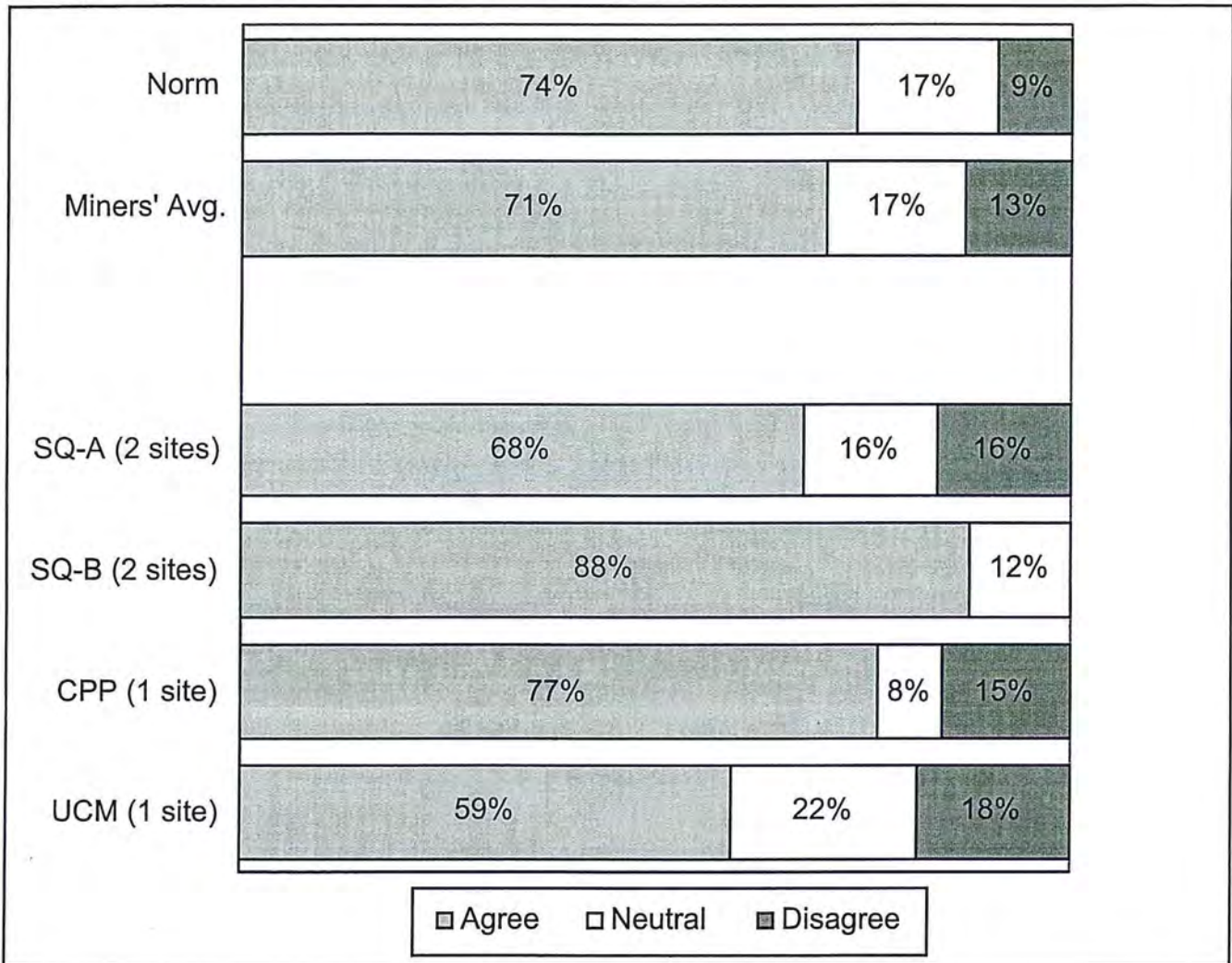
Peer Support for Safety by Question (continued)

123. Employees in my work group recognize each other for working safely.



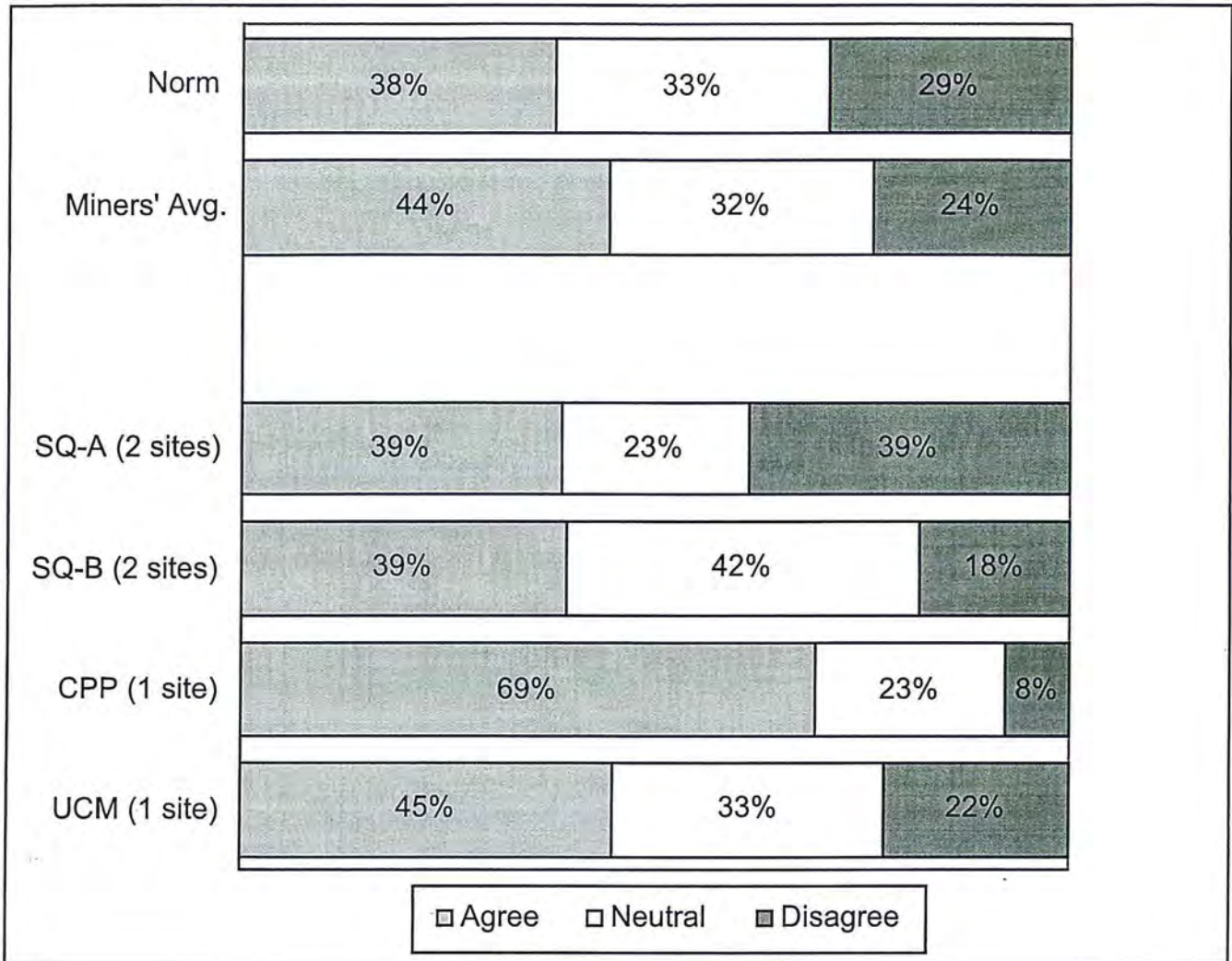
Peer Support for Safety by Question (continued)

110. I would be willing to have a coworker observe me while I work in order to give me feedback regarding safe and unsafe behaviors observed.



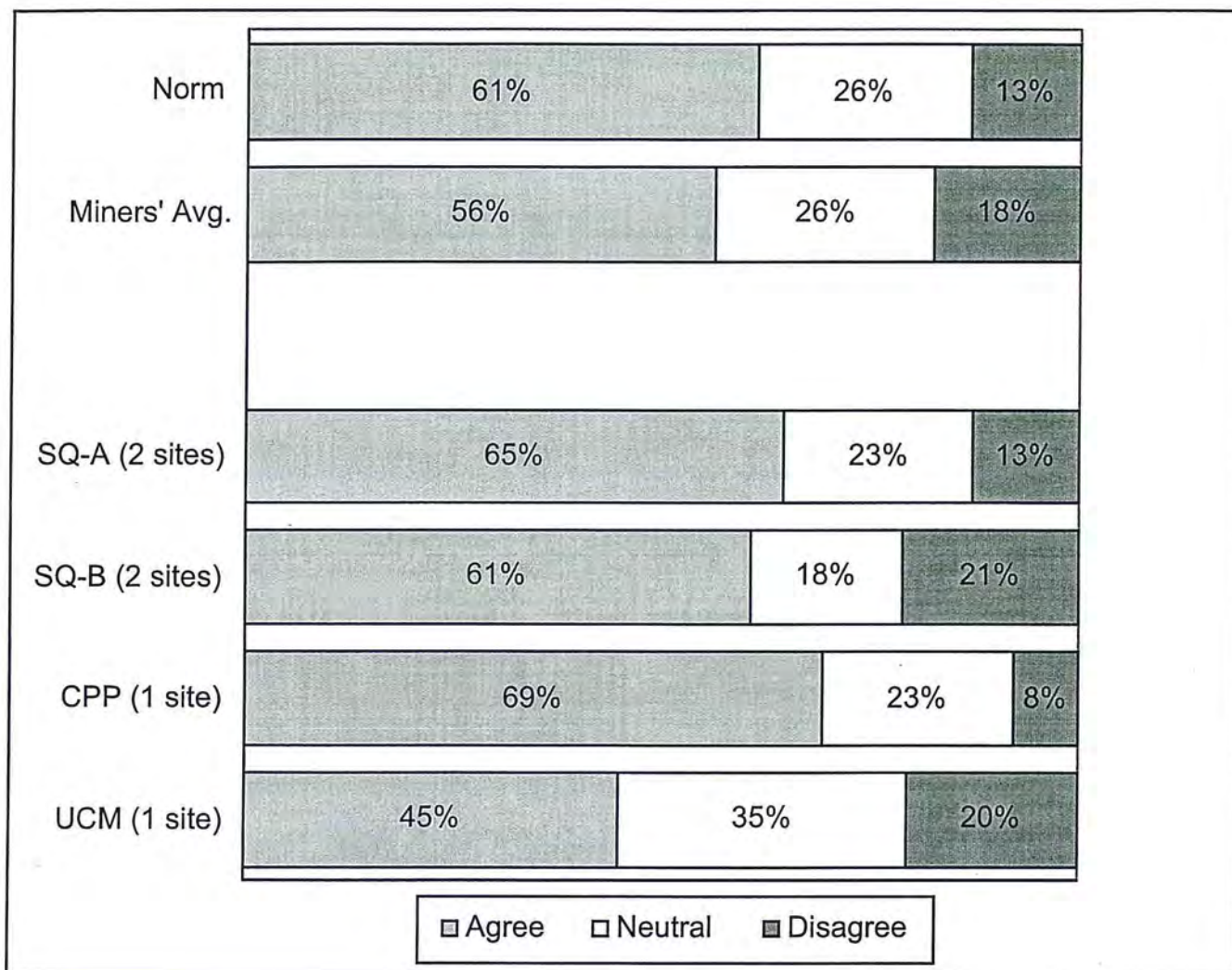
Peer Support for Safety by Question (continued)

117. Most employees in my group would not feel comfortable if their work practices were observed and recorded by a coworker.



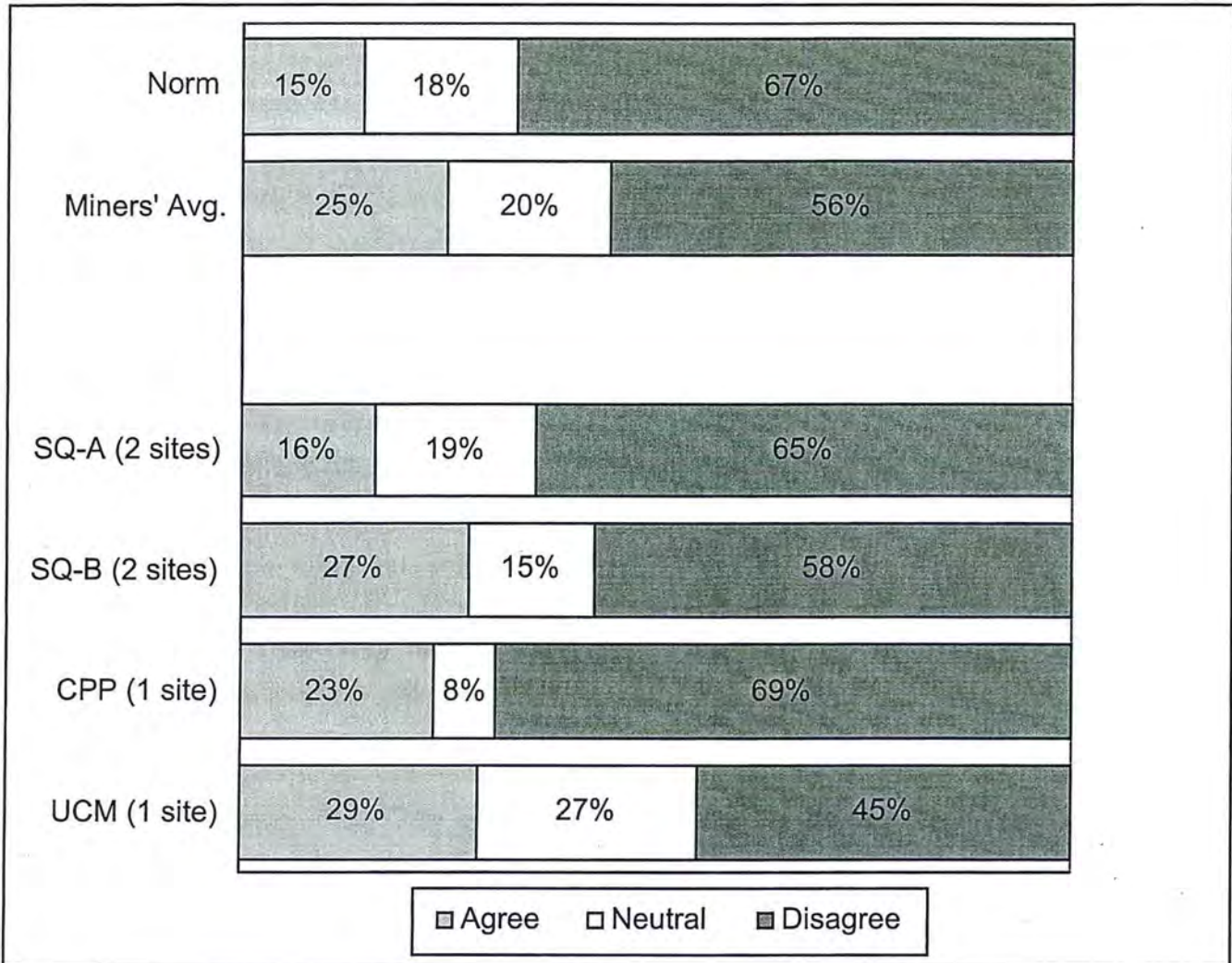
Peer Support for Safety by Question (continued)

5. Employees do not like it when coworkers bypass safety policy, even when no harm is done.



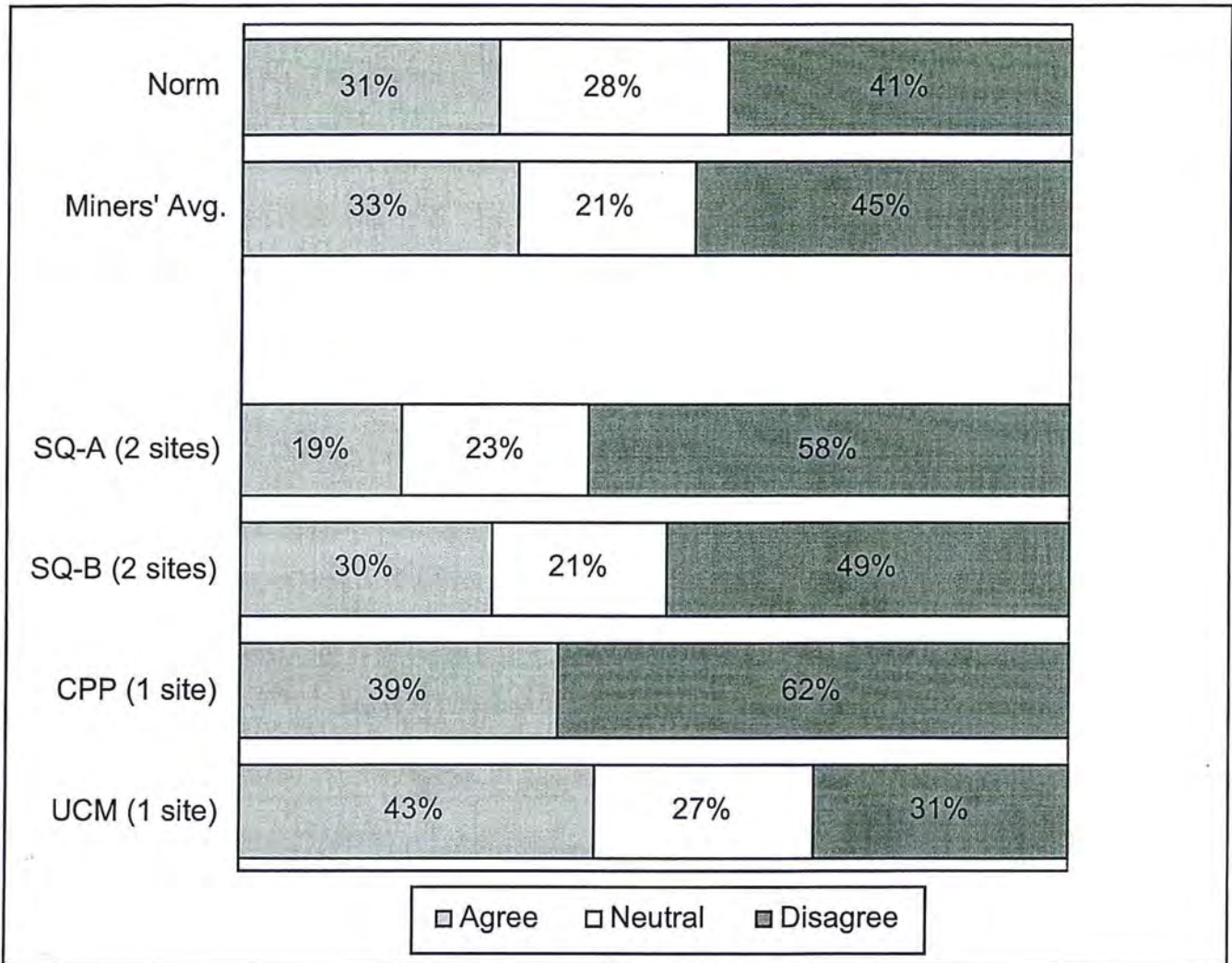
Peer Support for Safety by Question (continued)

9. I feel pressure from my coworkers to “short-cut” safe work practices.



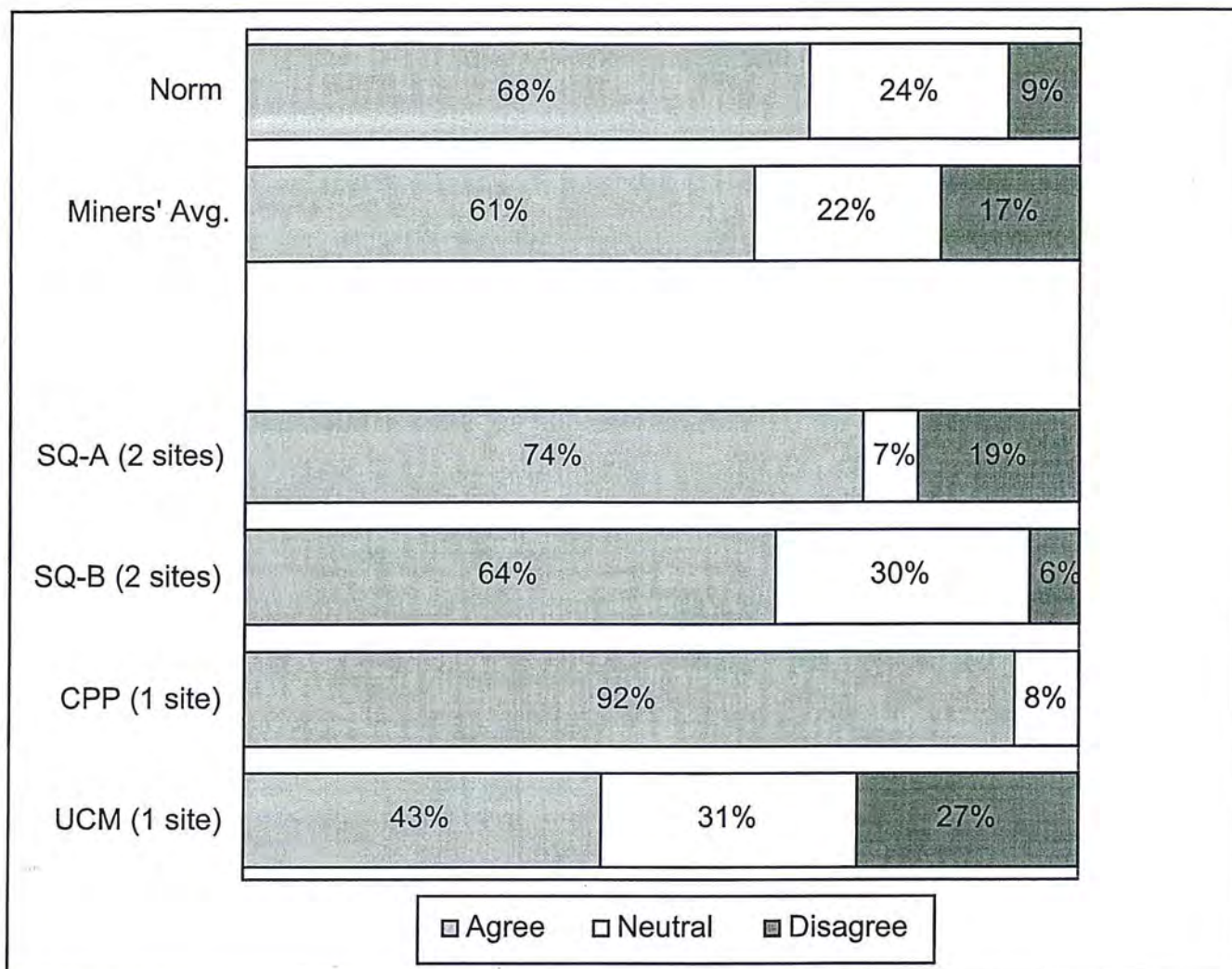
Peer Support for Safety by Question (continued)

34. Employees here often “short-cut” safe work practices.



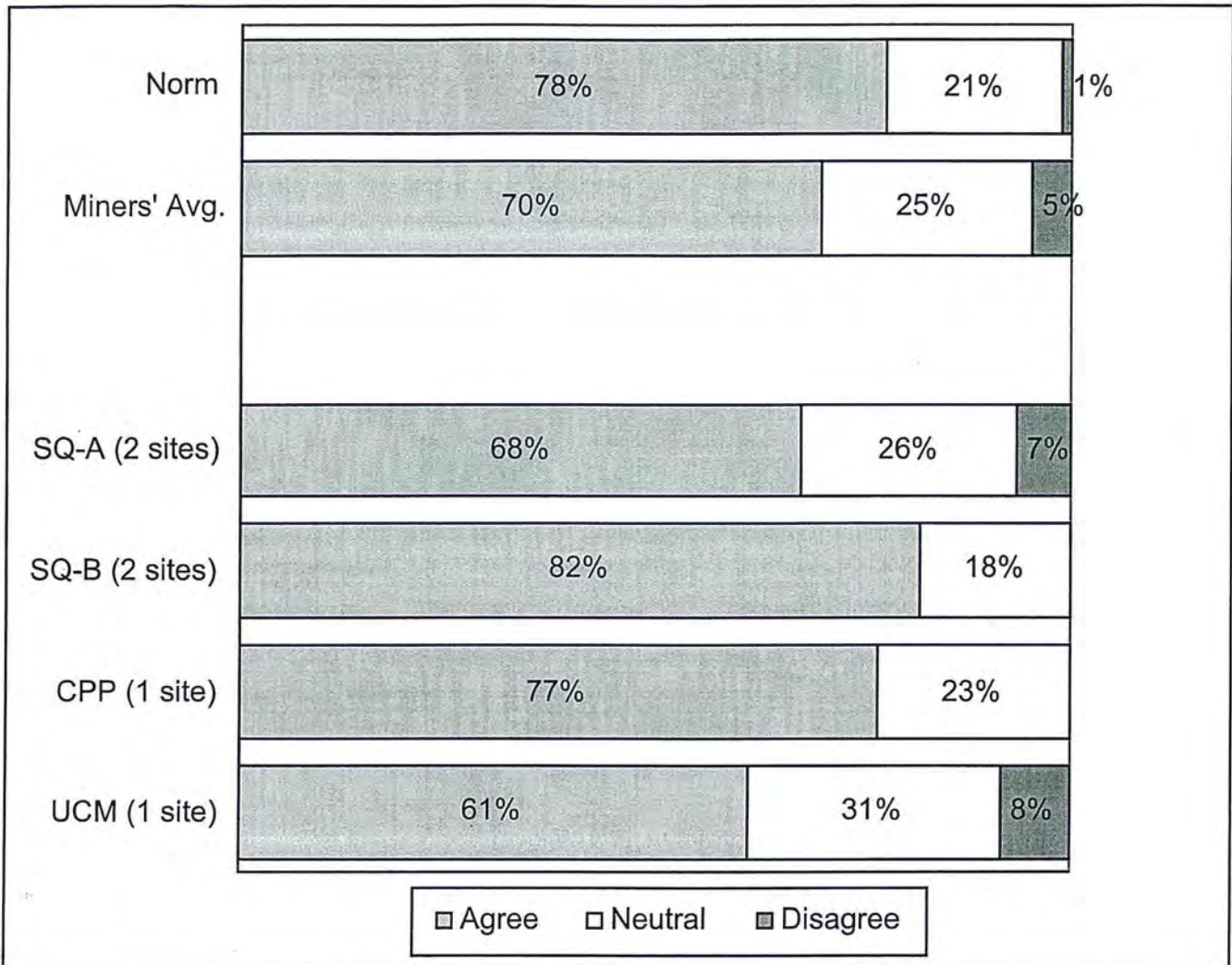
Peer Support for Safety by Question (continued)

119. Most of my coworkers actively support the company's safety programs.



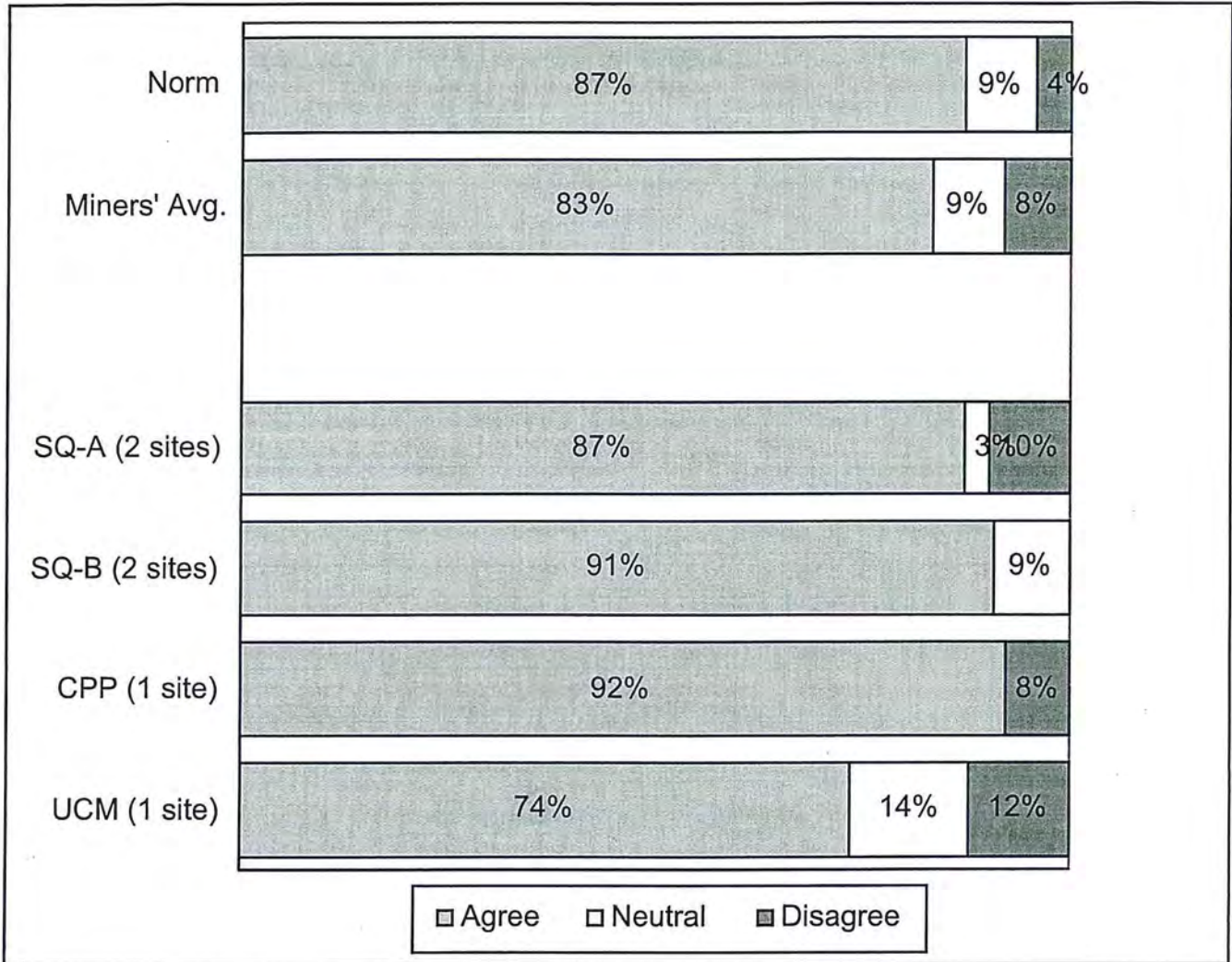
Personal Responsibility for Safety

Overall Personal Responsibility for Safety by Company



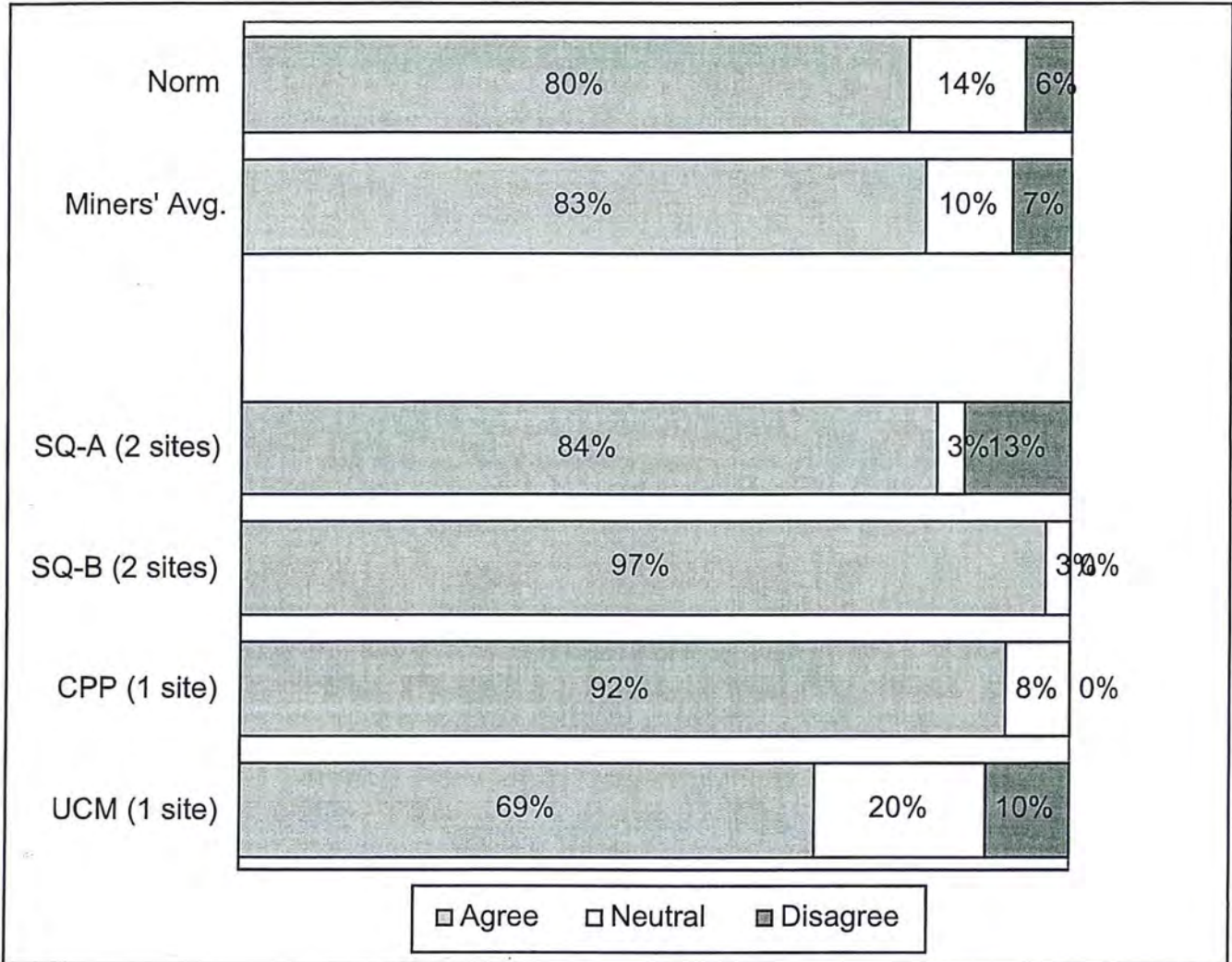
Personal Responsibility for Safety by Question

82. It is the responsibility of each employee to seek out opportunities to prevent injury to him- or herself.



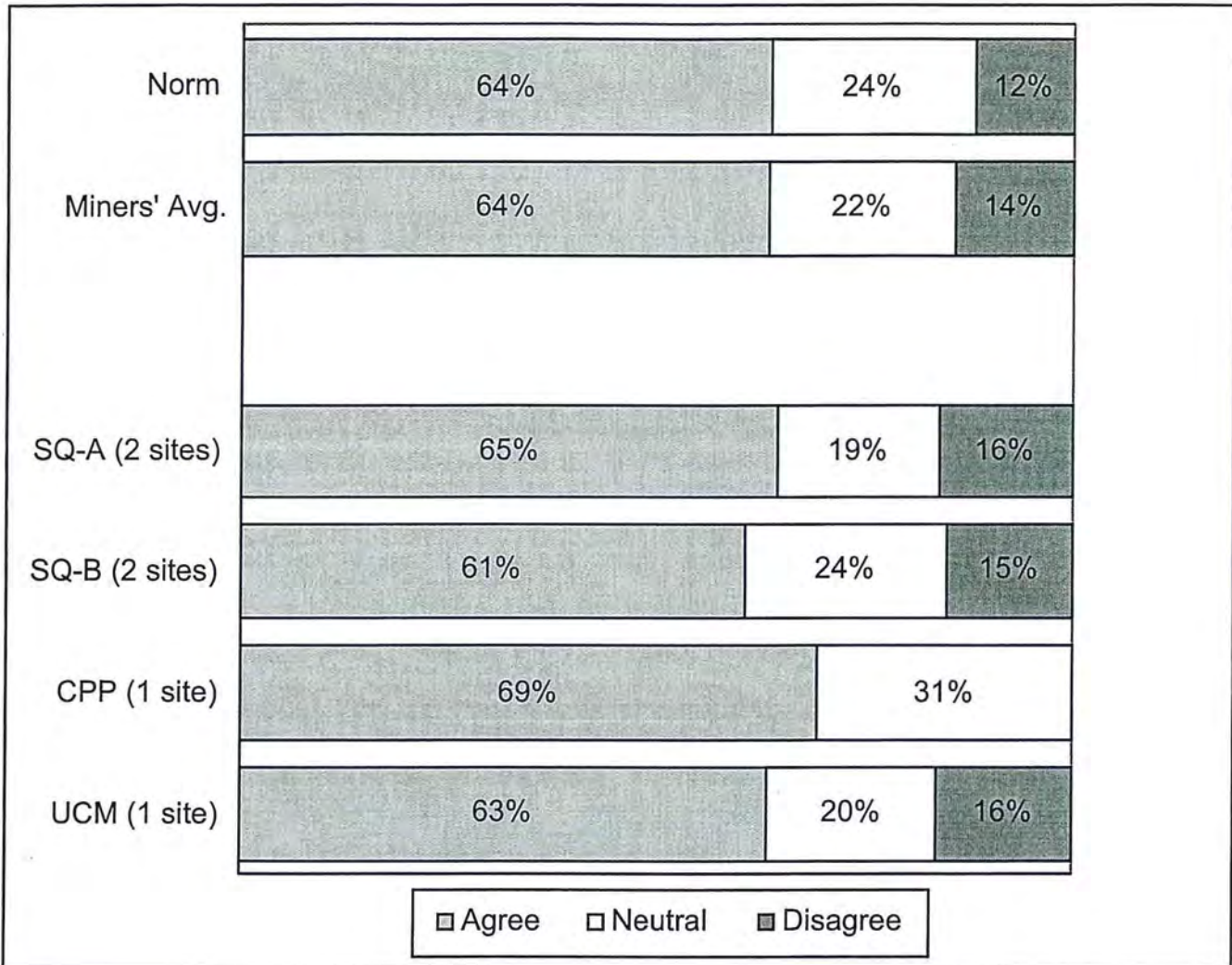
Personal Responsibility for Safety by Question (continued)

61. It is the responsibility of each employee to seek out opportunities to prevent injury to others.



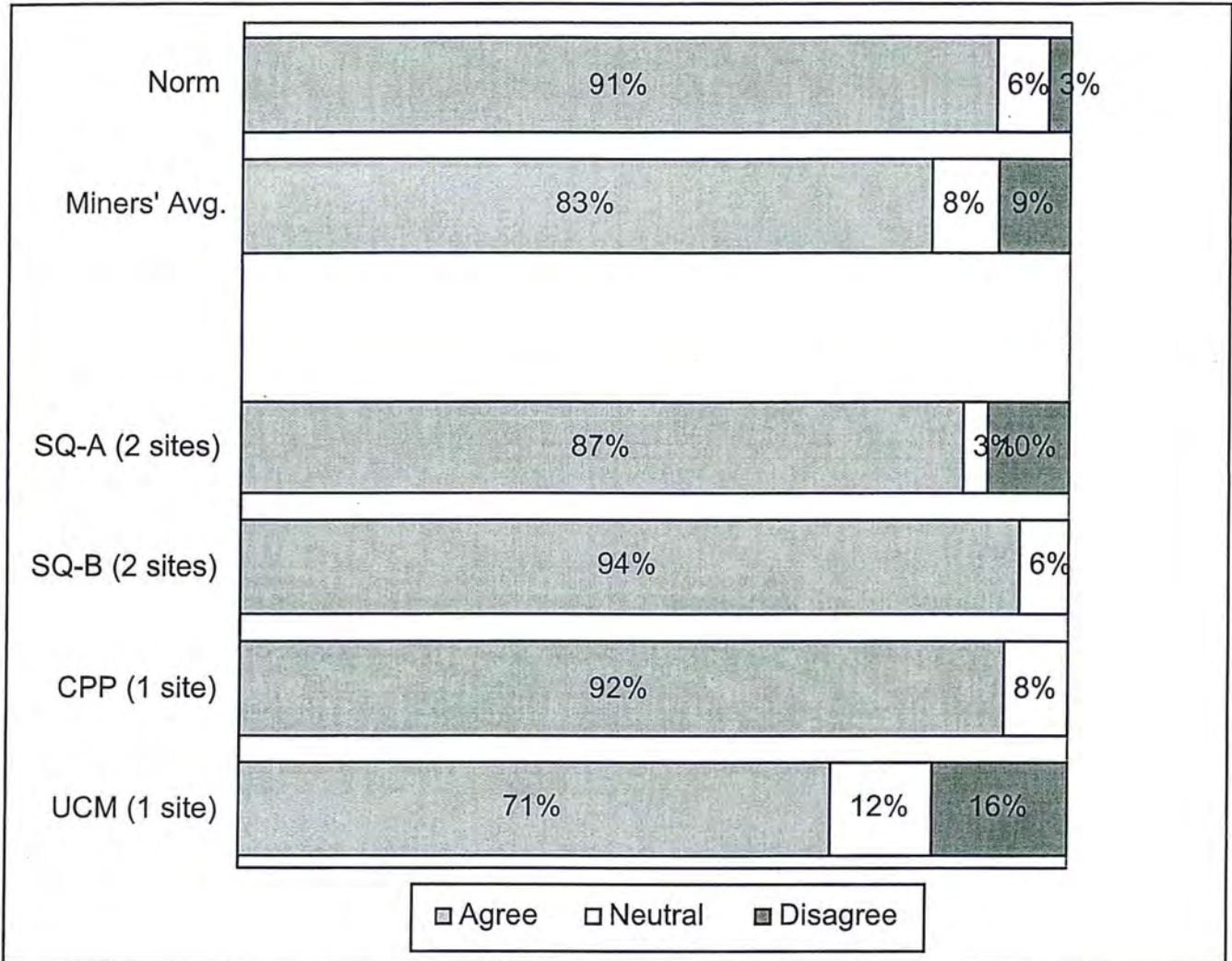
Personal Responsibility for Safety by Question (continued)

109. I have more respect for workers who work safely than for those who do not.



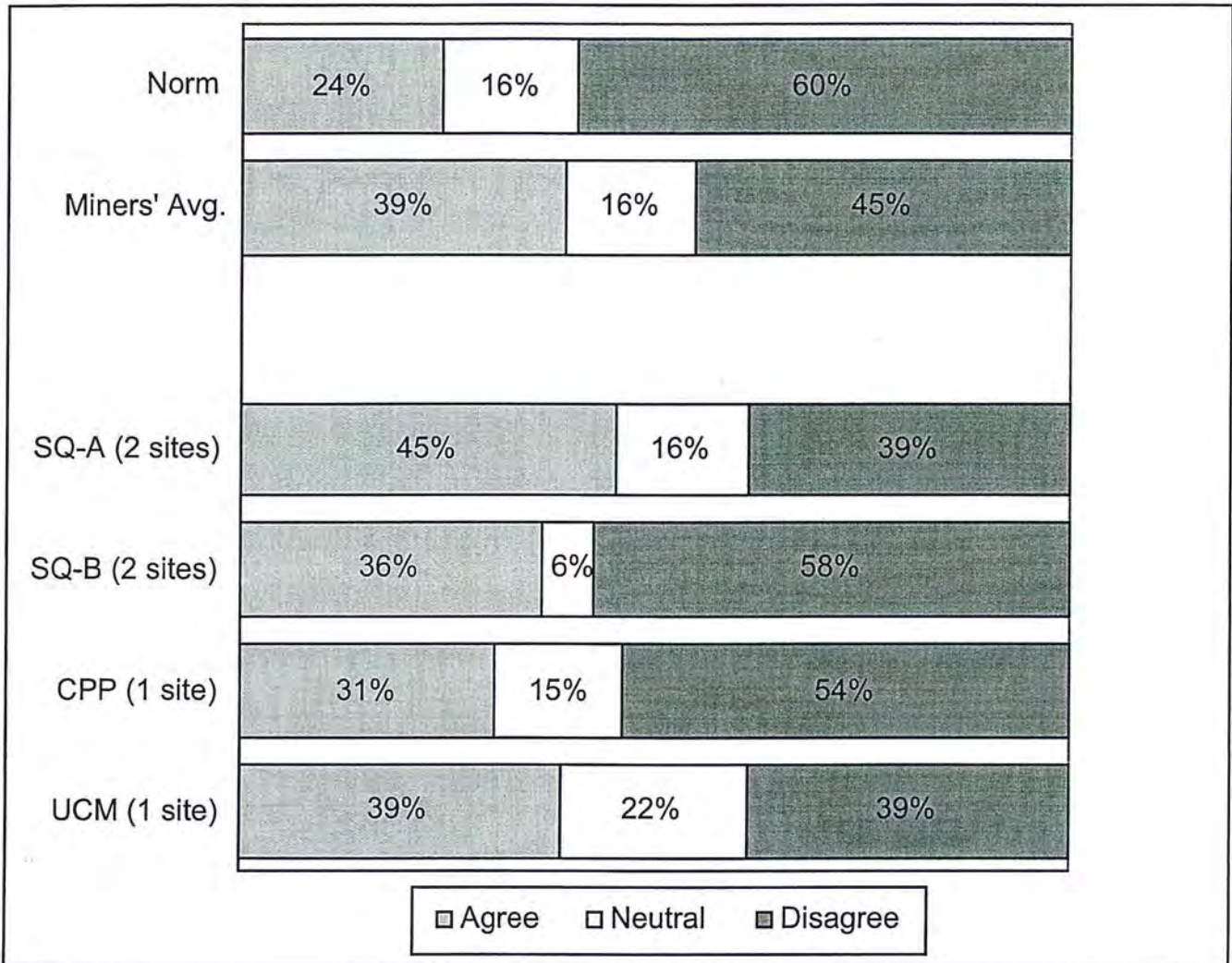
Personal Responsibility for Safety by Question (continued)

69. When a safety rule or procedure is issued, I try to follow it as best I can.



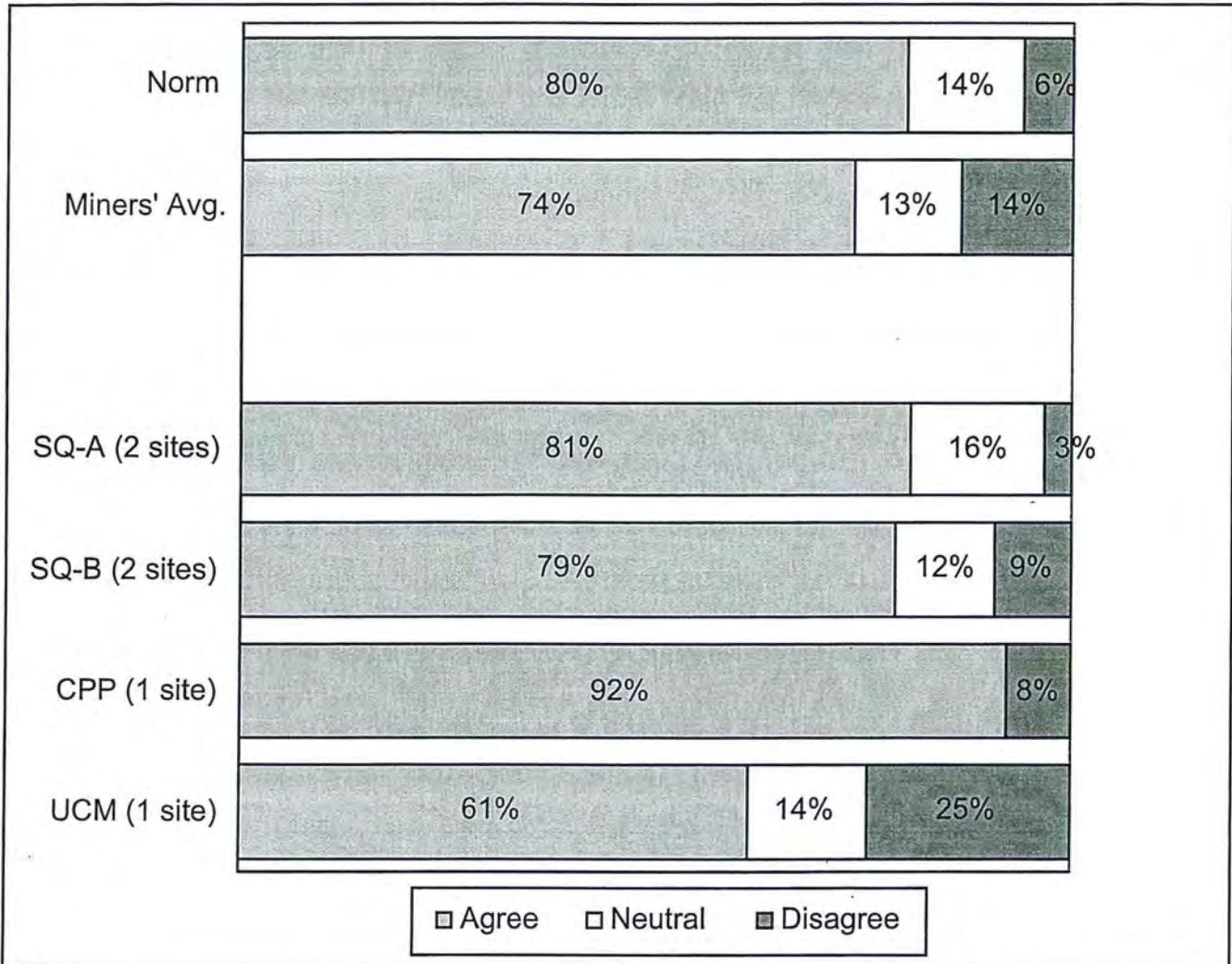
Personal Responsibility for Safety by Question (continued)

16. I sometimes overlook hazards to get the job done.



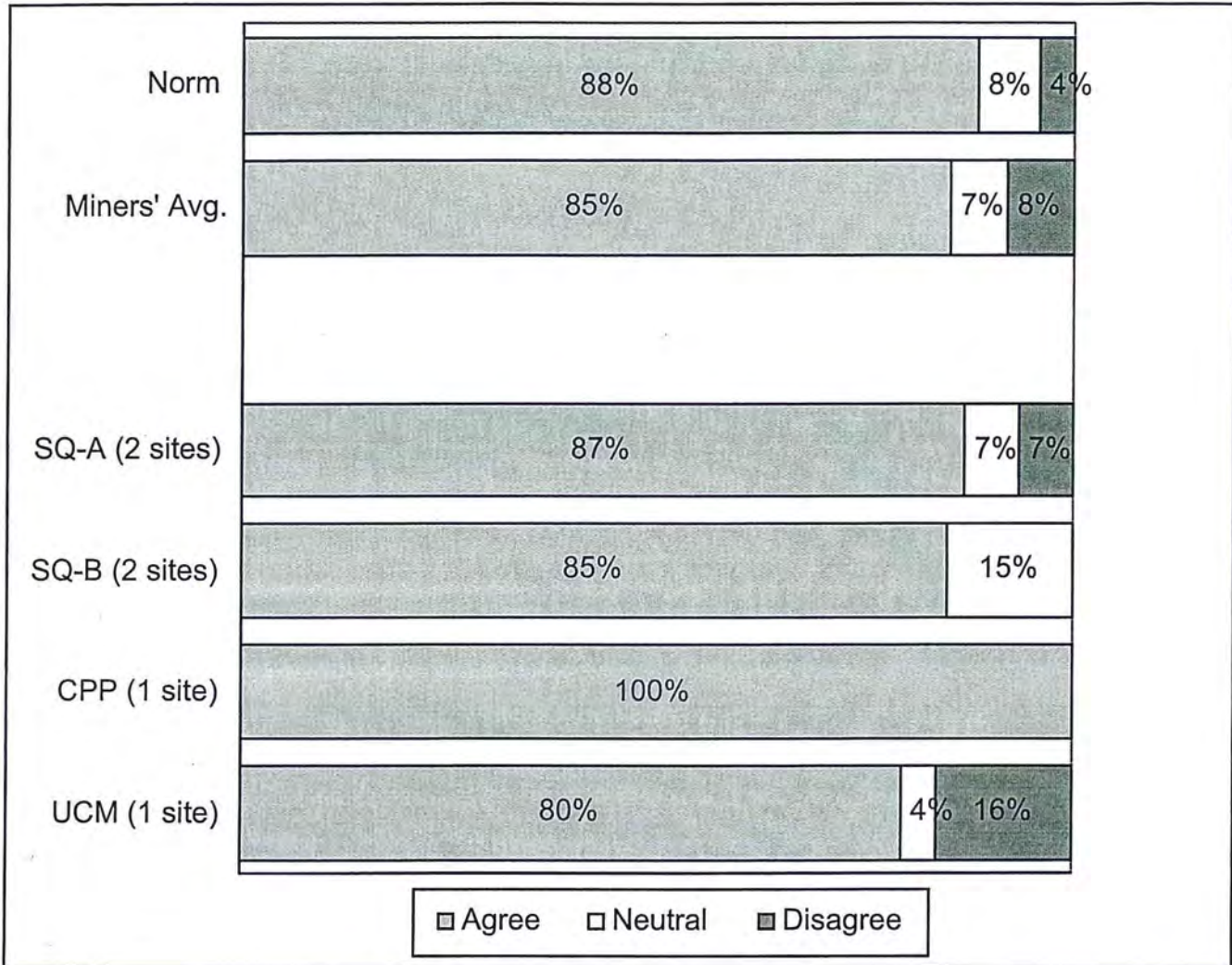
Personal Responsibility for Safety by Question (continued)

65. When I see a potential safety hazard, I personally do something to correct it.



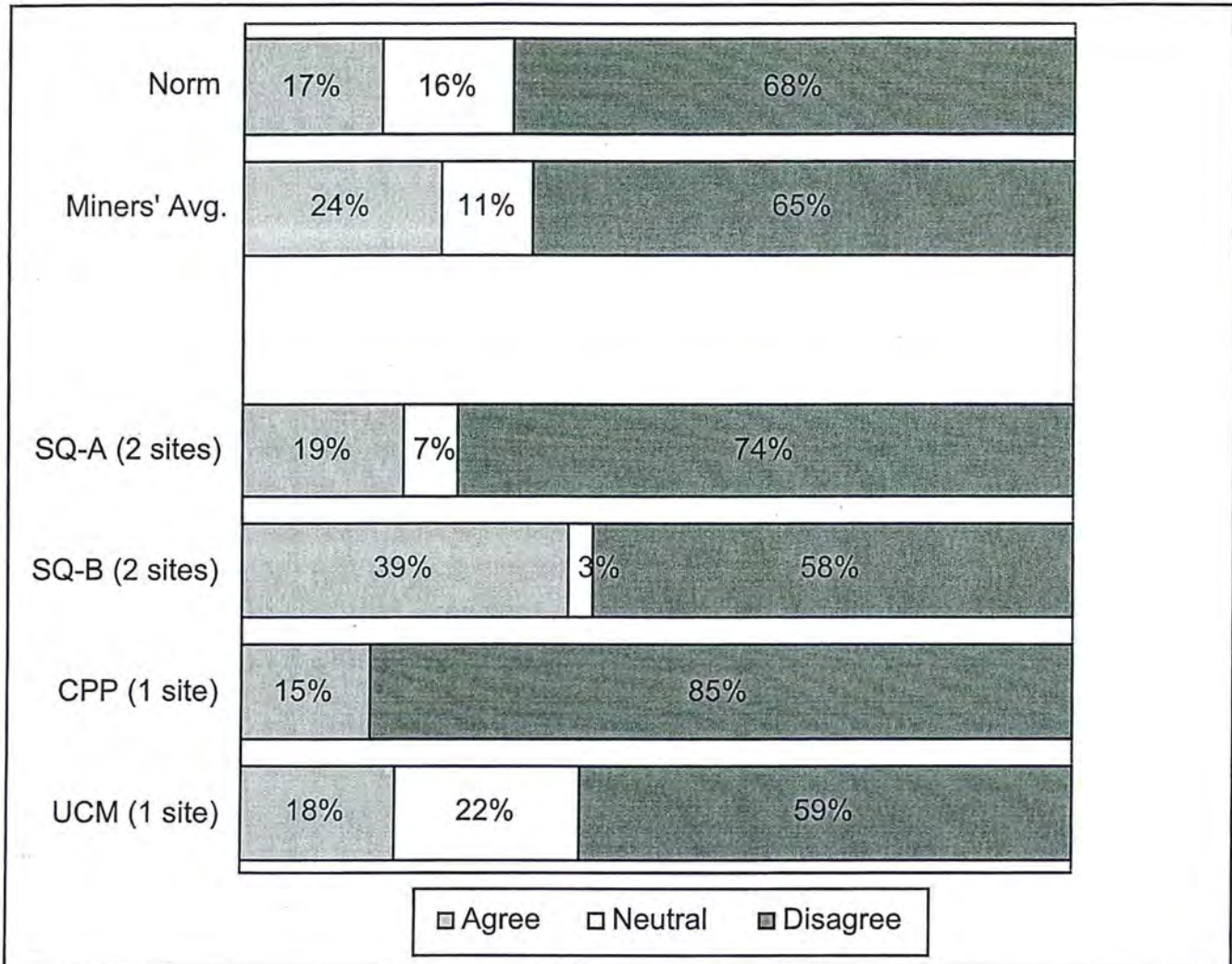
Personal Responsibility for Safety by Question (continued)

8. I am willing to put forth a little extra effort to improve safety at our site.



Personal Responsibility for Safety by Question (continued)

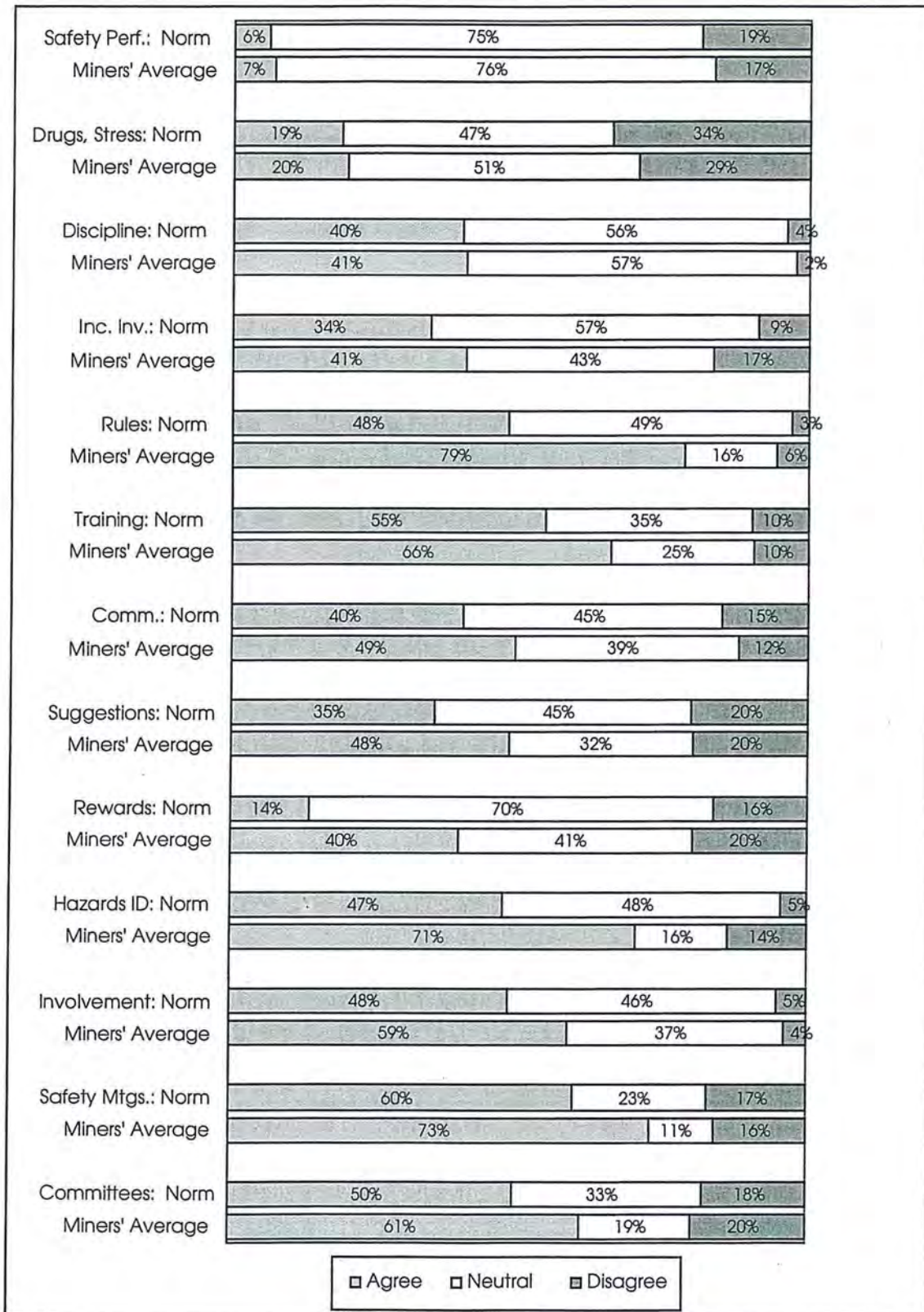
2. Besides performing my own job safely, there is little I can do to improve site safety.



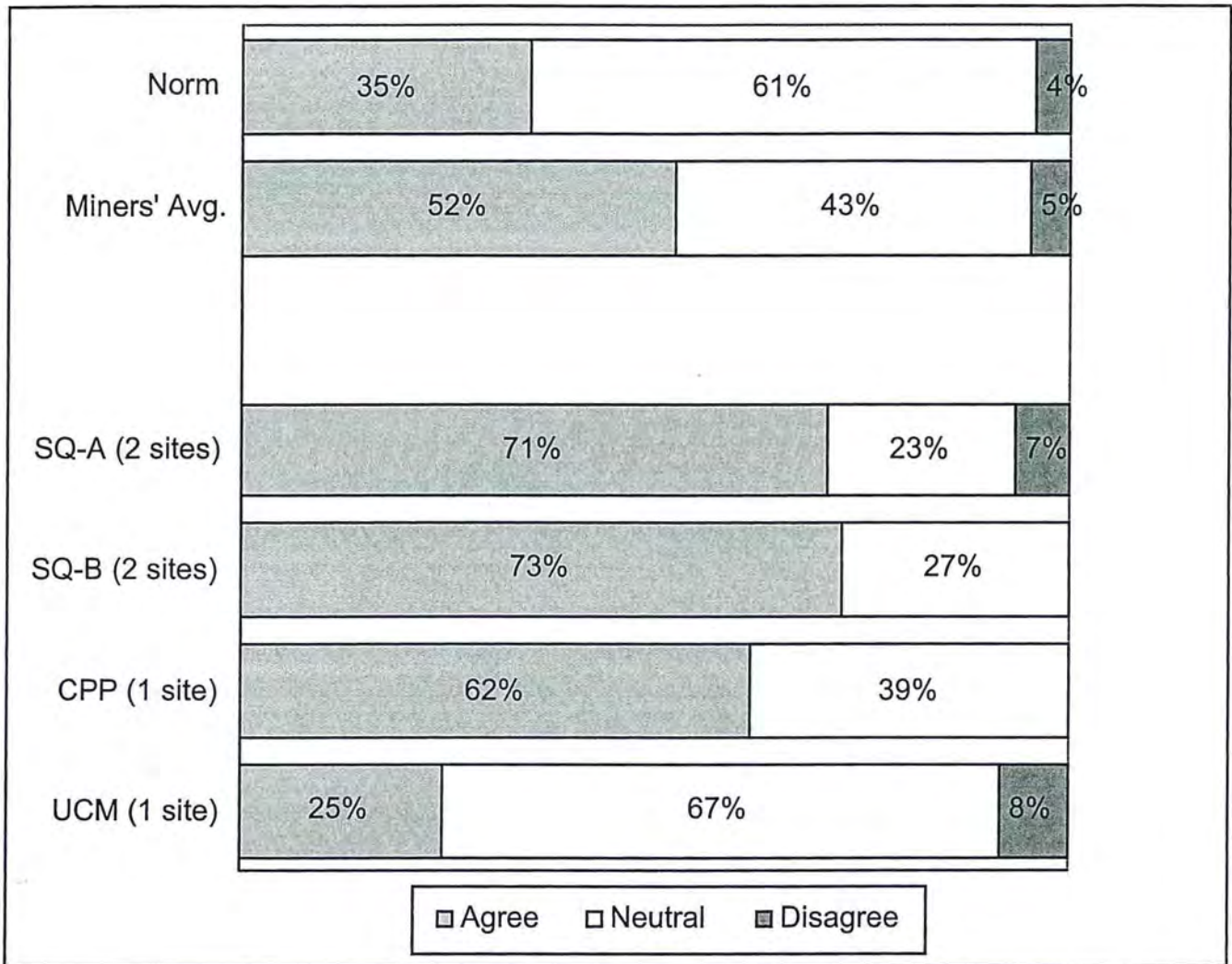
Safety Management Systems

Safety Performance
Stress, Drugs, and Alcohol
Discipline
Incident Reporting and Investigations
Rules and Regulations
Training
Communication
Safety Suggestions
Rewards and Reinforcement
Hazards Identification and Corrections
Employee Involvement
Other Safety Management Systems

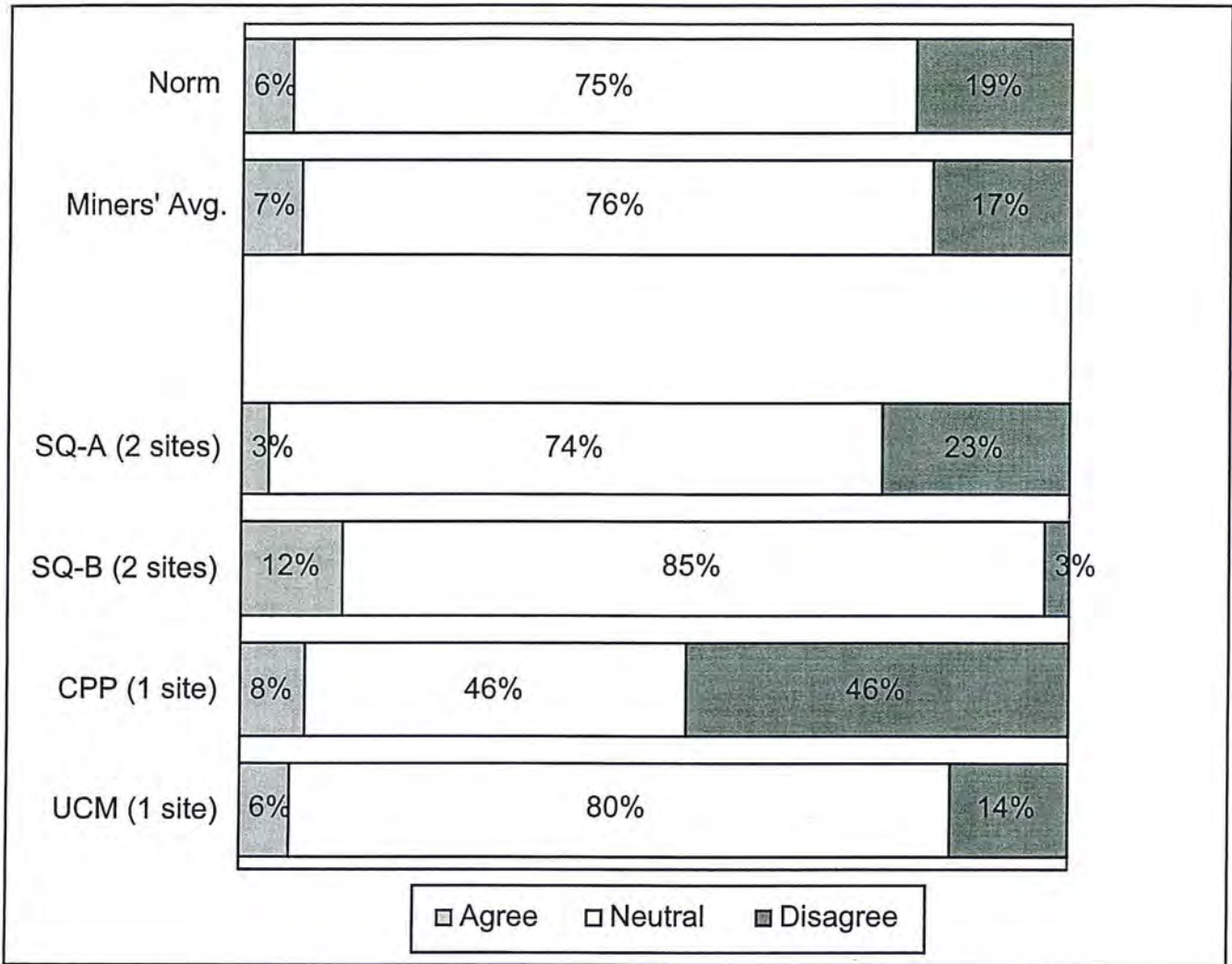
Overall Safety Management Systems



Overall Safety Management Systems by Company

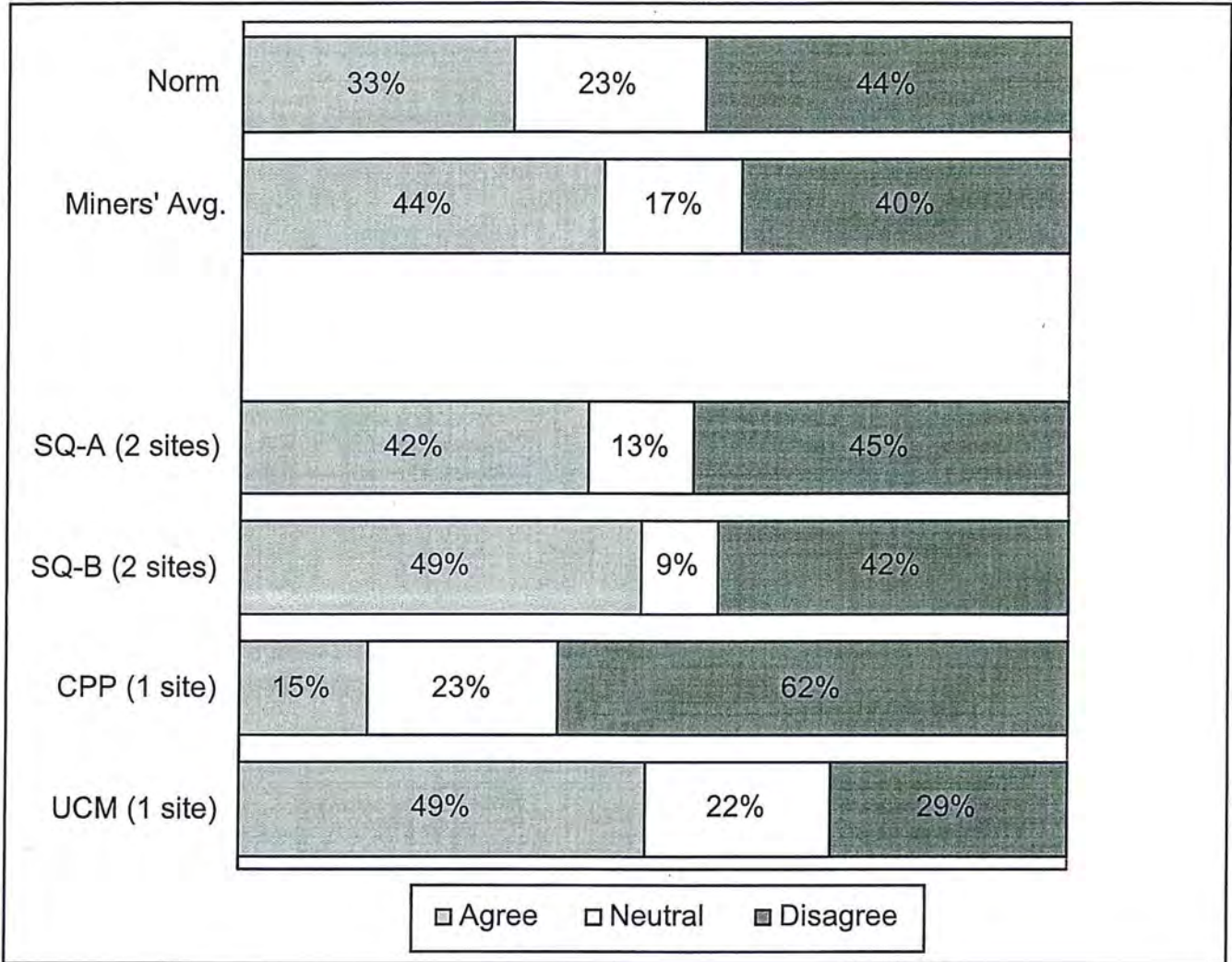


Overall Safety Performance by Company



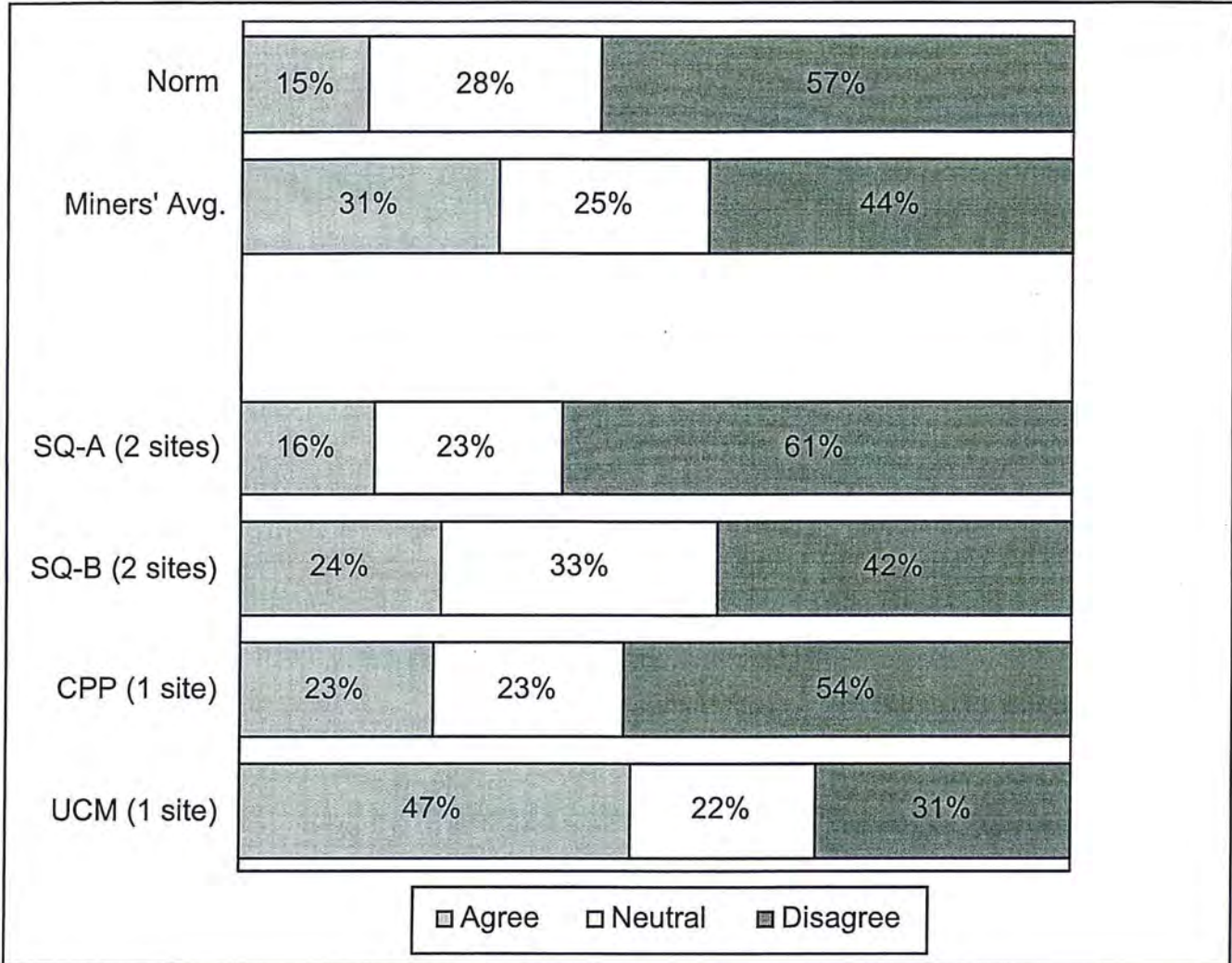
Safety Performance by Question

89. The risk level of my job concerns me quite a bit.



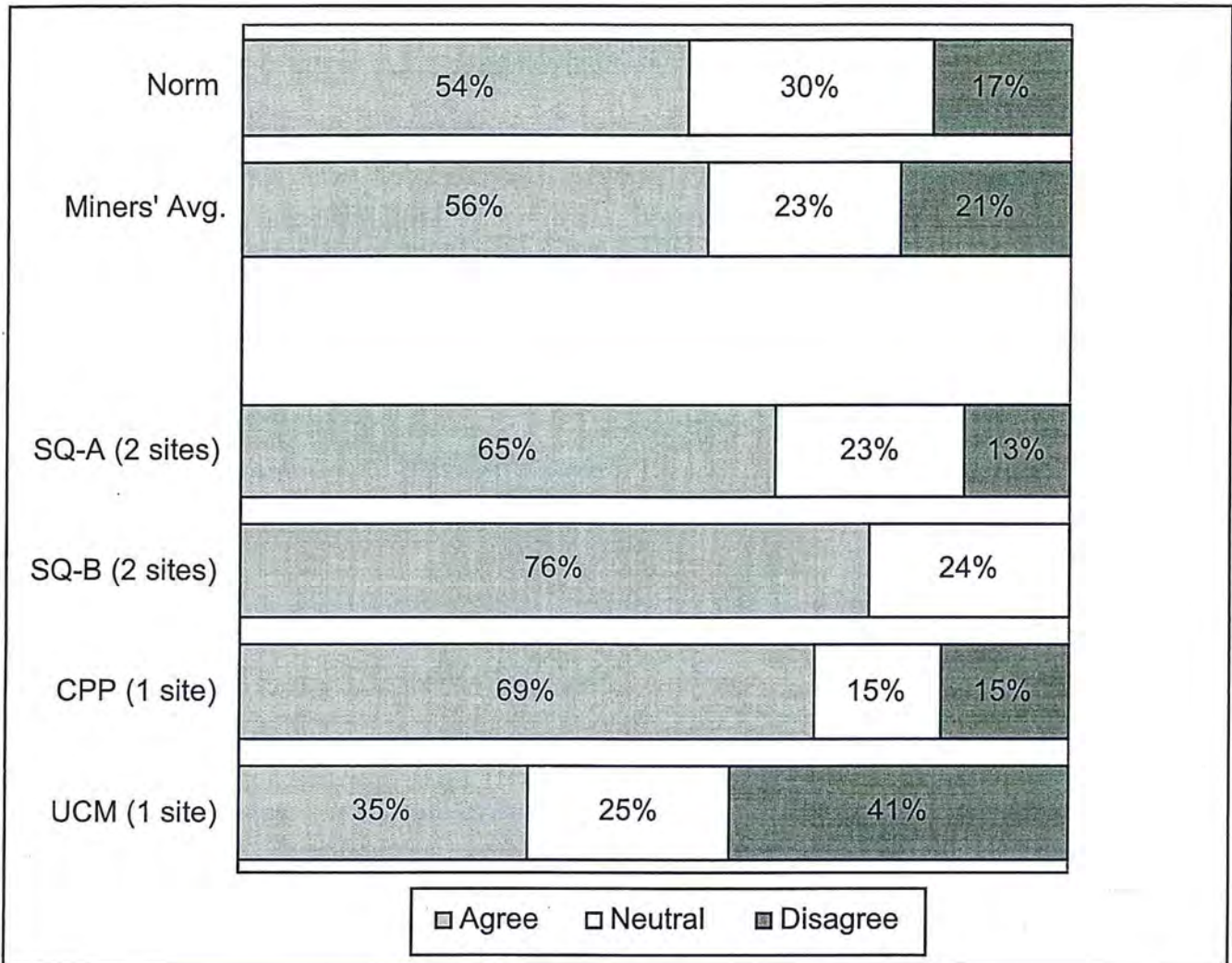
Safety Performance by Question (continued)

95. Compared to other workplaces, I think mine is rather risky.



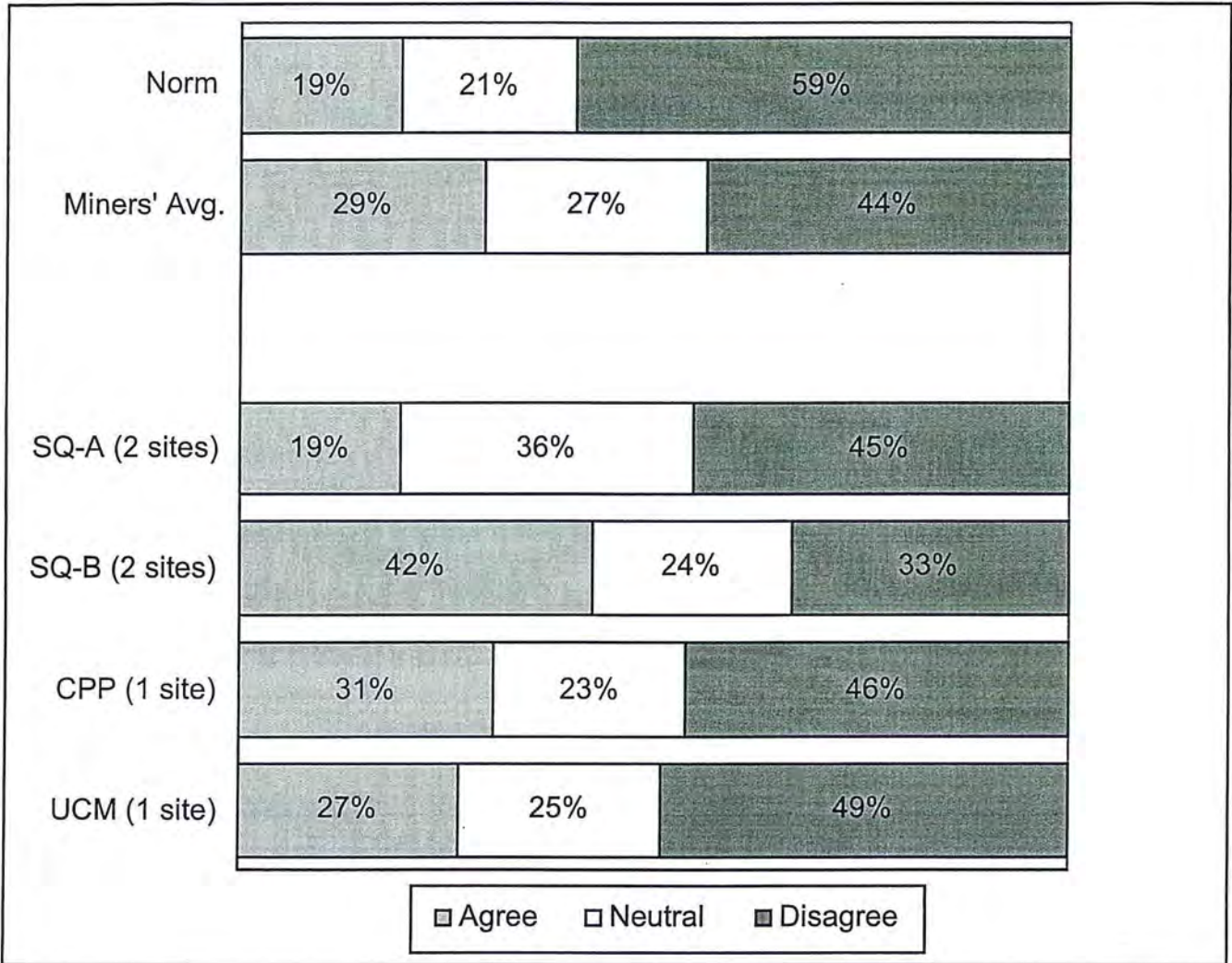
Safety Performance by Question (continued)

122. The company's current safety performance is very good.



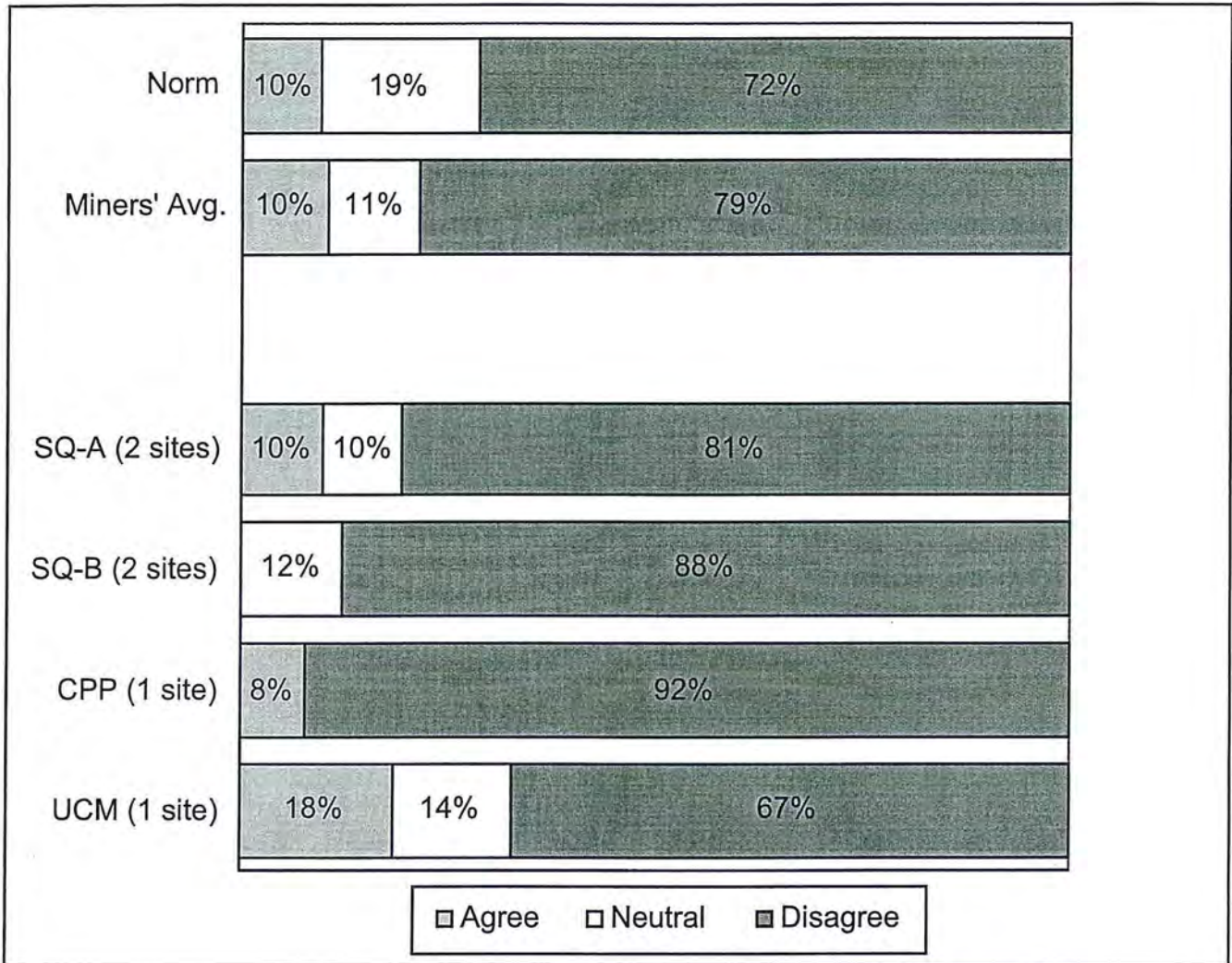
Safety Performance by Question (continued)

40. If the company maintains its current safety performance, that will be good enough.



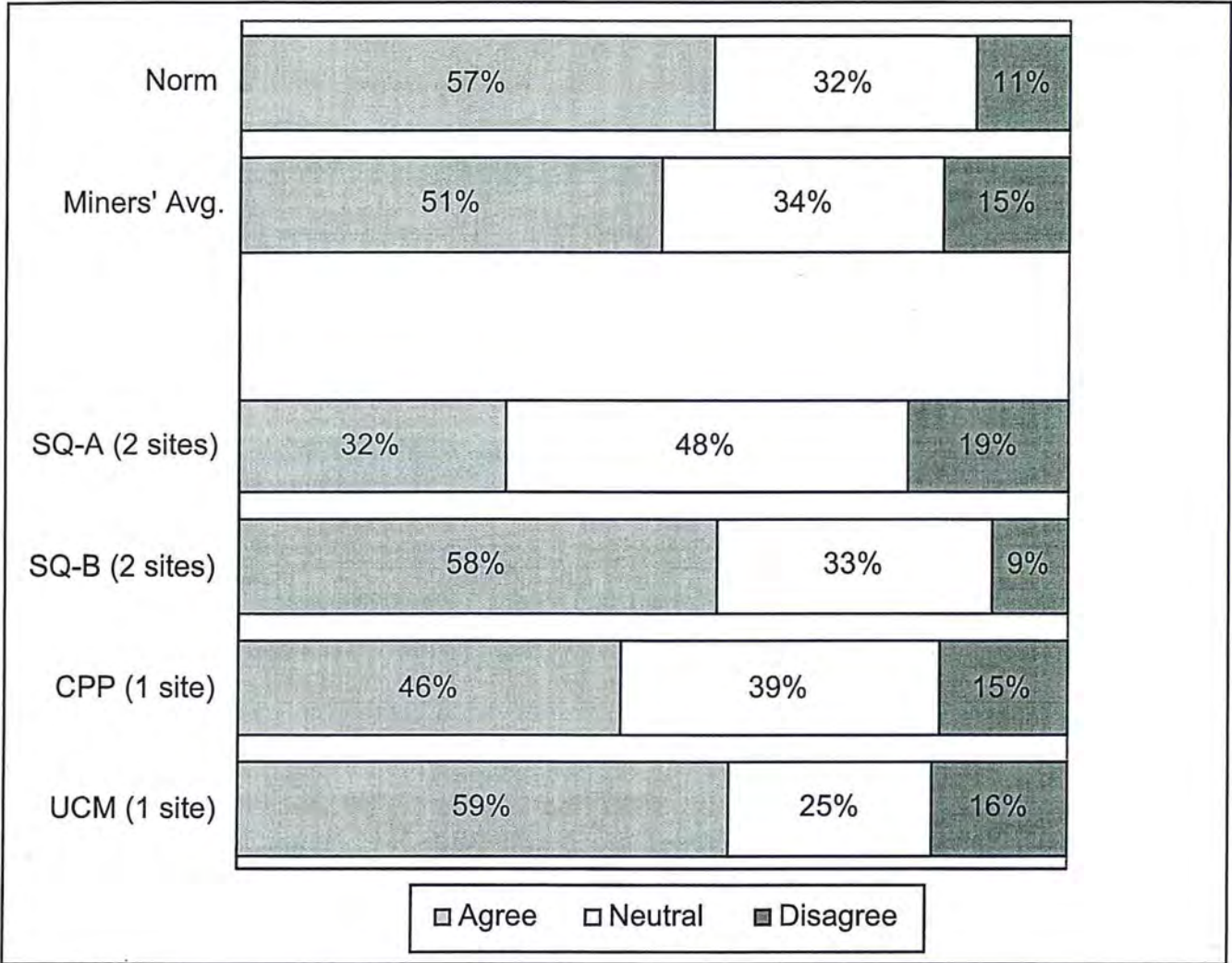
Safety Performance by Question (continued)

73. The company currently spends too much effort on safety.

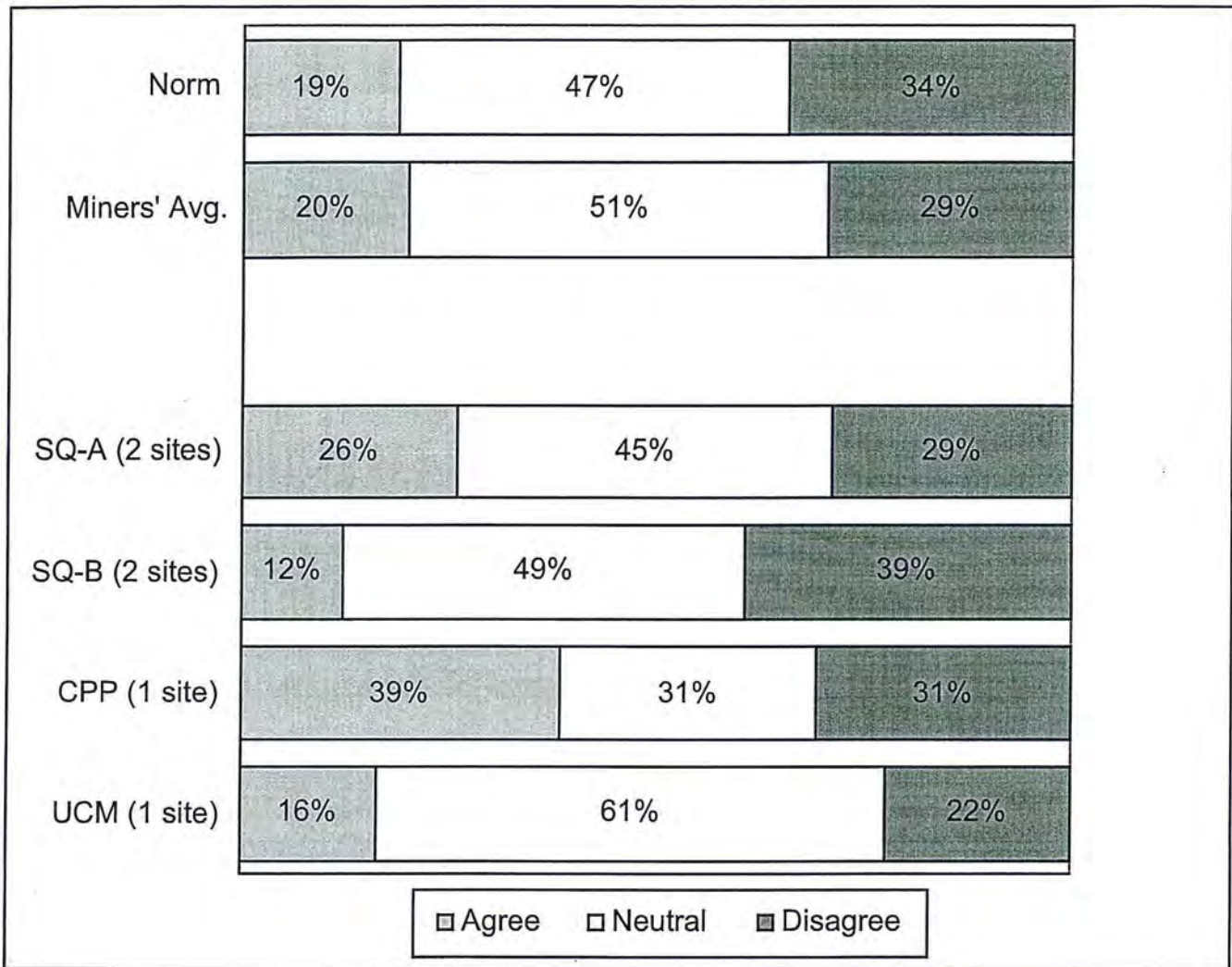


Safety Performance by Question (continued)

19. The company should be doing more to improve workplace safety.

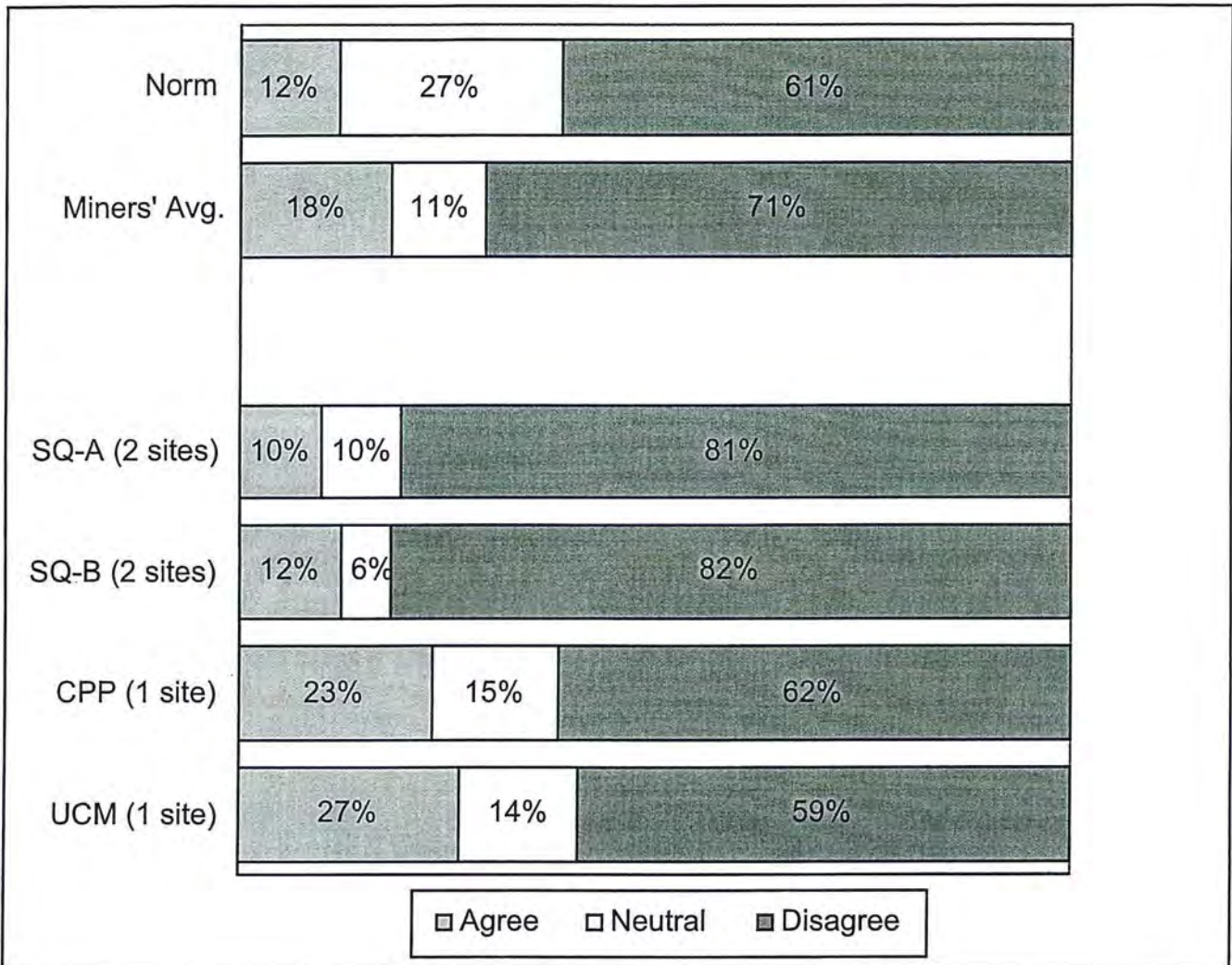


Overall Stress, Drugs, and Alcohol by Company



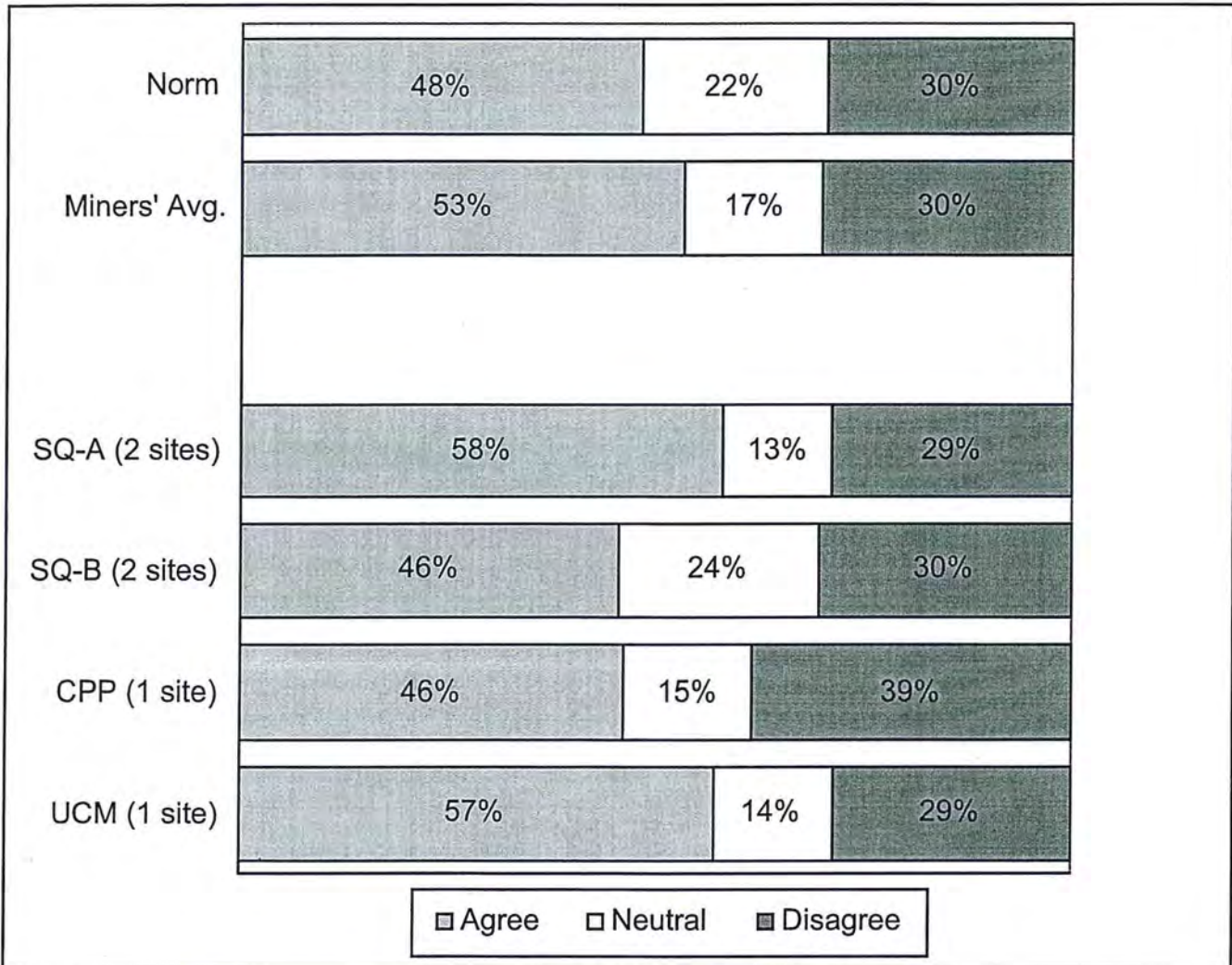
Stress, Drugs, and Alcohol by Question

90. Alcohol or drug abuse is a problem in my plant.



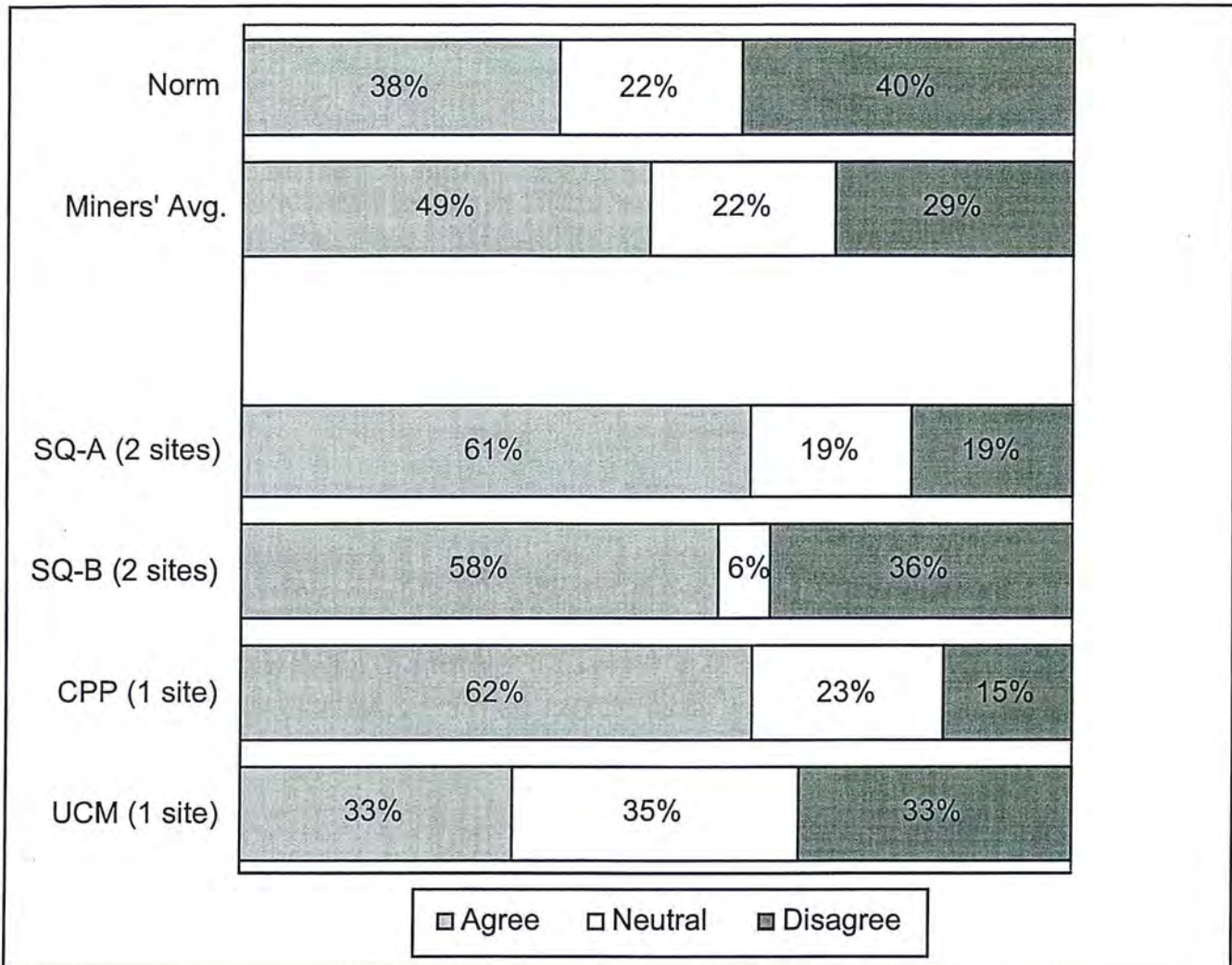
Stress, Drugs, and Alcohol by Question (continued)

78. I believe that work-related stress affects my ability to perform my job safely.

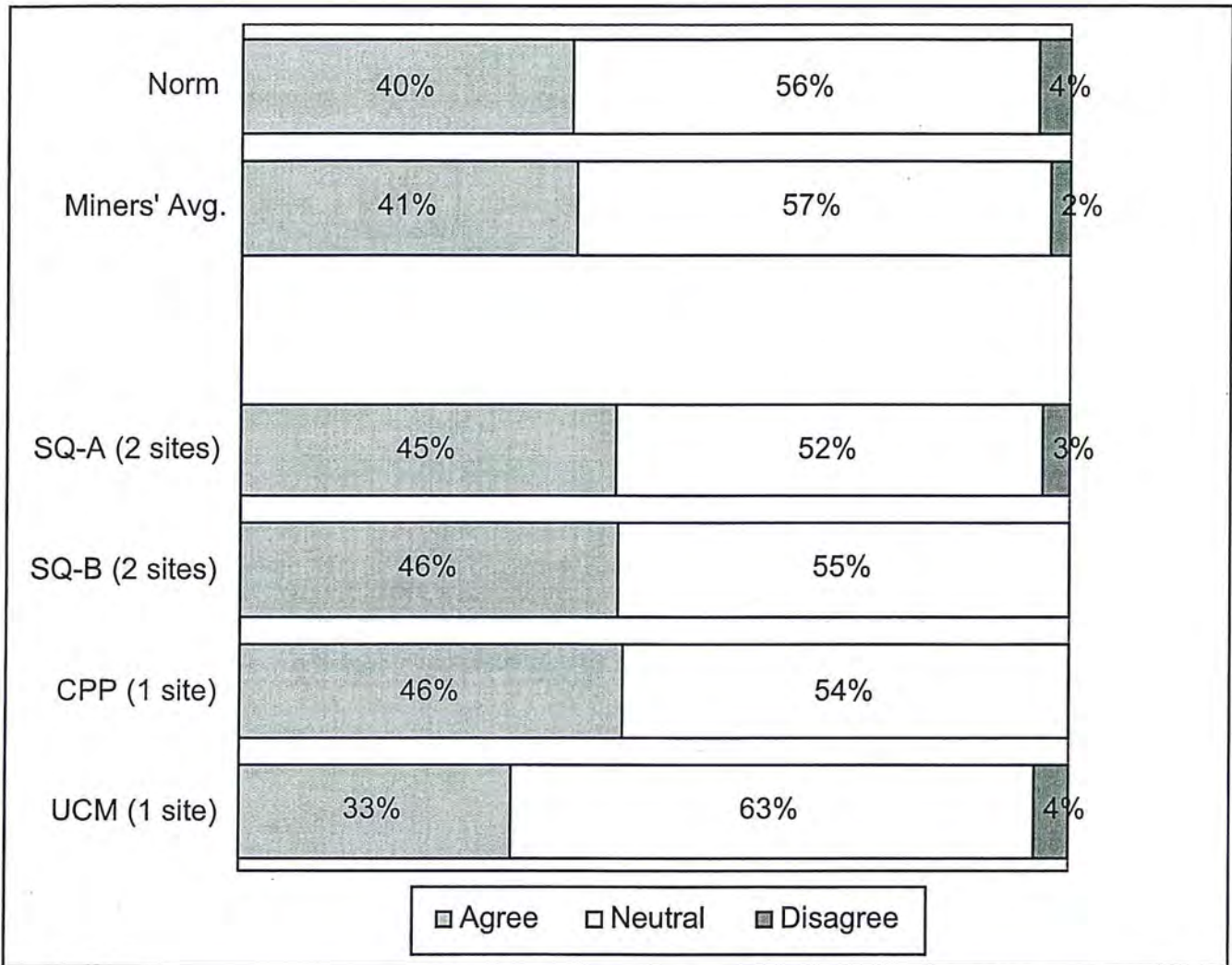


Stress, Drugs, and Alcohol by Question (continued)

30. I believe that stress caused from factors outside of work affects my ability to perform my job safely.

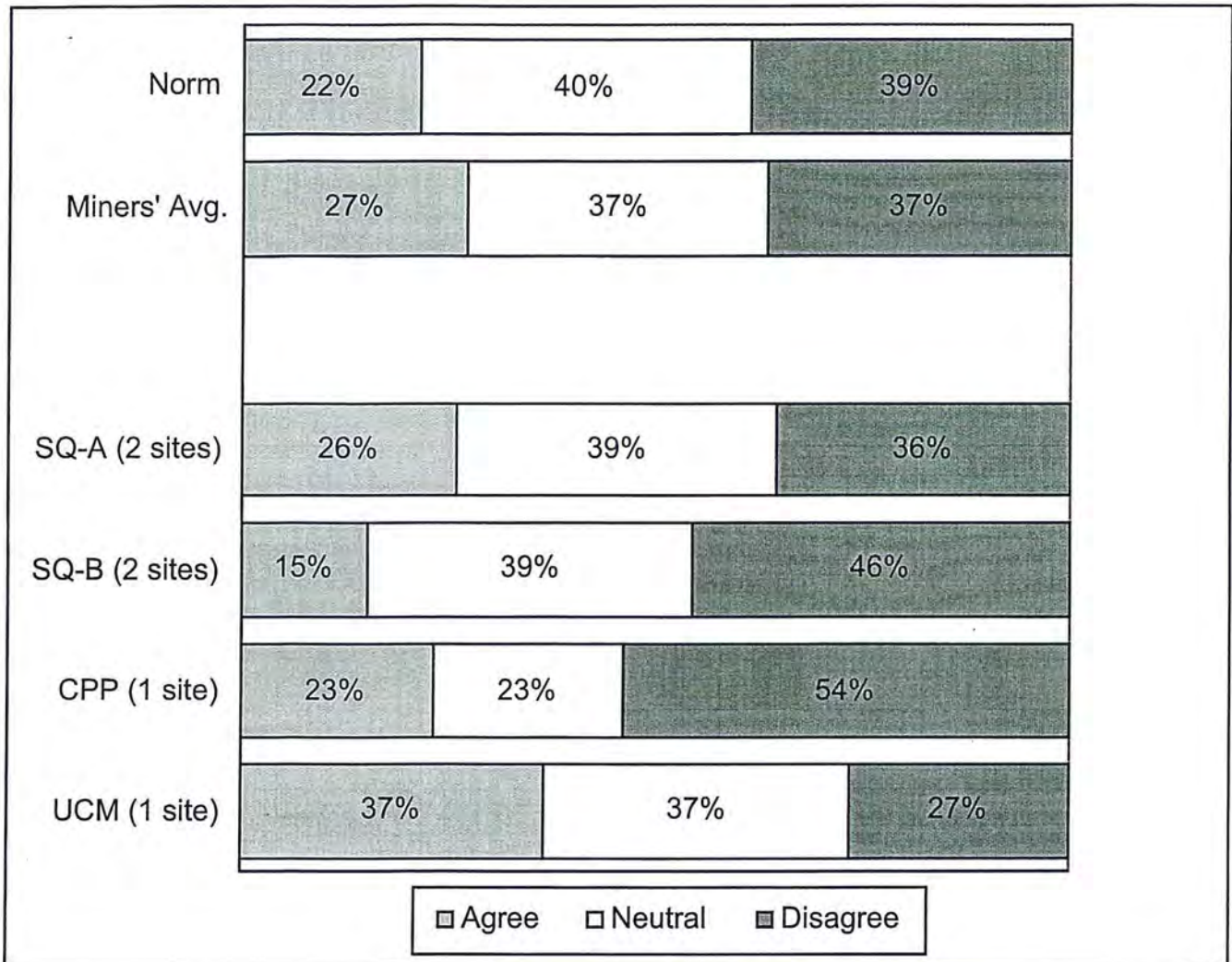


Overall Discipline by Company



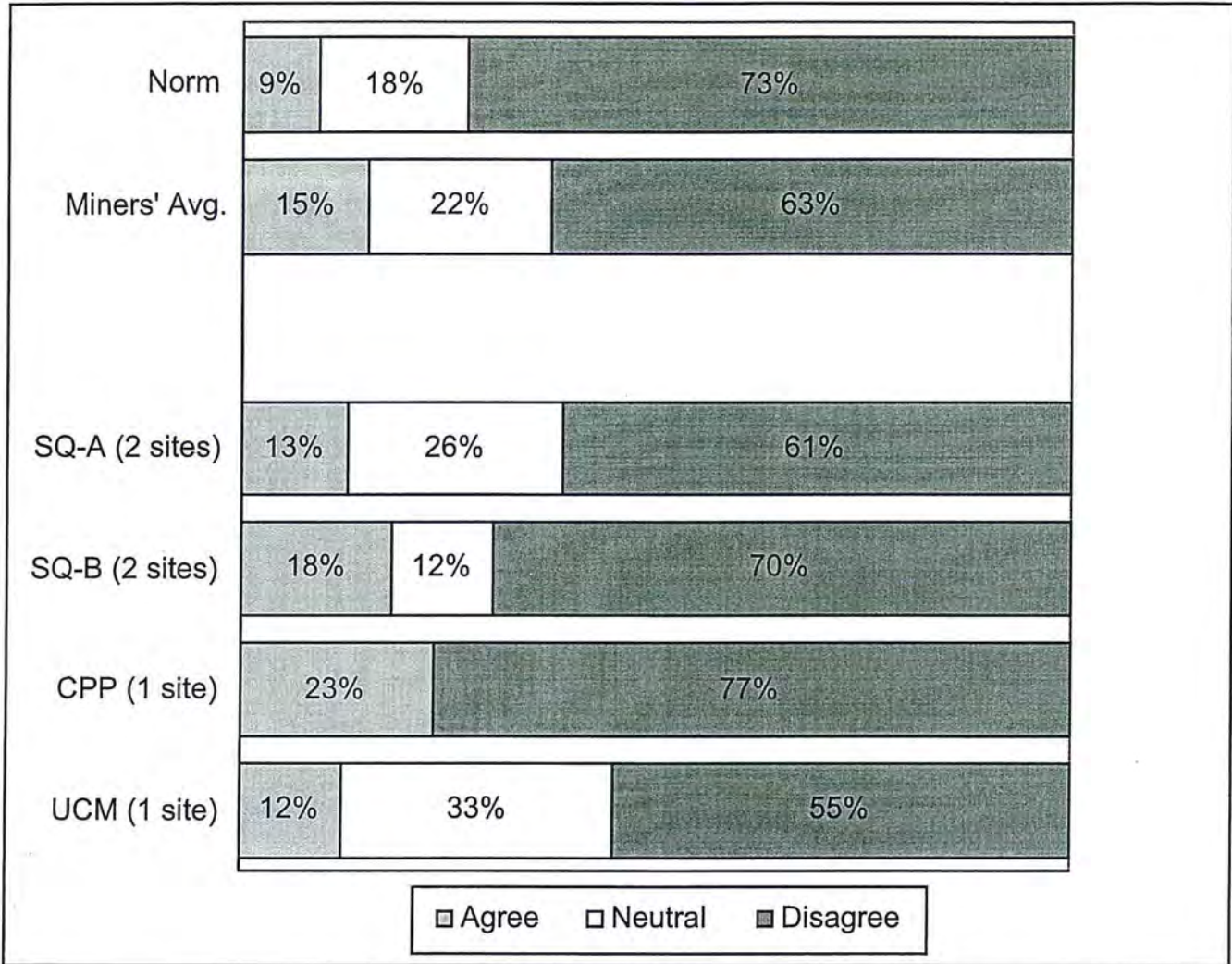
Discipline by Question

116. It is common for employees to be disciplined for having a work injury.



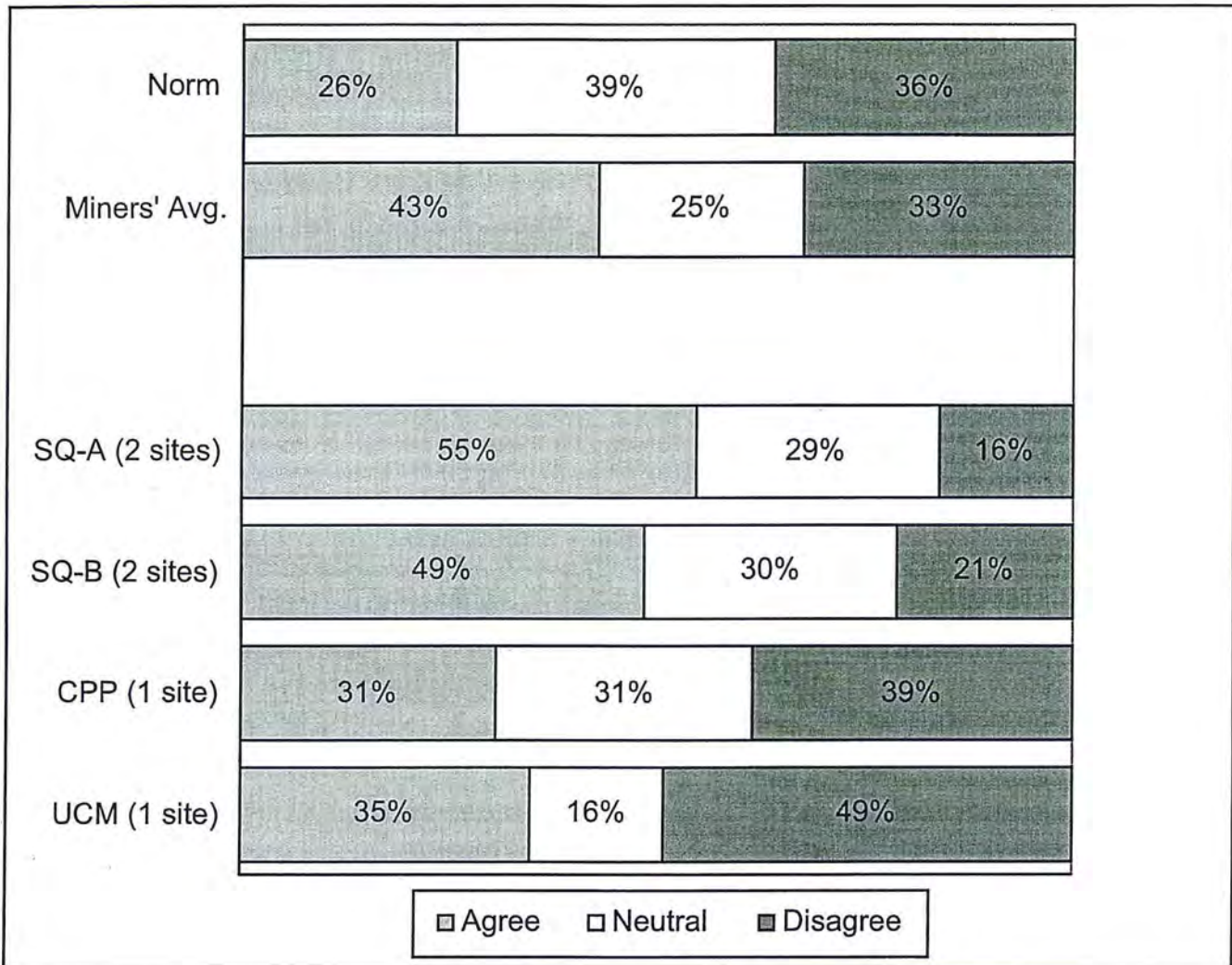
Discipline by Question (continued)

35. I have been disciplined for having a work injury.



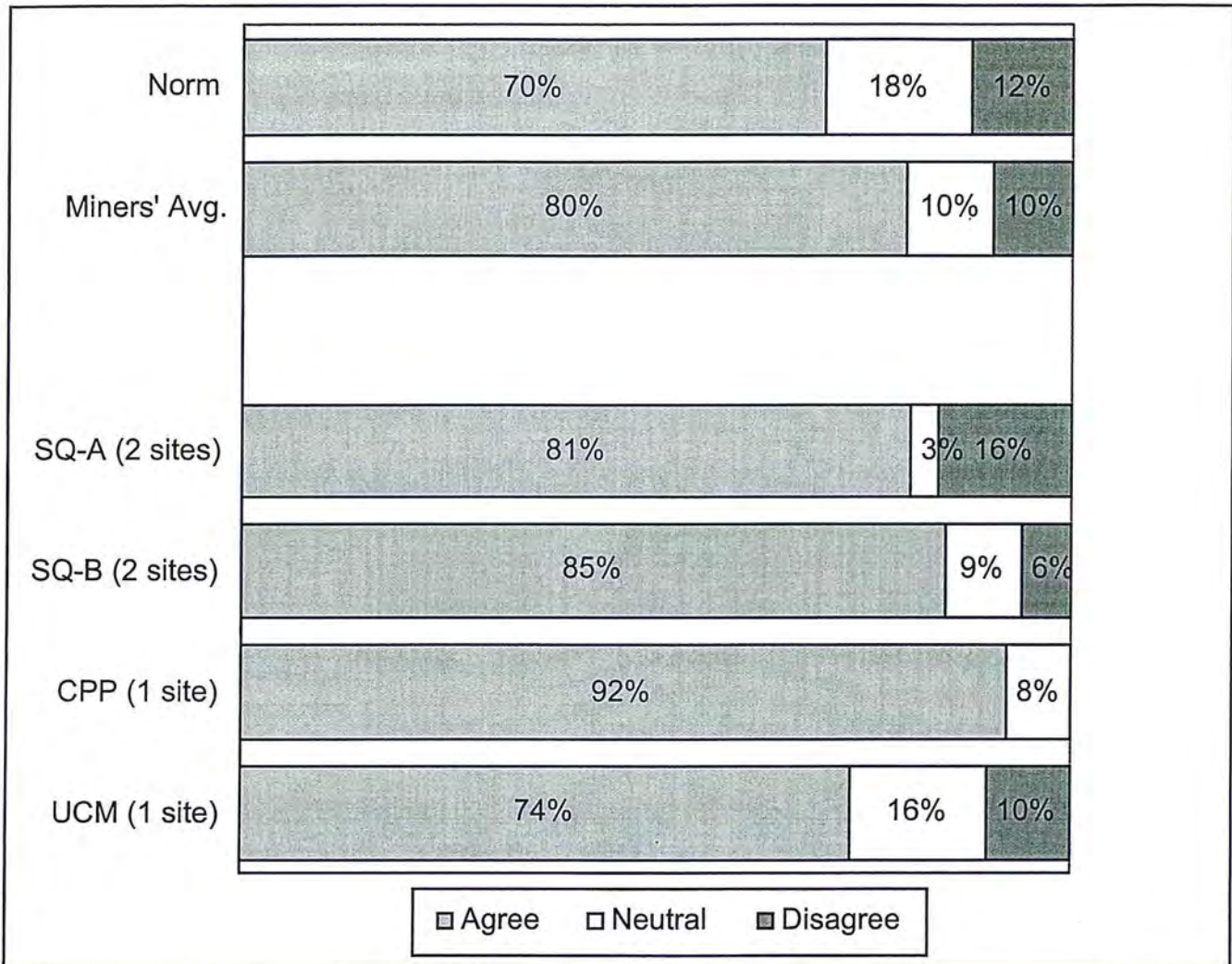
Discipline by Question (continued)

18. The company uses a consistent procedure for dealing with employees who violate safety rules.



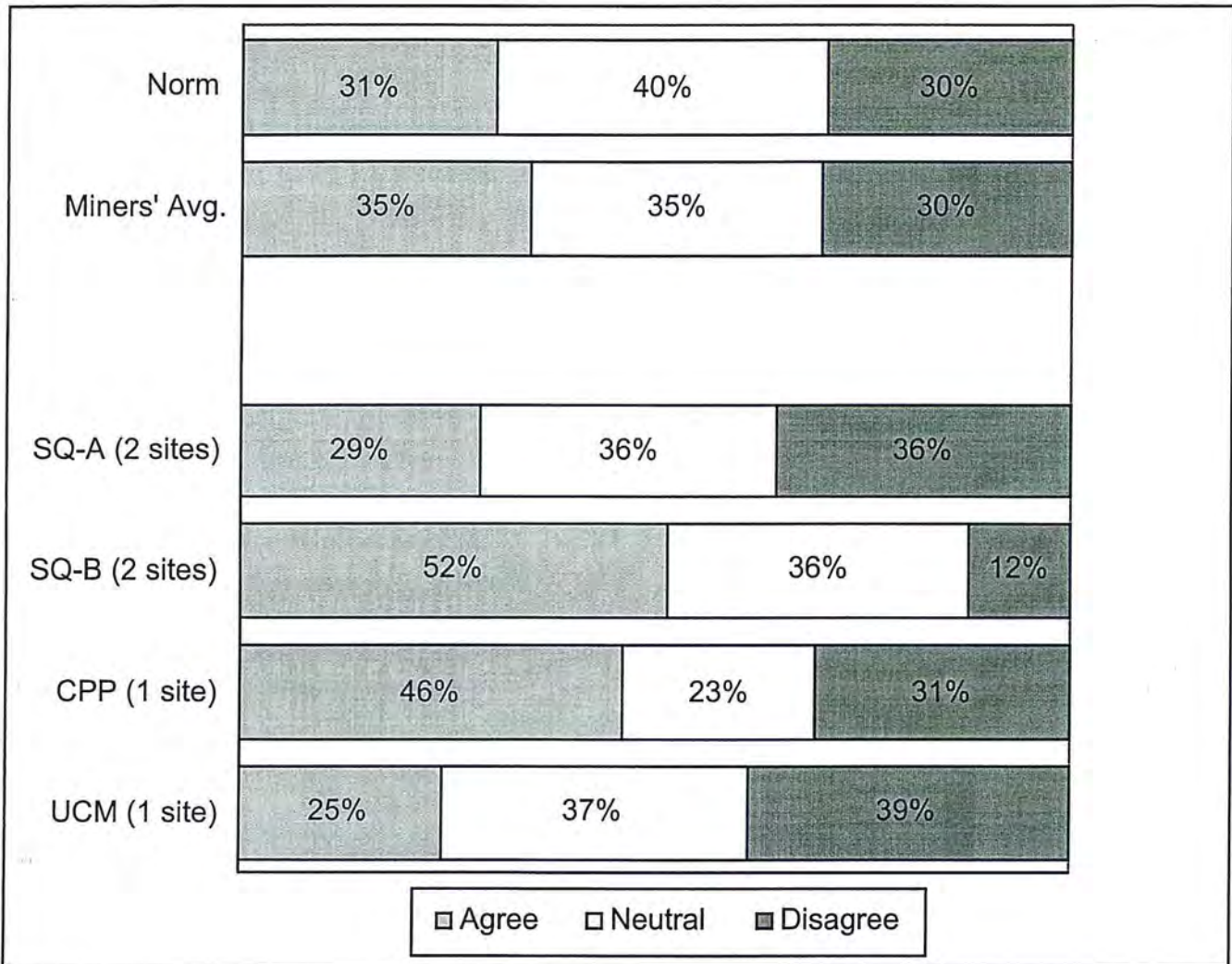
Discipline by Question (continued)

10. Discipline of some sort should be assessed for serious safety violations.

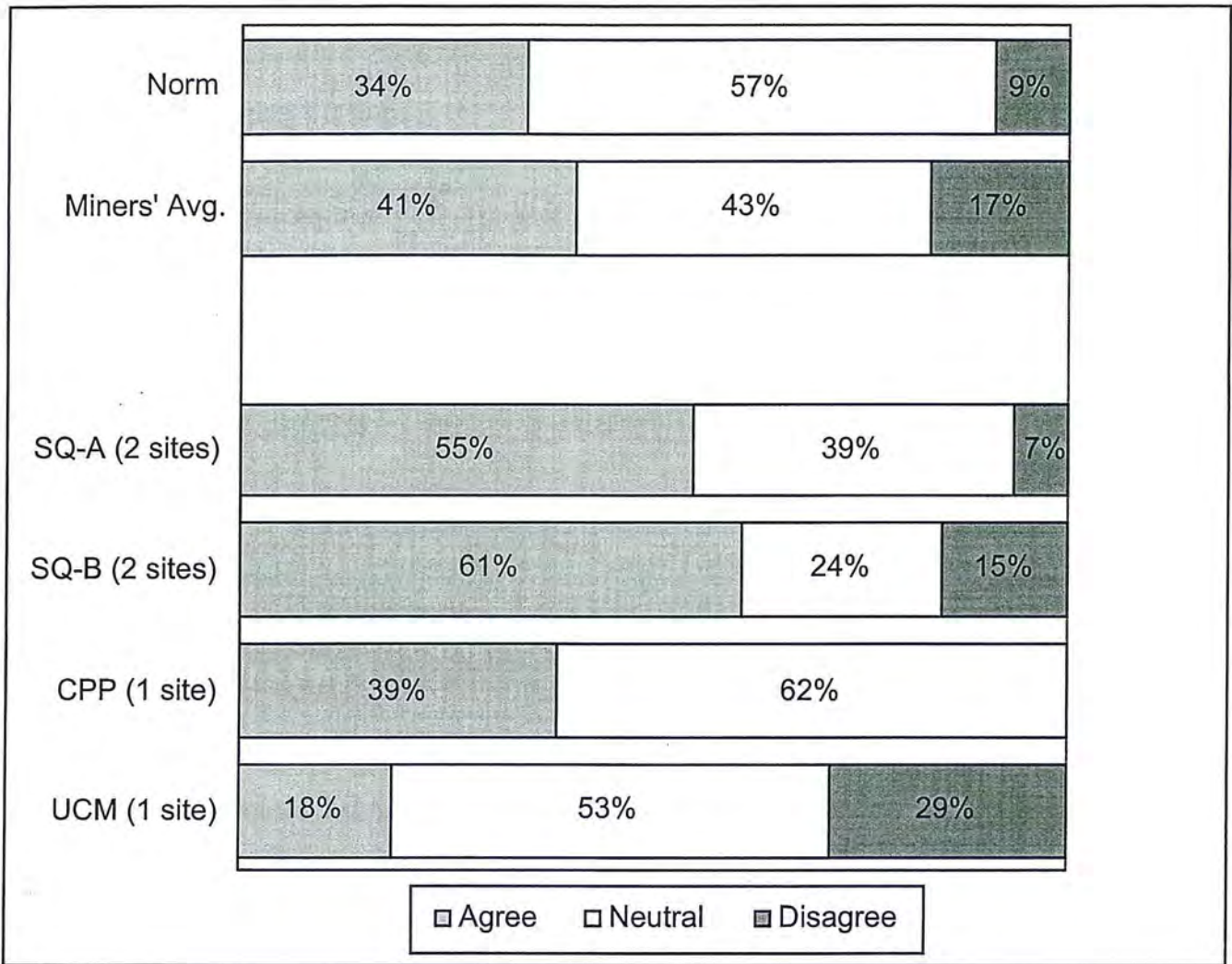


Discipline by Question (continued)

44. Discipline is not used often enough for dealing with serious safety violations.

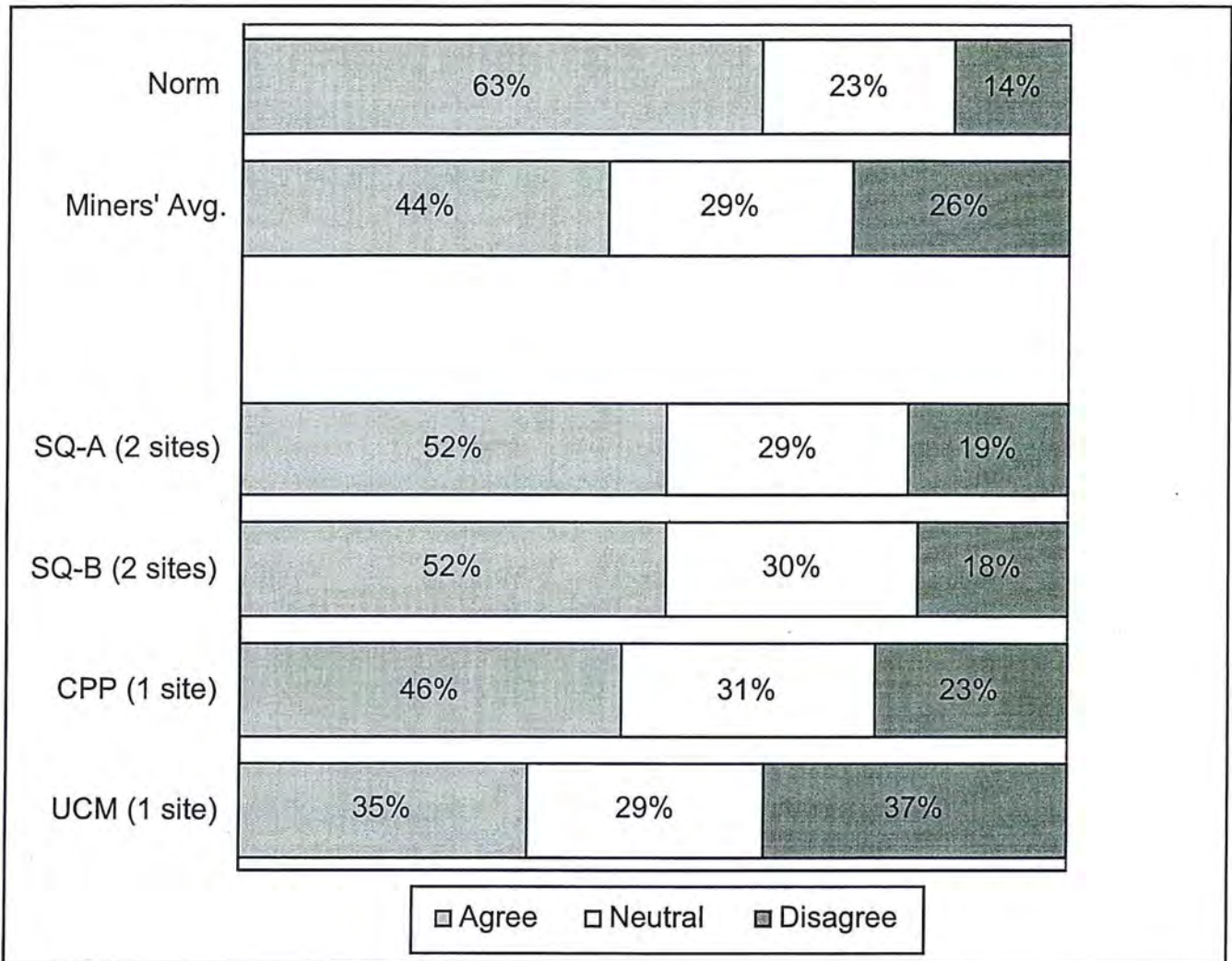


Overall Incident Reporting and Investigations by Company



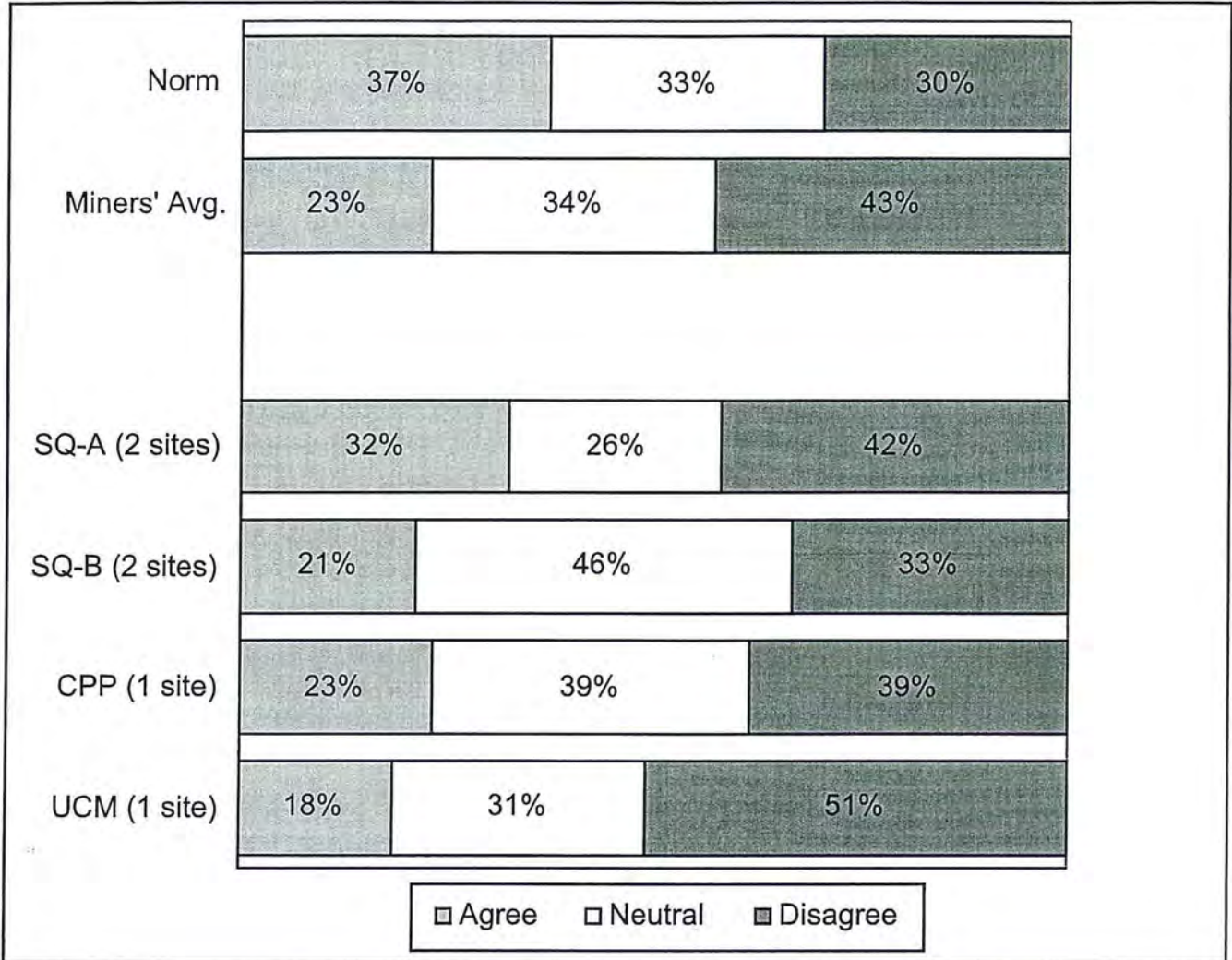
Incident Reporting and Investigations by Question

106. I am encouraged to report near misses.



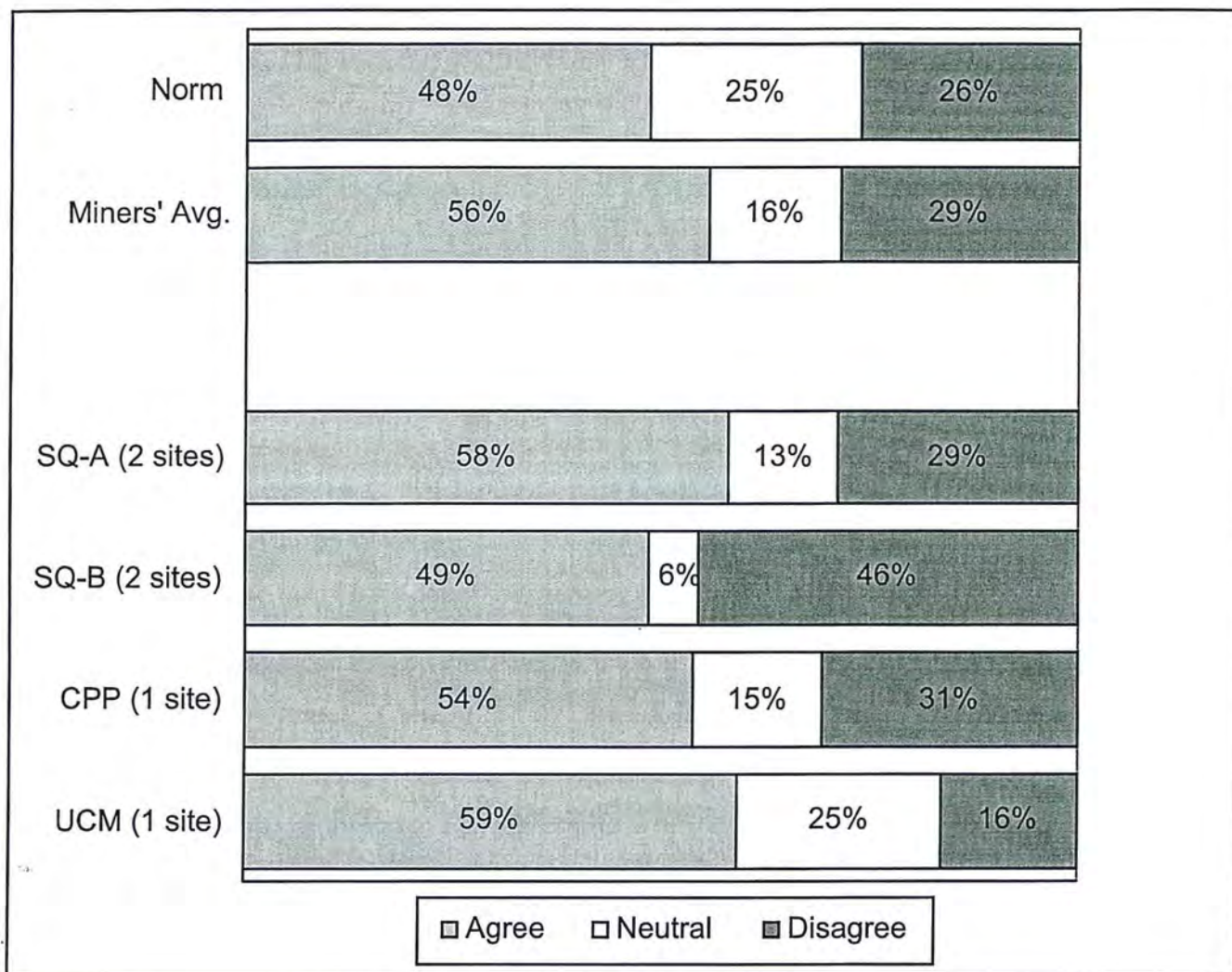
Incident Reporting and Investigations by Question (continued)

128. Near misses are consistently reported and investigated at our plant.



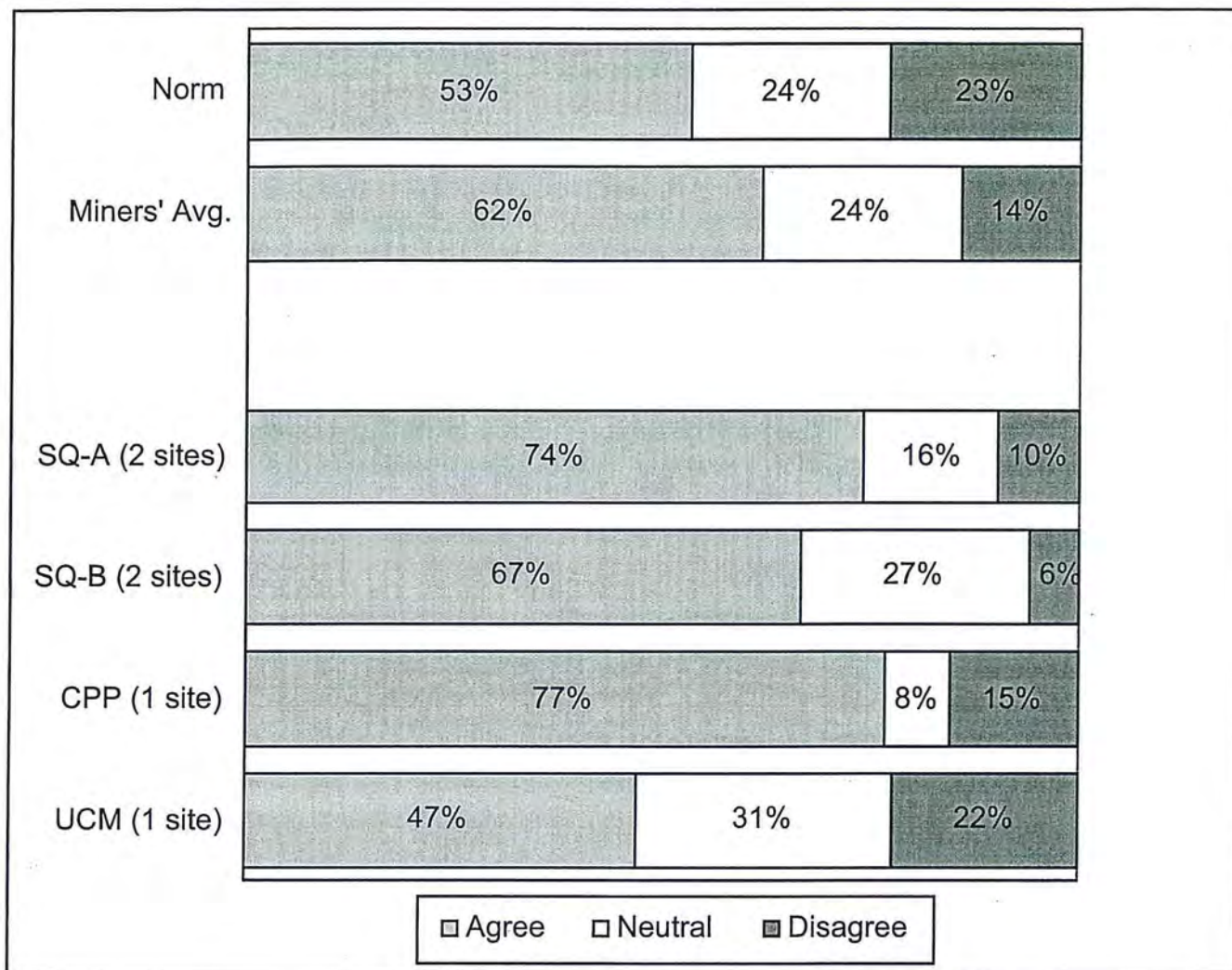
Incident Reporting and Investigations by Question (continued)

43. Minor injuries often go unreported.



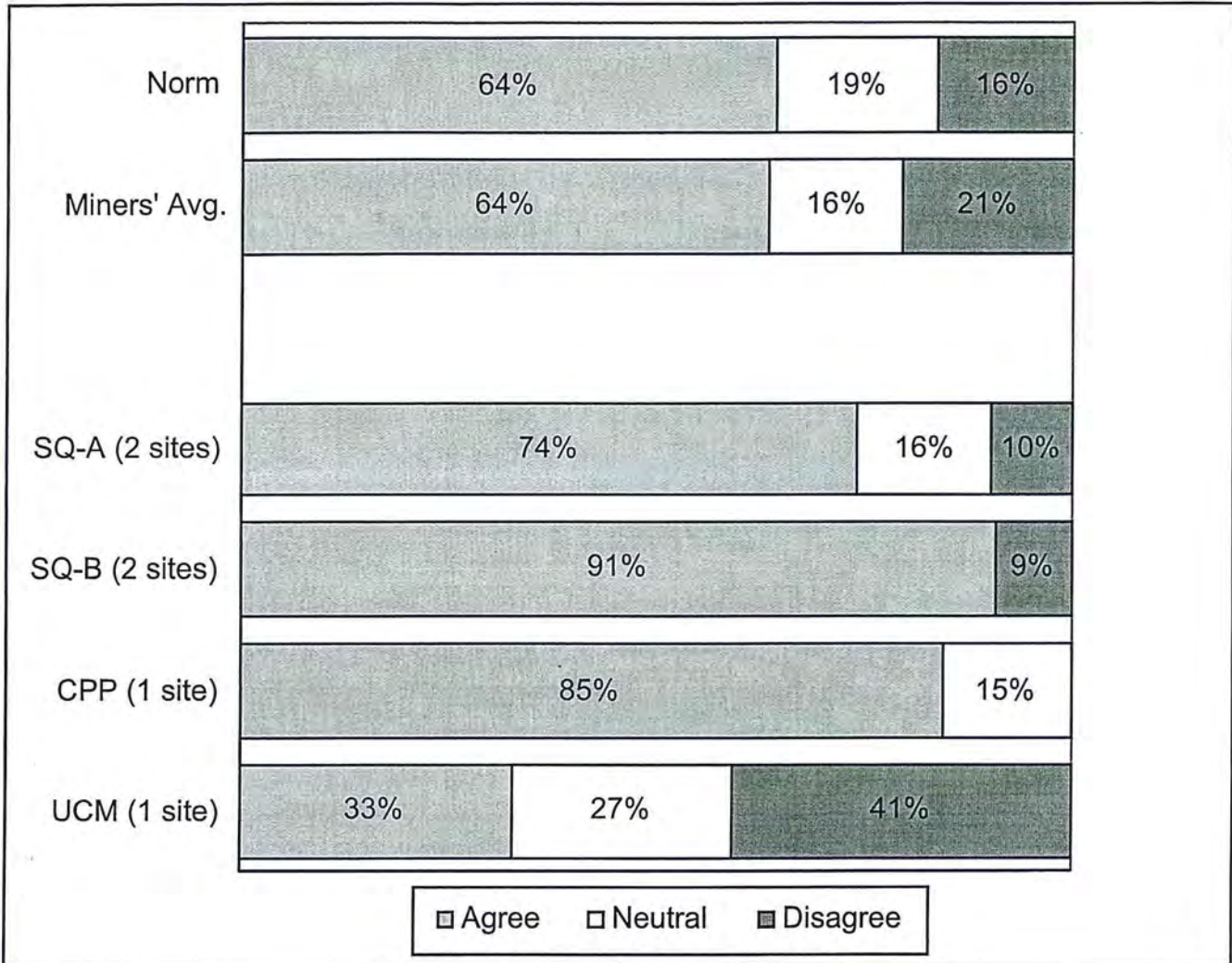
Incident Reporting and Investigations by Question (continued)

115. If I received a minor injury on the job, I would report it.



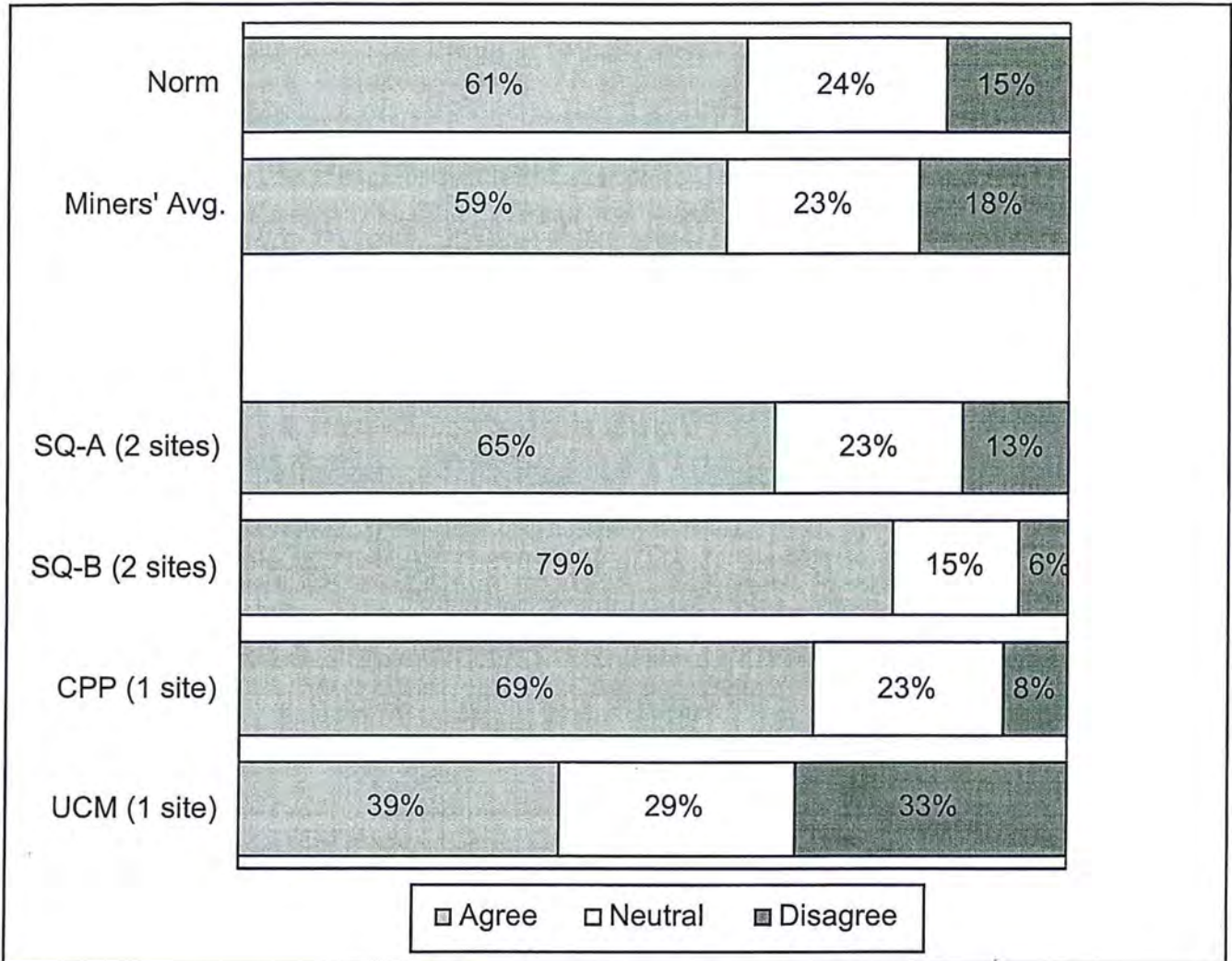
Incident Reporting and Investigations by Question (continued)

101. Management truly wants to know about all incidents and injuries, even if they are minor.



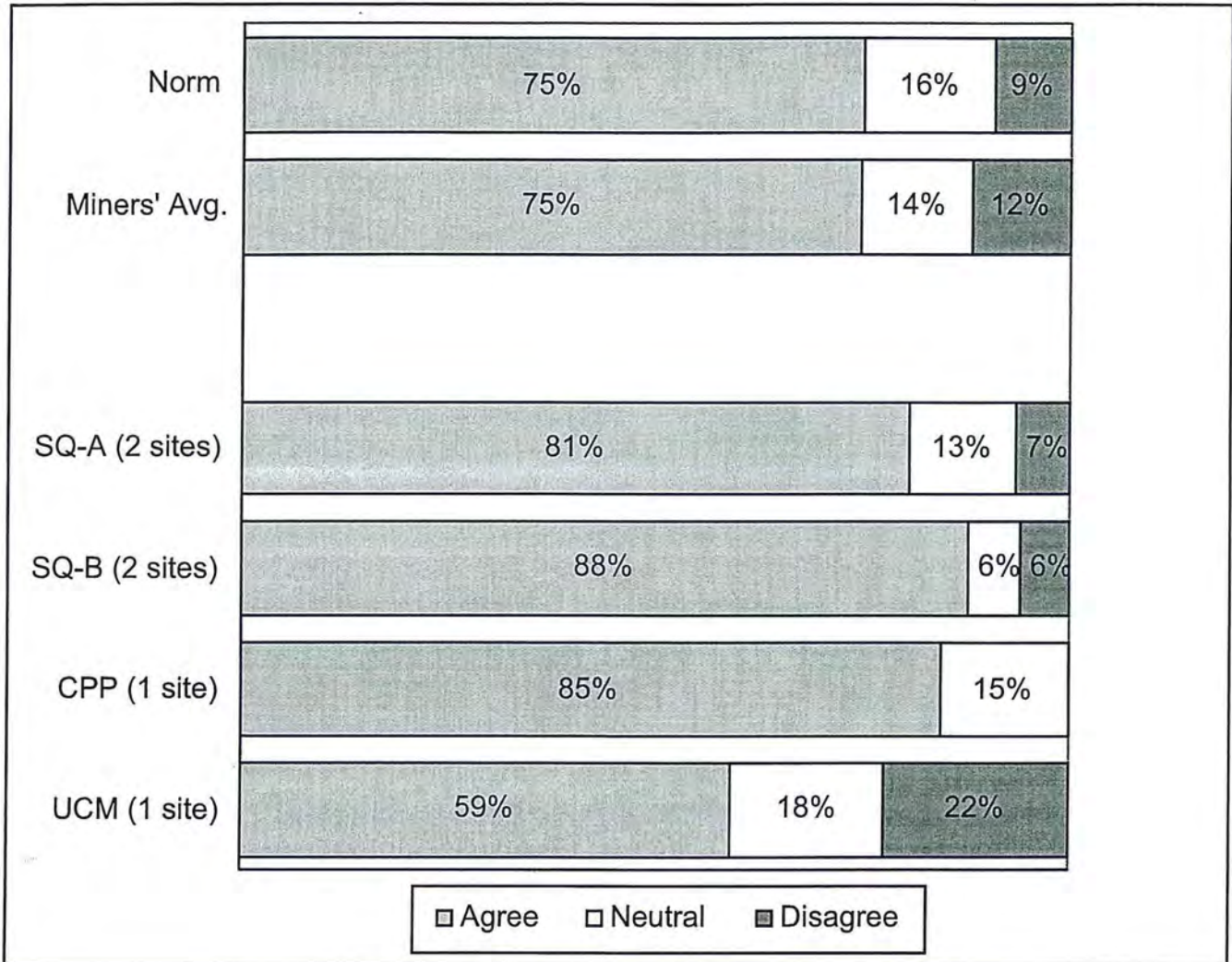
Incident Reporting and Investigations by Question (continued)

42. Incidents and injuries are thoroughly investigated.



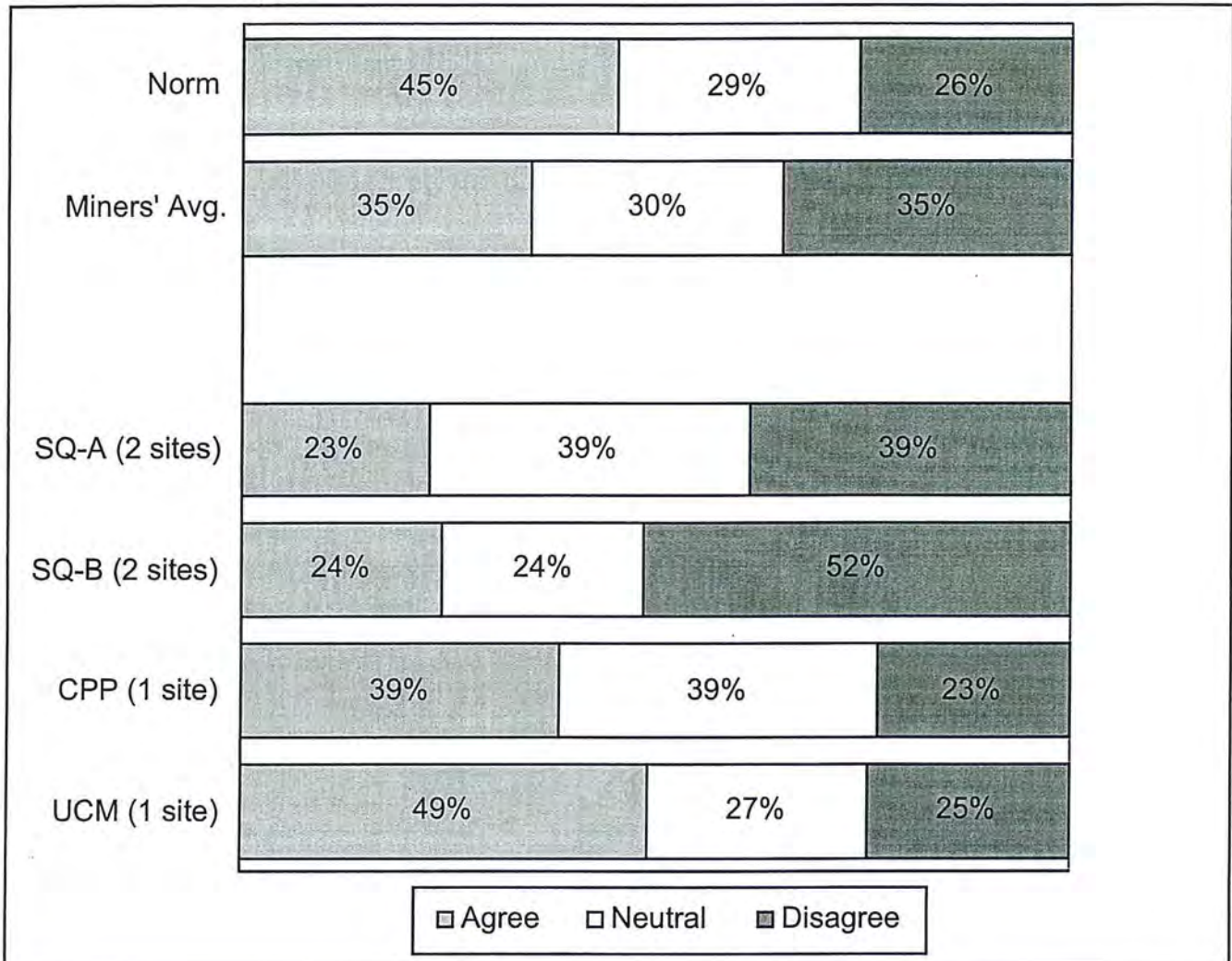
Incident Reporting and Investigations by Question (continued)

104. I would feel free to discuss the causes of my injury with the investigation team.

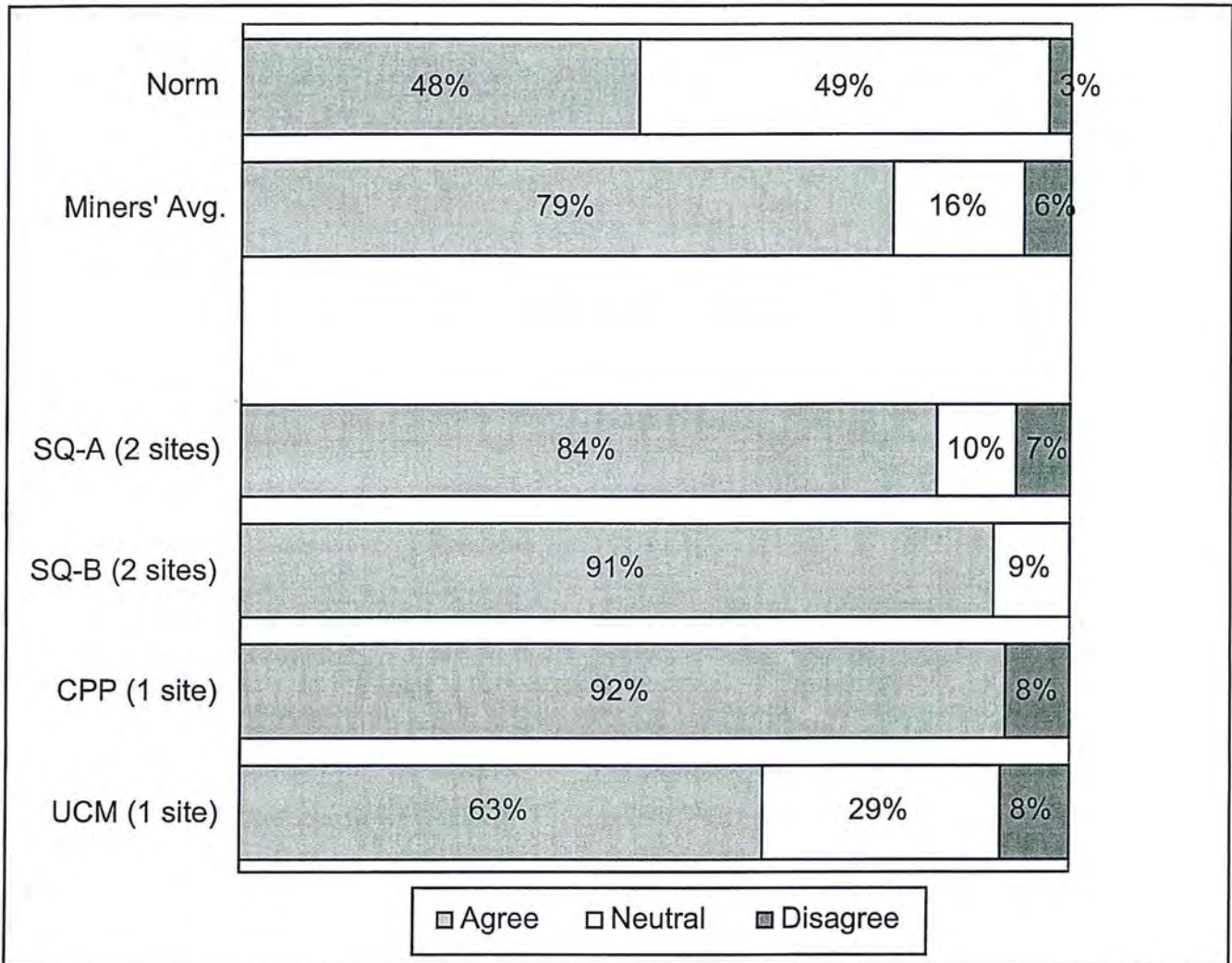


Incident Reporting and Investigations by Question (continued)

84. Management places most of the blame for an accident on the injured employee.

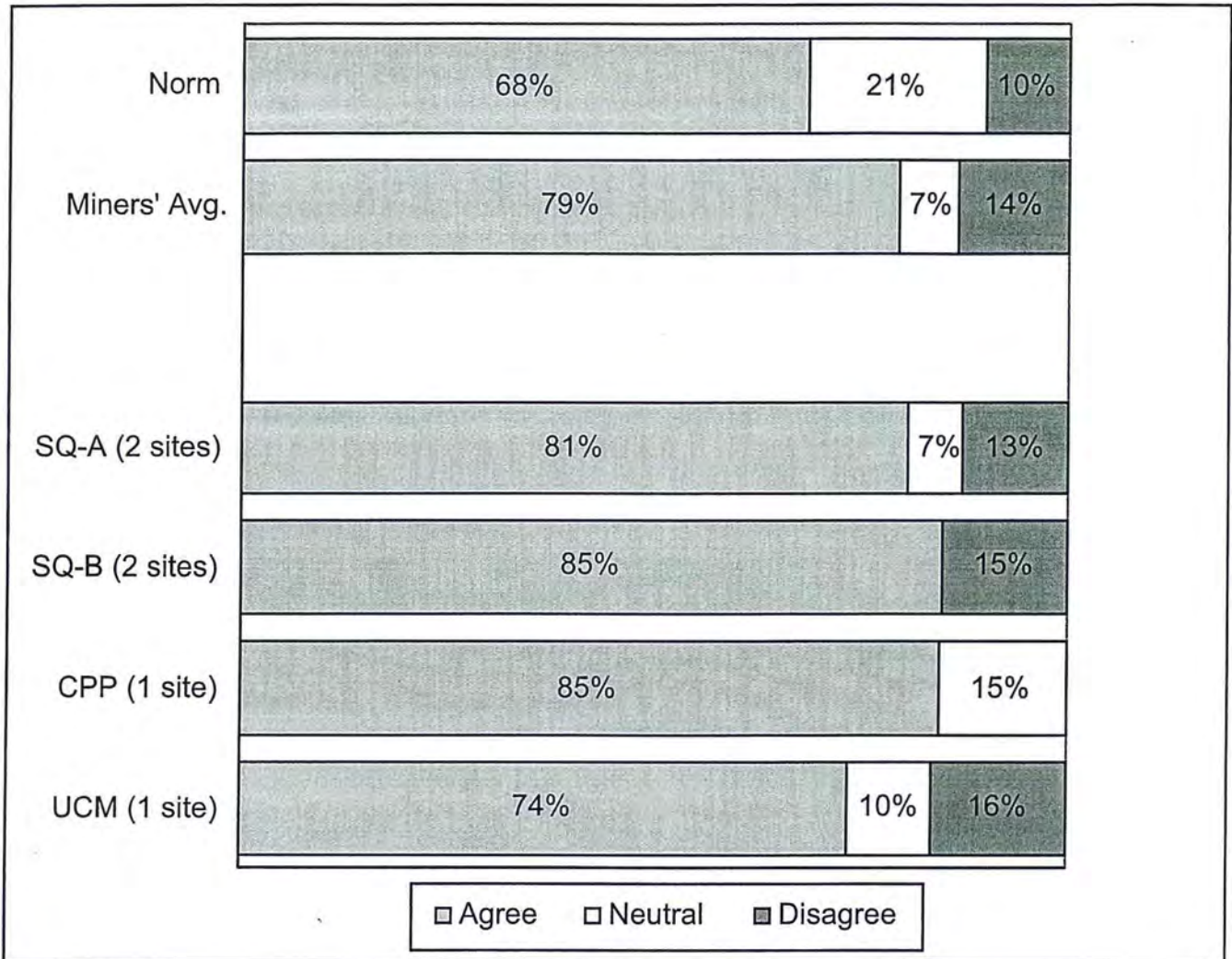


Overall Rules and Regulations by Company



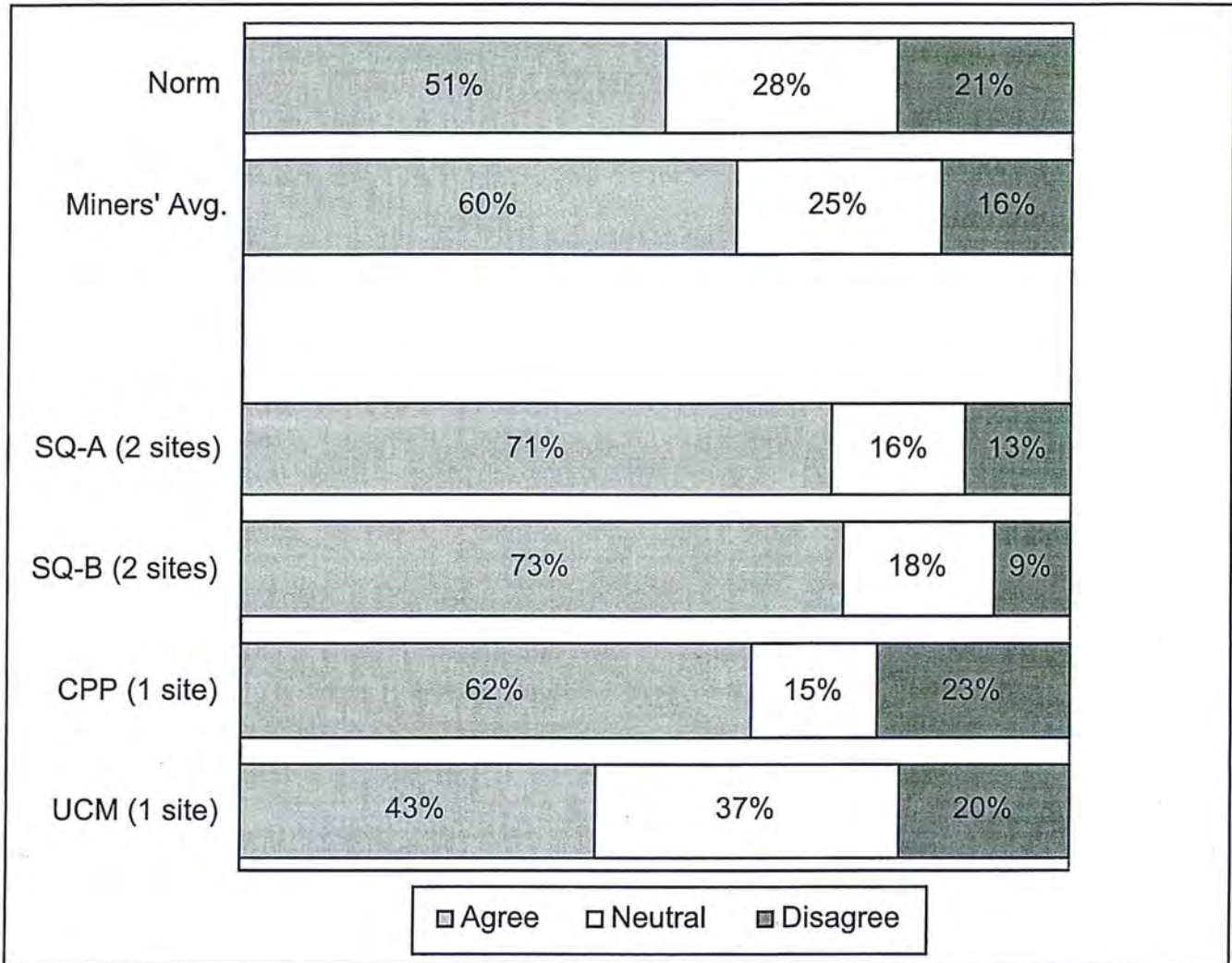
Rules and Regulations by Question

36. Employees understand the safety rules and procedures for their own jobs.



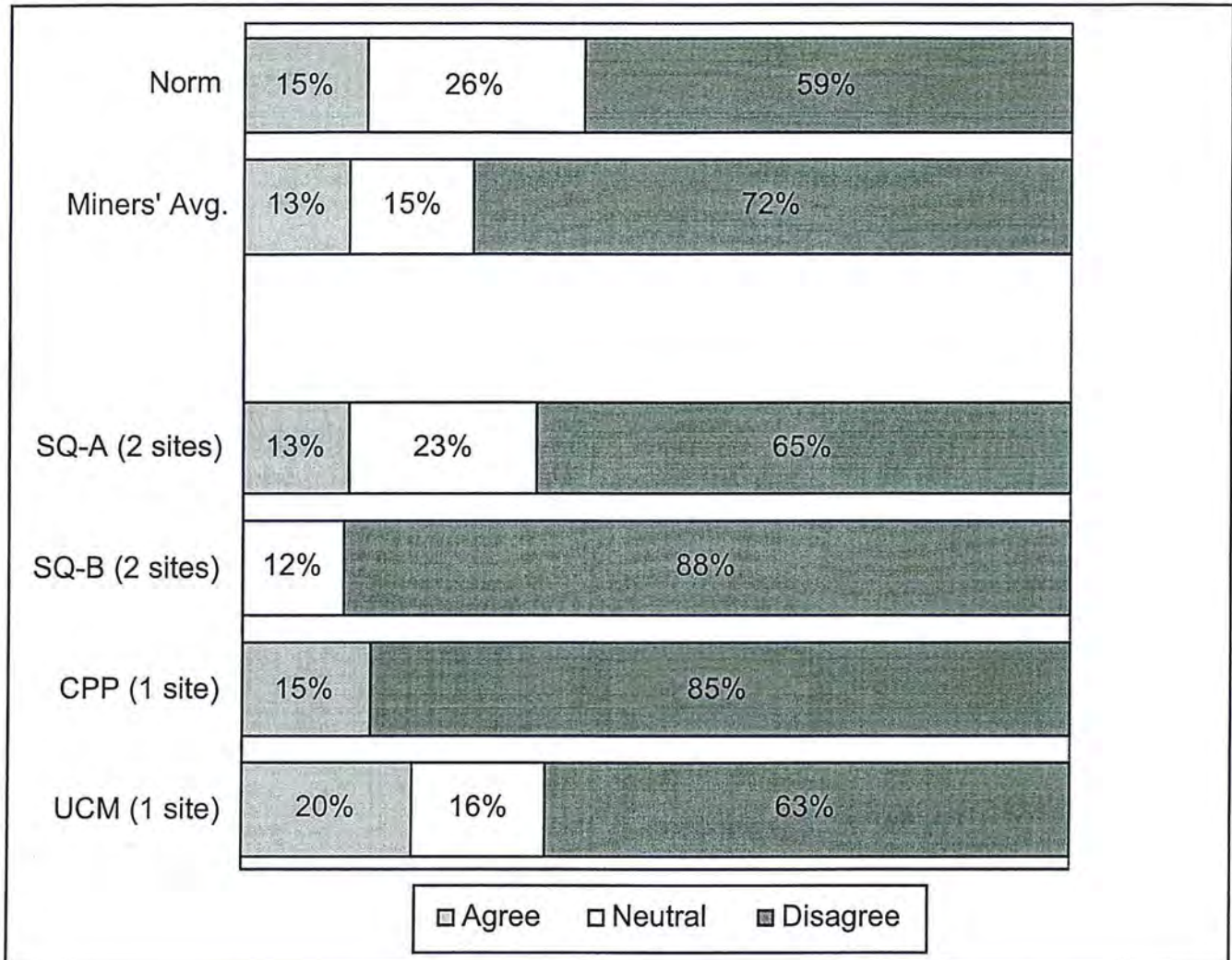
Rules and Regulations by Question (continued)

51. Employees get sufficient background and reasons behind the company's safety rules.



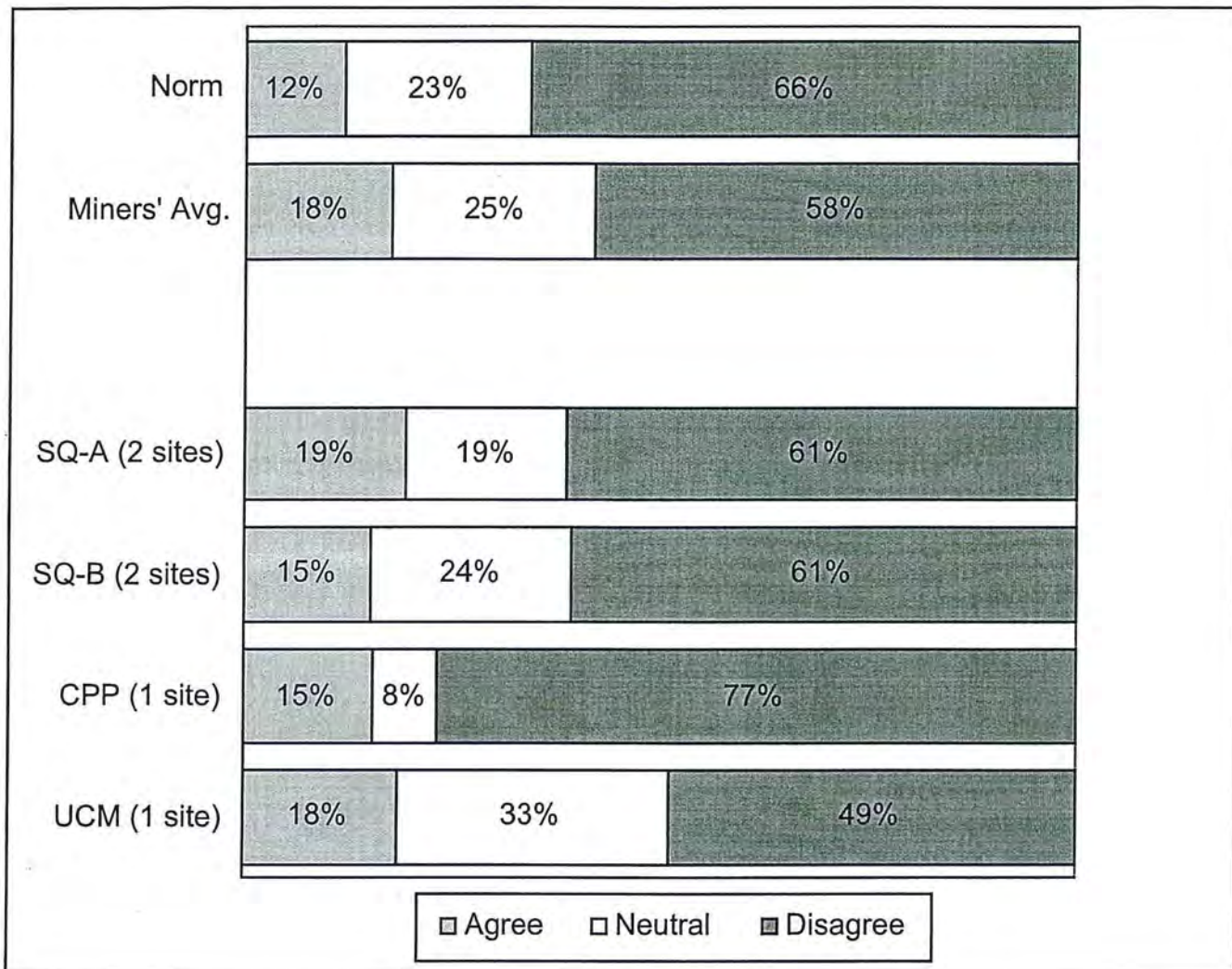
Rules and Regulations by Question (continued)

70. The company has too many rules and regulations governing safety.

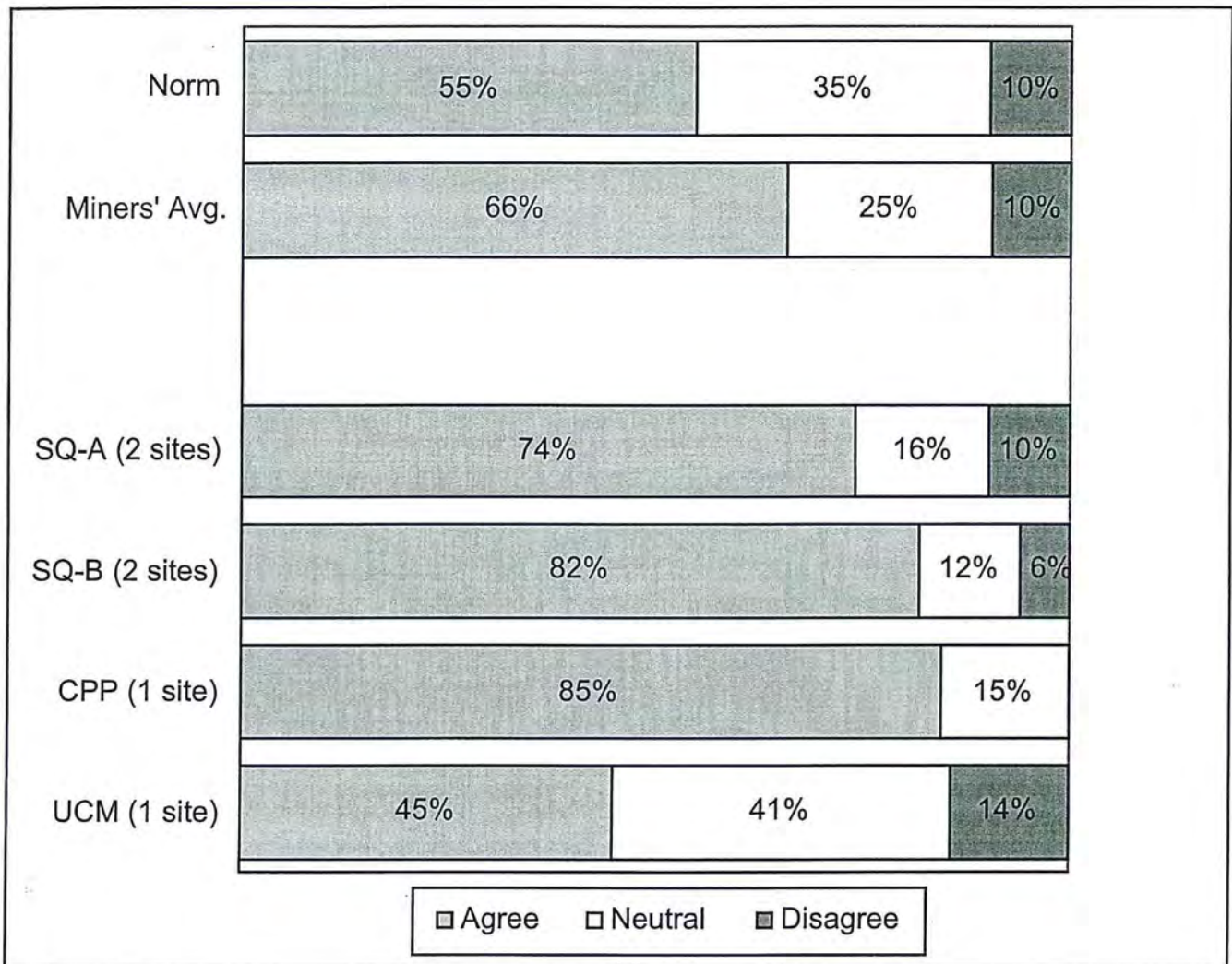


Rules and Regulations by Question (continued)

96. Compliance with safety rules and regulations needlessly slows down my job.

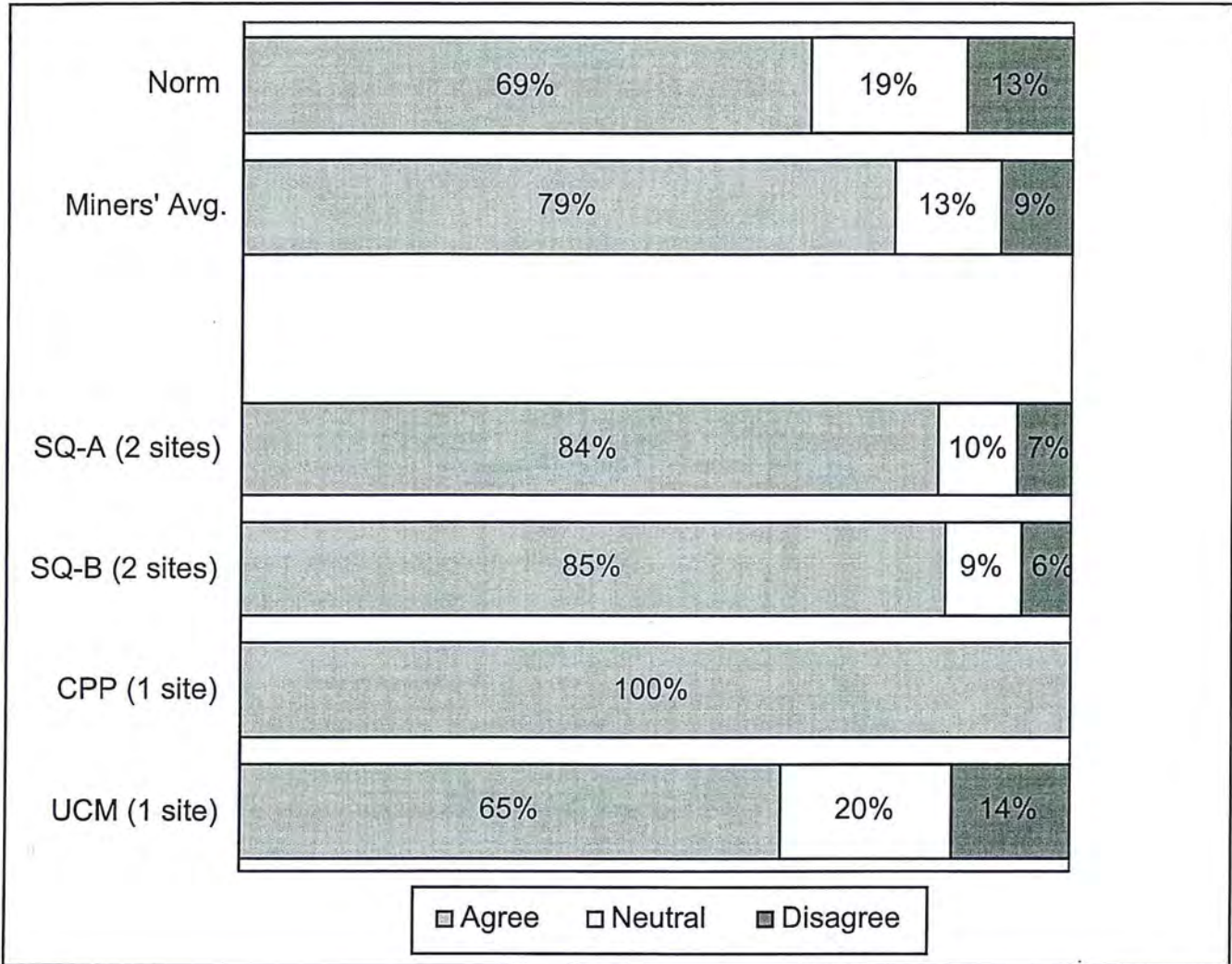


Overall Training by Company



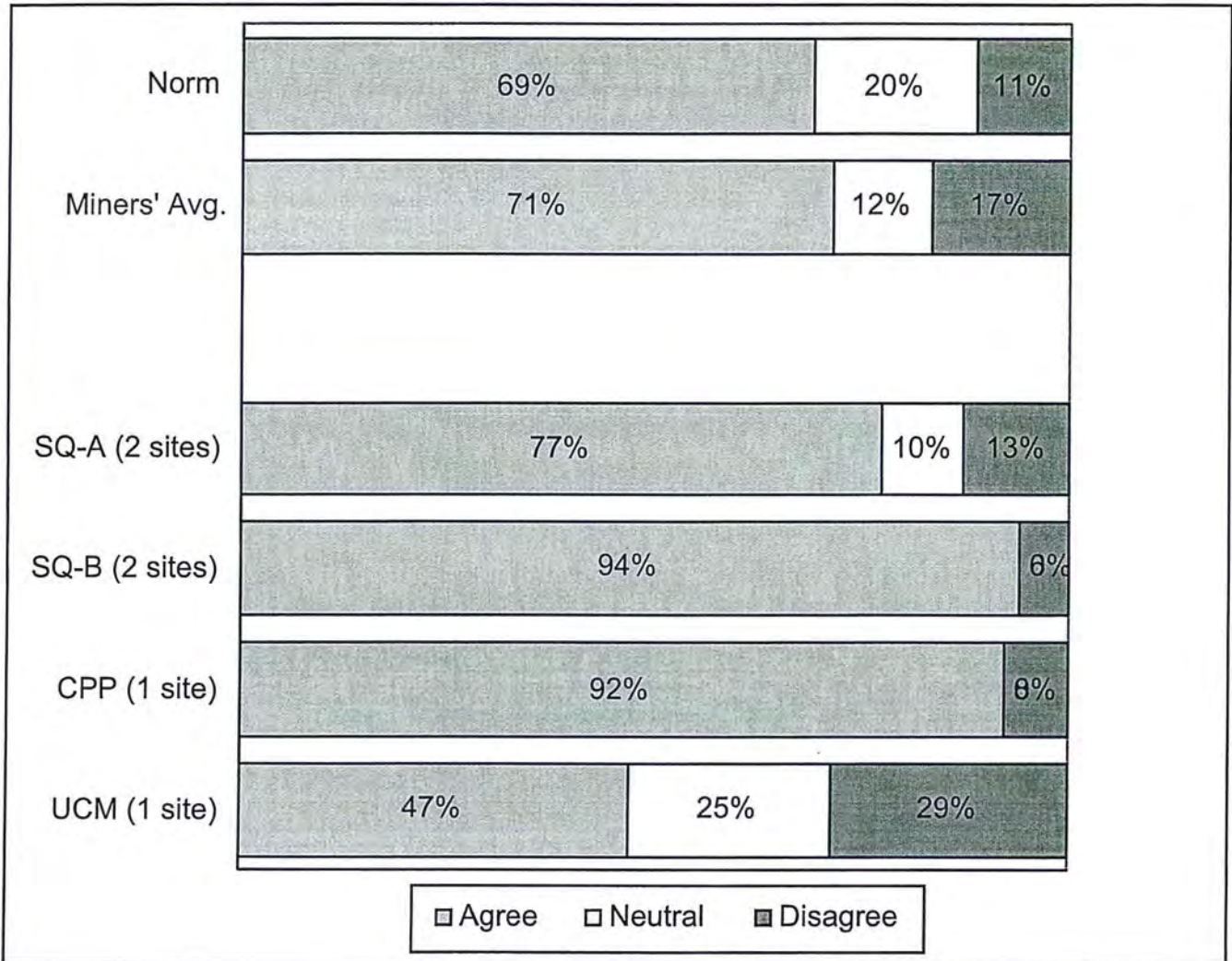
Training by Question

32. I have received adequate job safety training.



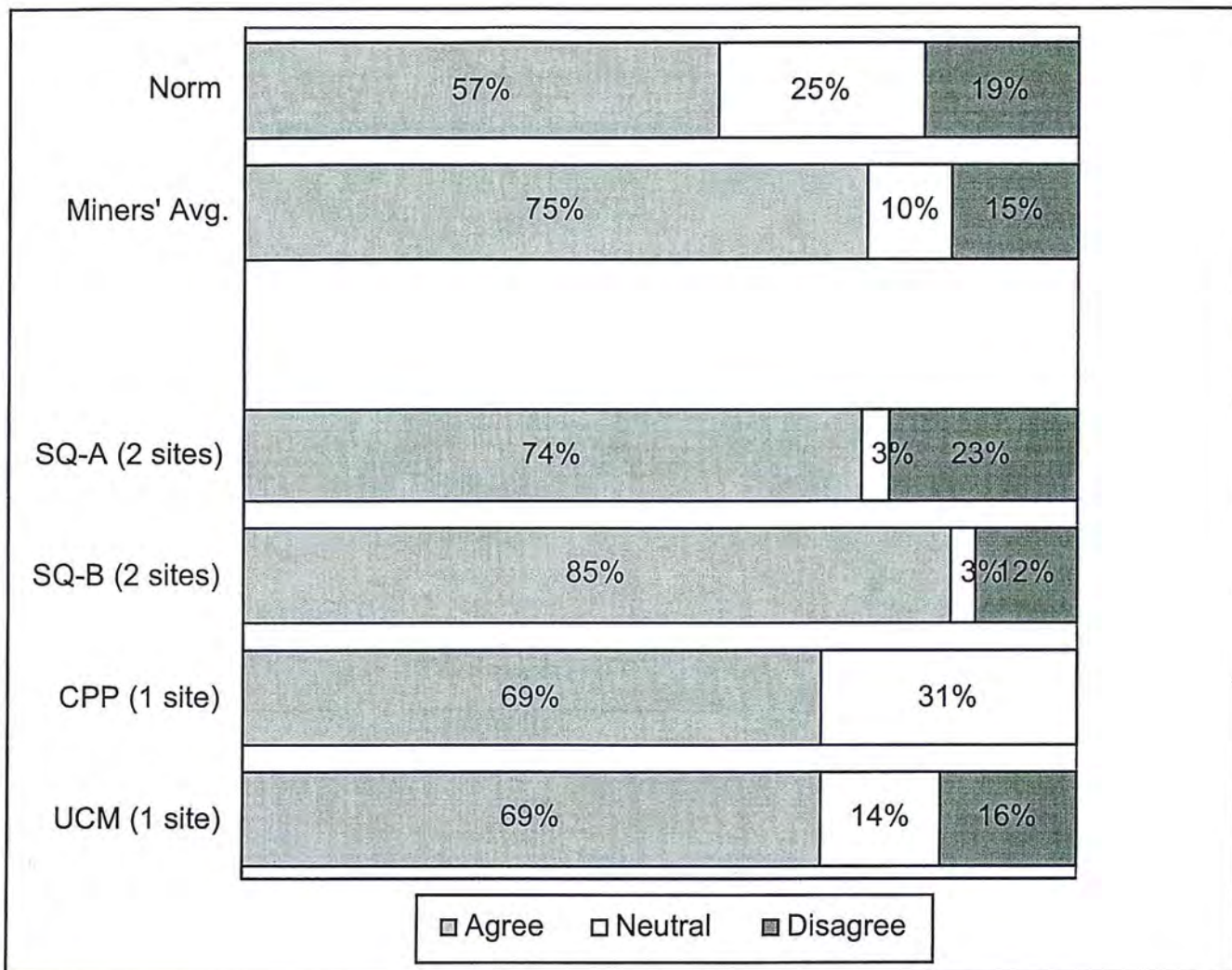
Training by Question (continued)

29. Information needed to work safely is made available to all employees.



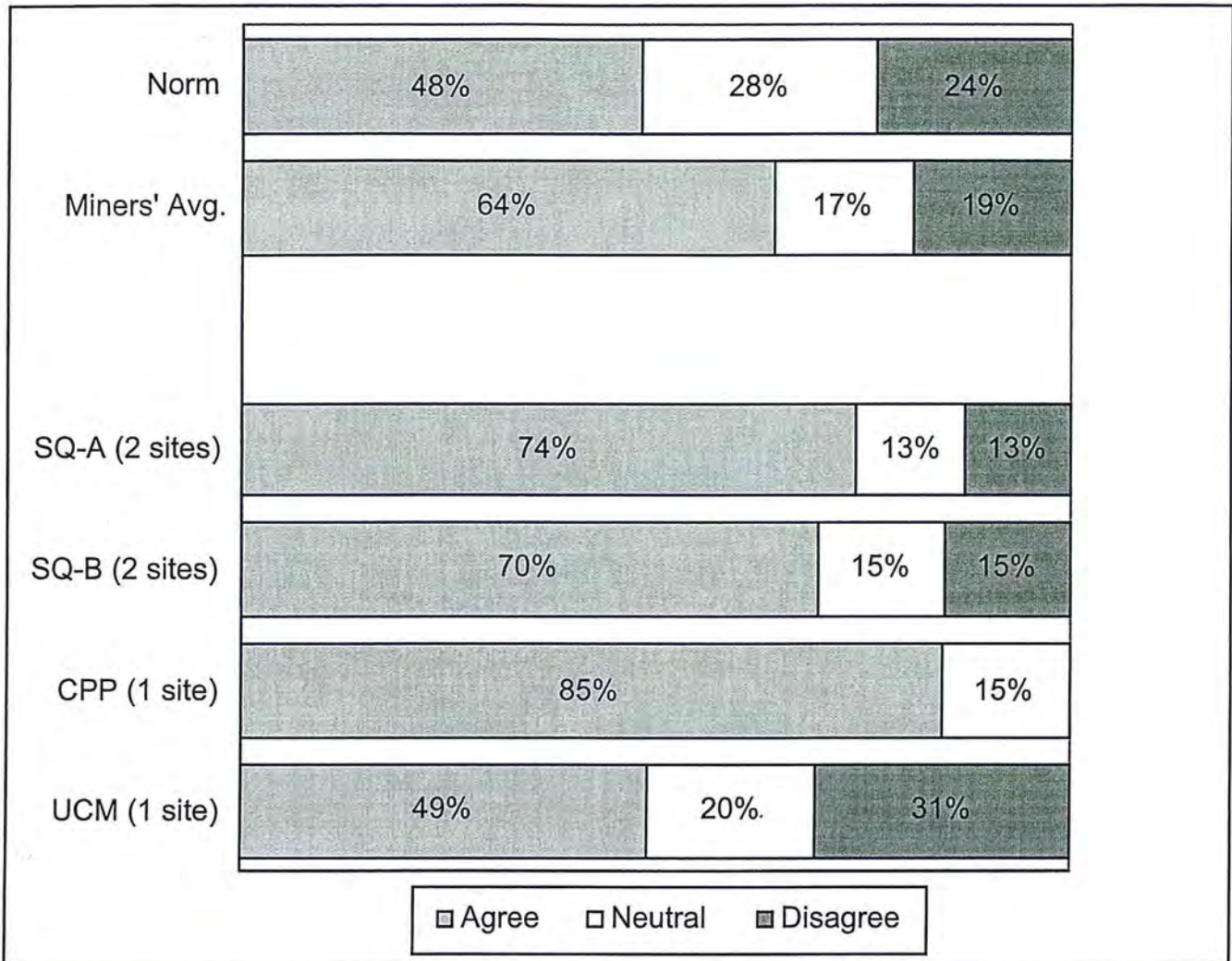
Training by Question (continued)

46. Employees fully understand the potential hazards of the operations they perform.



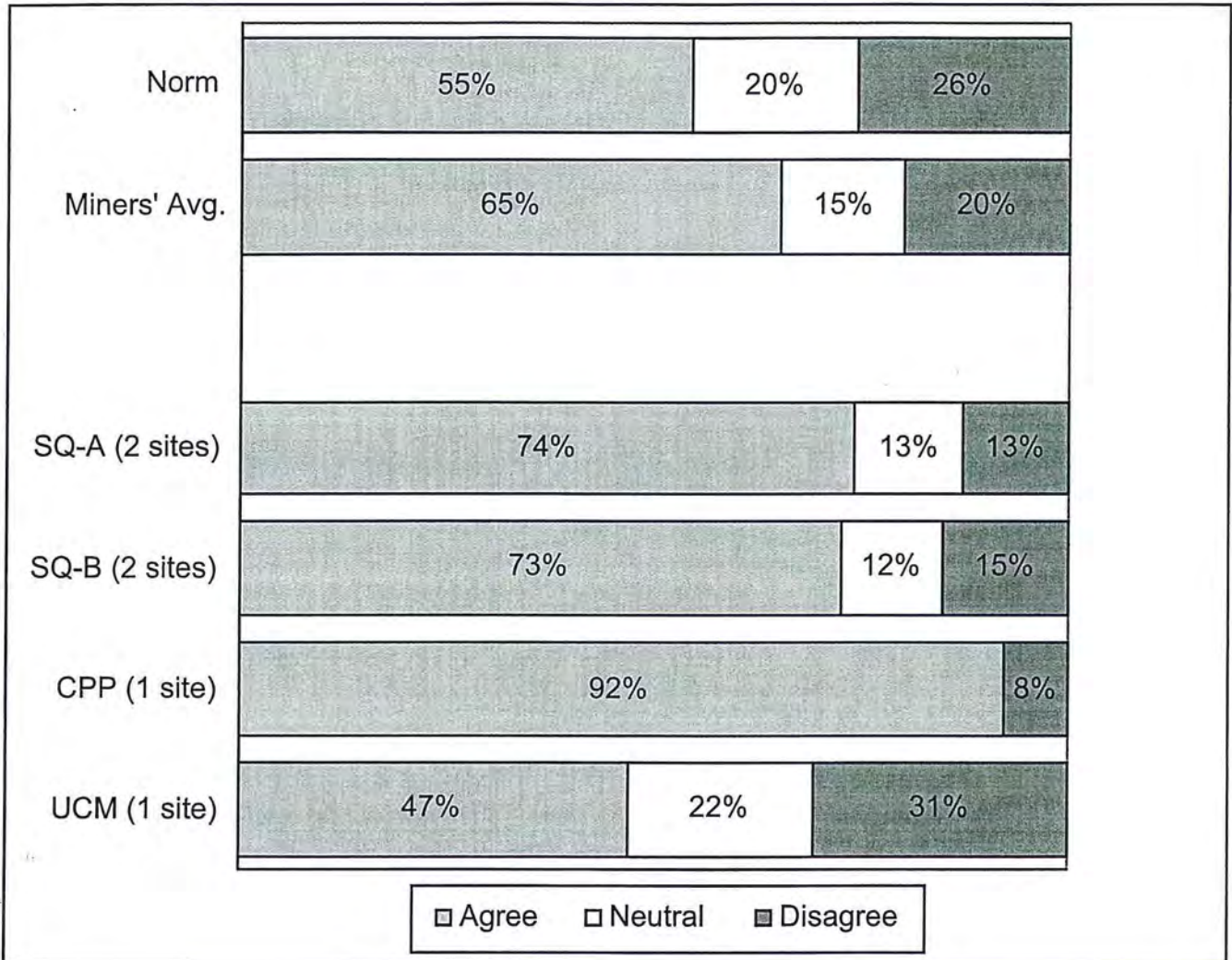
Training by Question (continued)

125. When asked to do a new job, I receive adequate training to be able to do it safely.

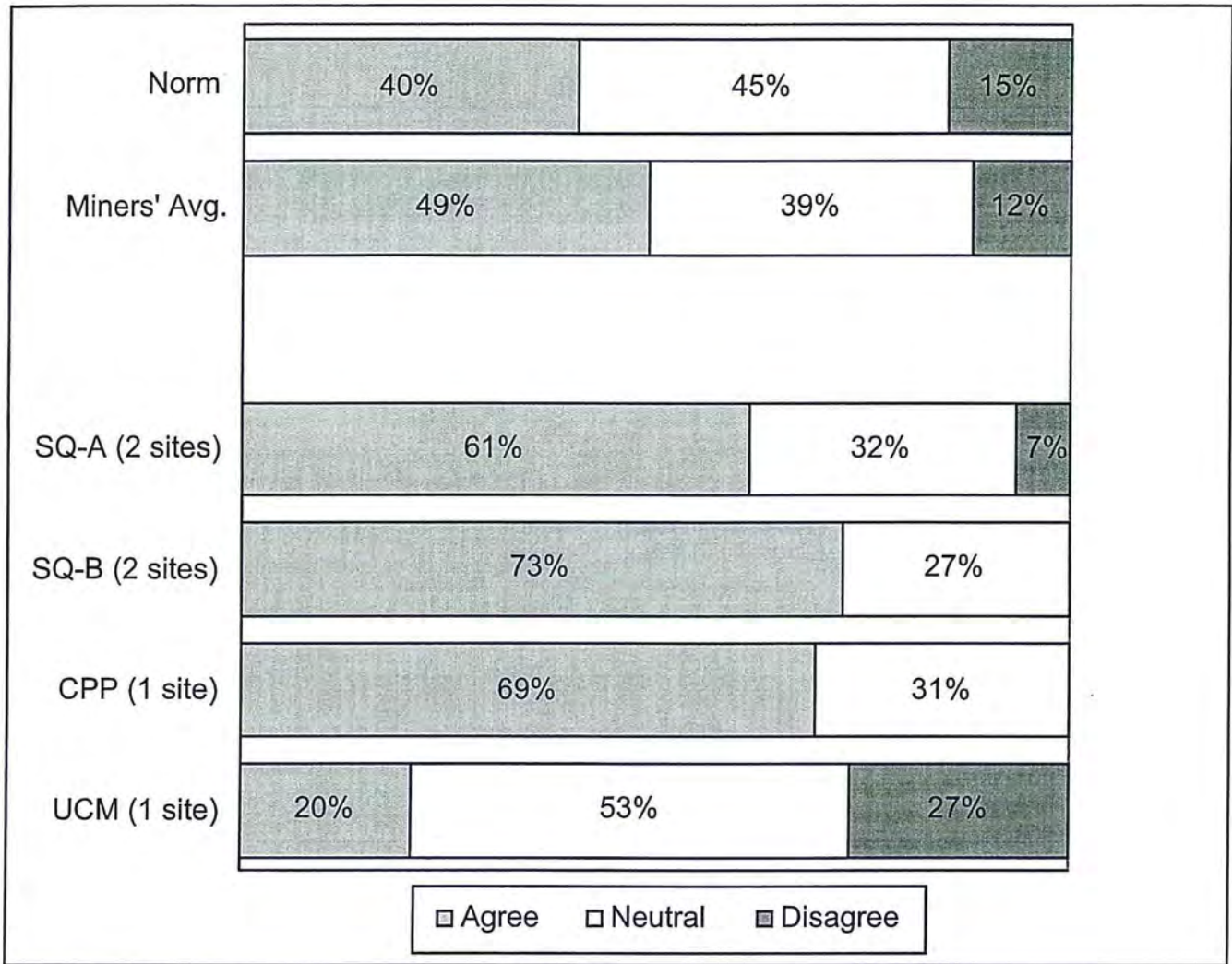


Training by Question (continued)

1. New employees receive sufficient safety training before being allowed to work alone.

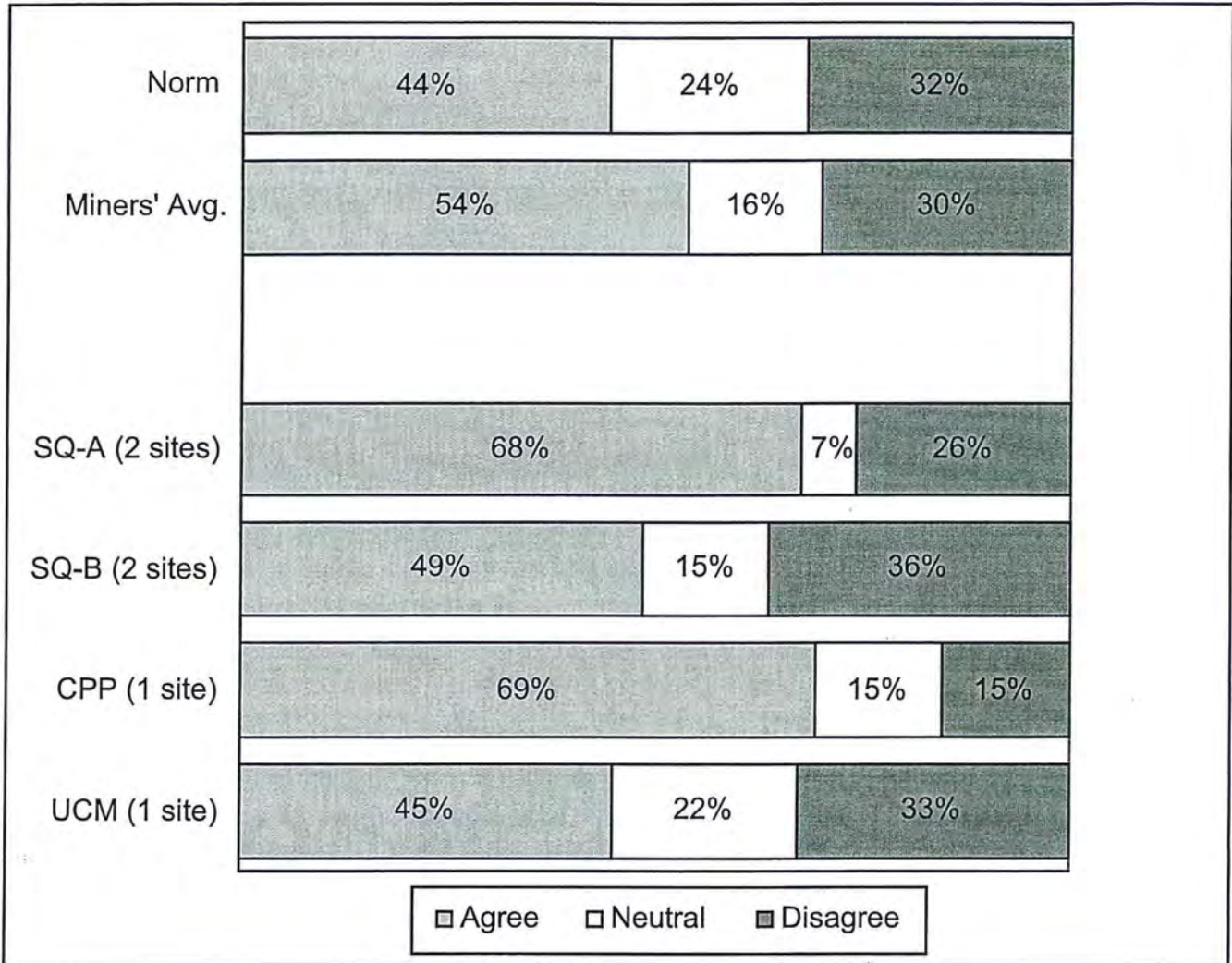


Overall Communication by Company



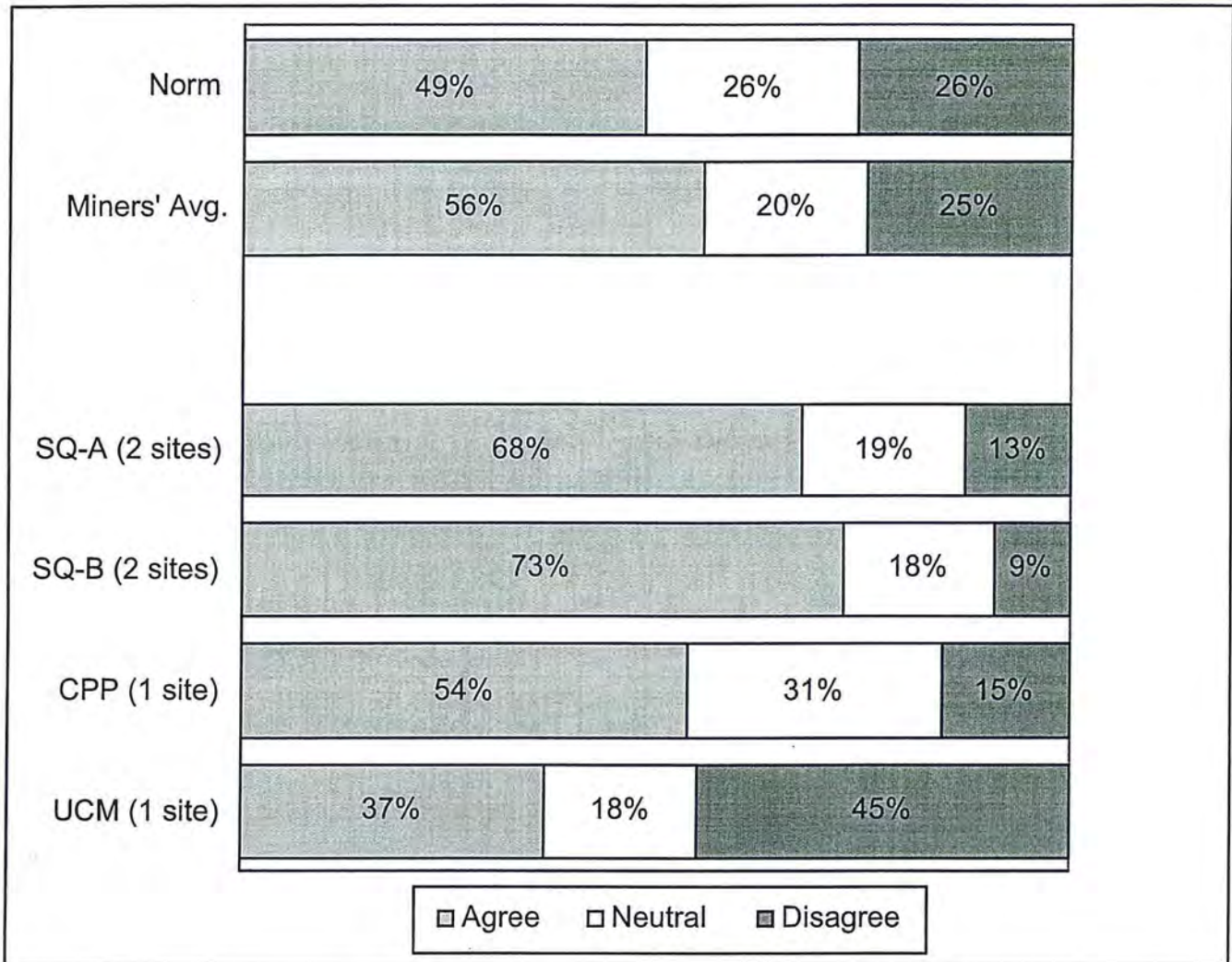
Communication by Question

47. Employees are provided information on such things as the type, frequency, cause, and cost of accidents.



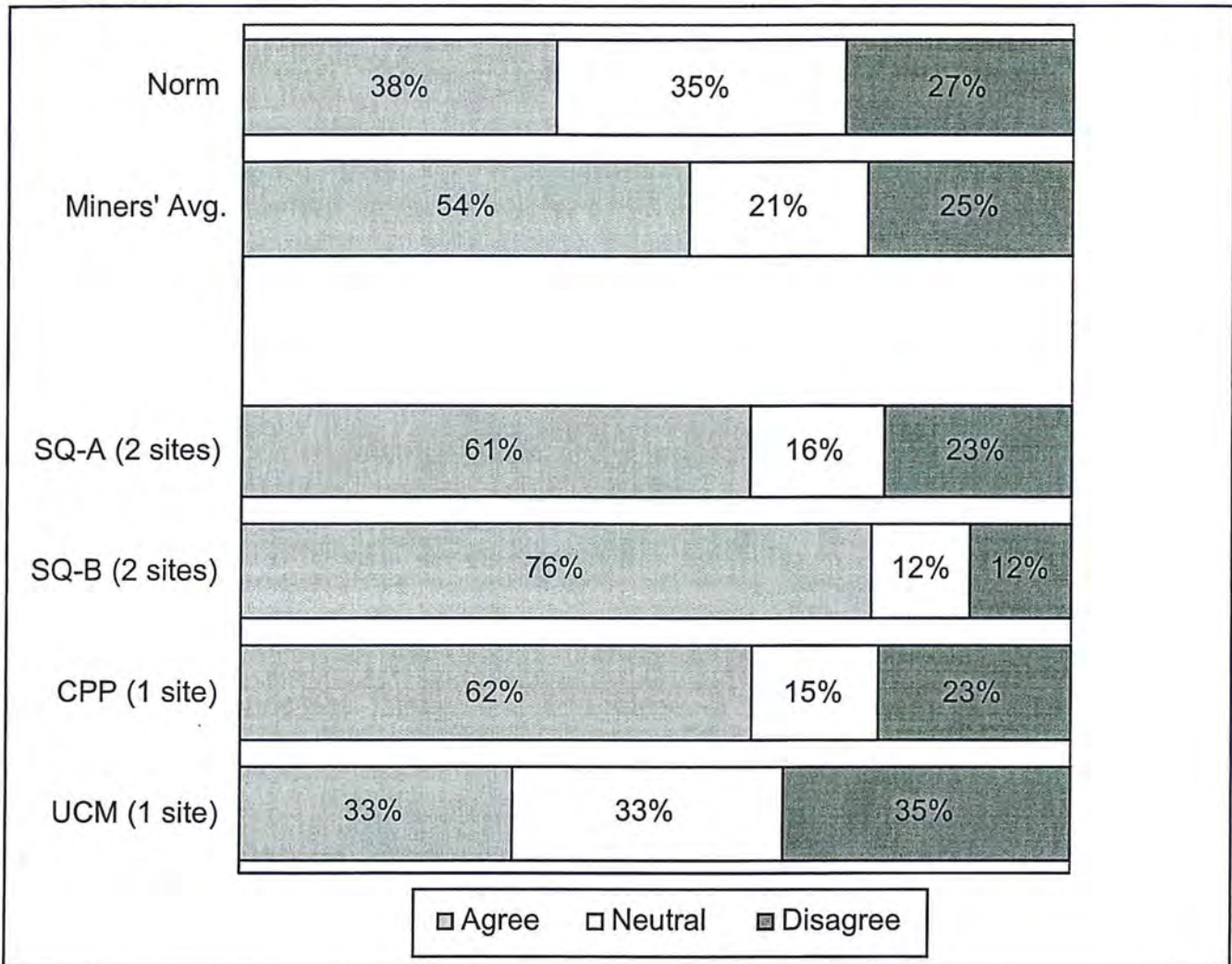
Communication by Question (continued)

20. Supervisors discuss safety improvement goals and efforts with employees on a regular basis.



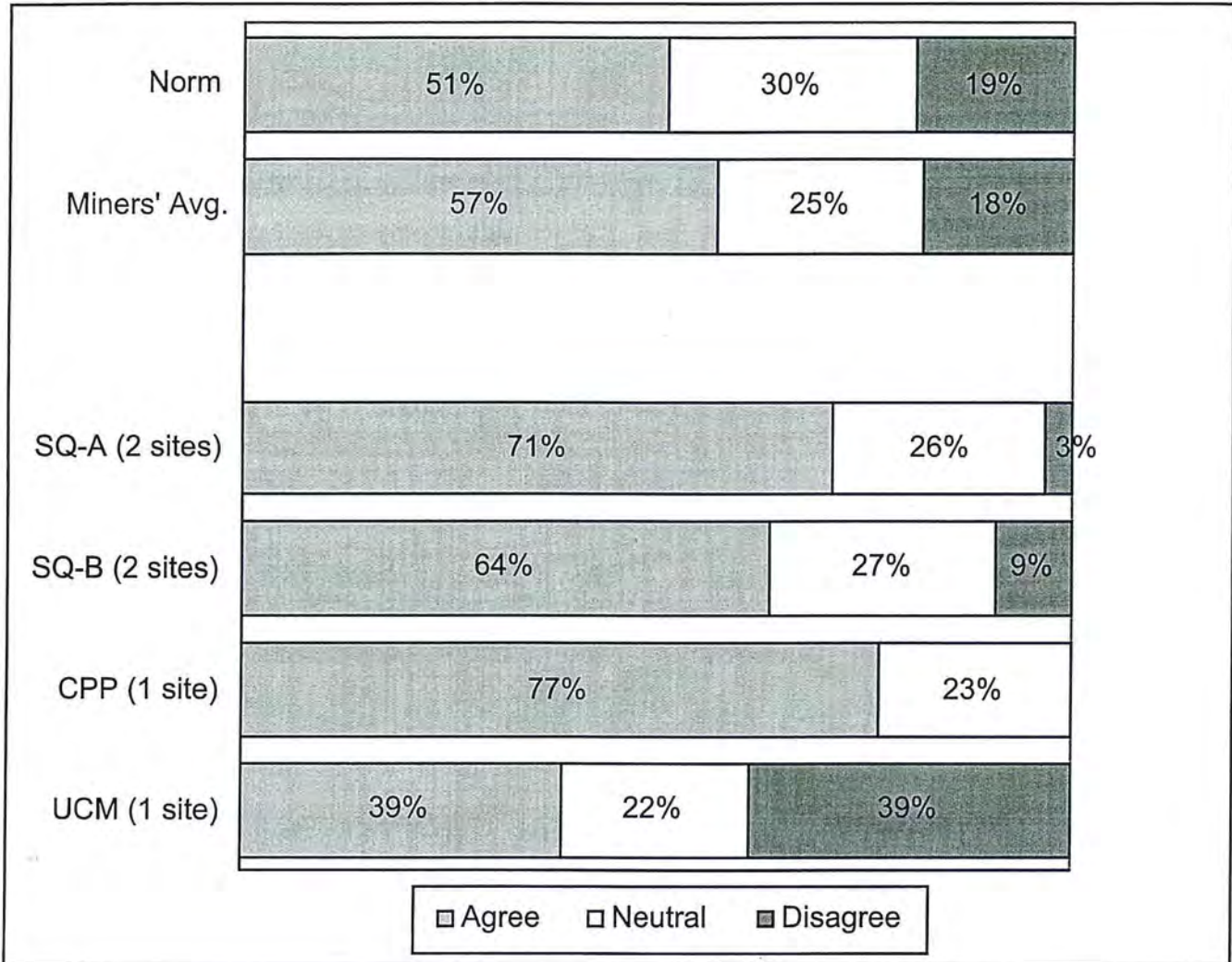
Communication by Question (continued)

111. Employees are routinely given feedback by supervisors regarding their safe and unsafe work behaviors.



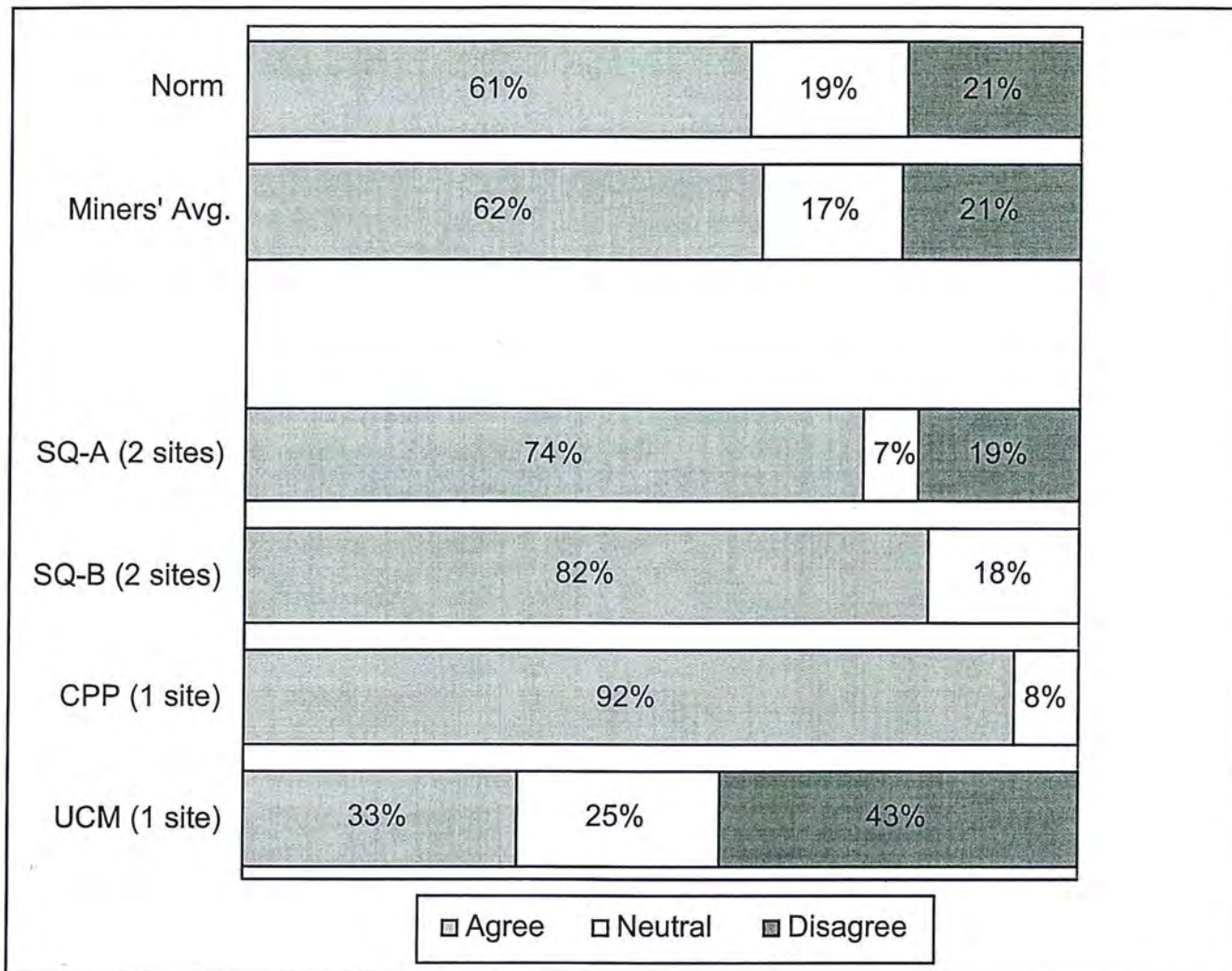
Communication by Question (continued)

15. When an incident or injury is investigated, the results are promptly reported back to involved employees.

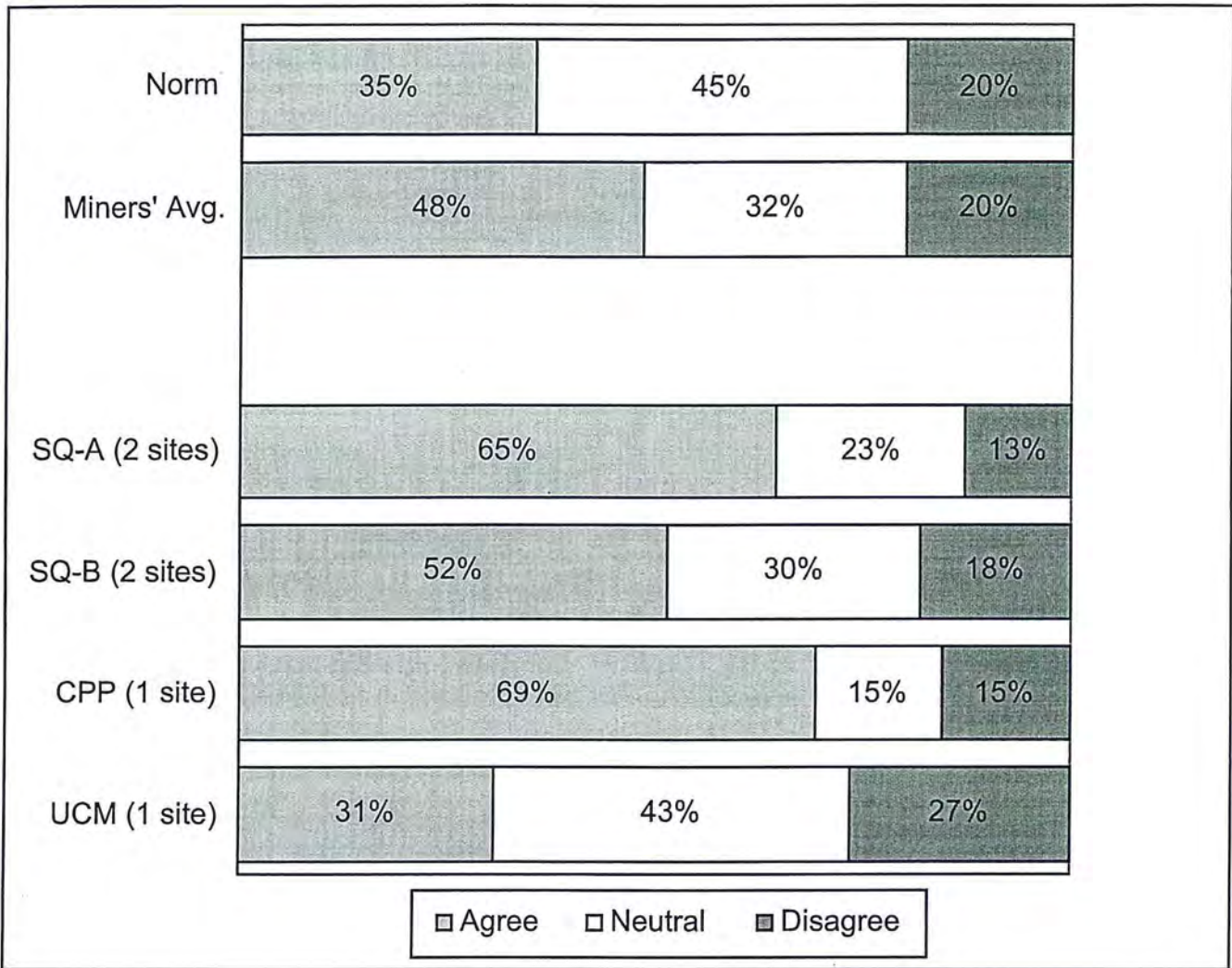


Communication by Question (continued)

11. Safety rules and procedures are regularly reviewed with employees.

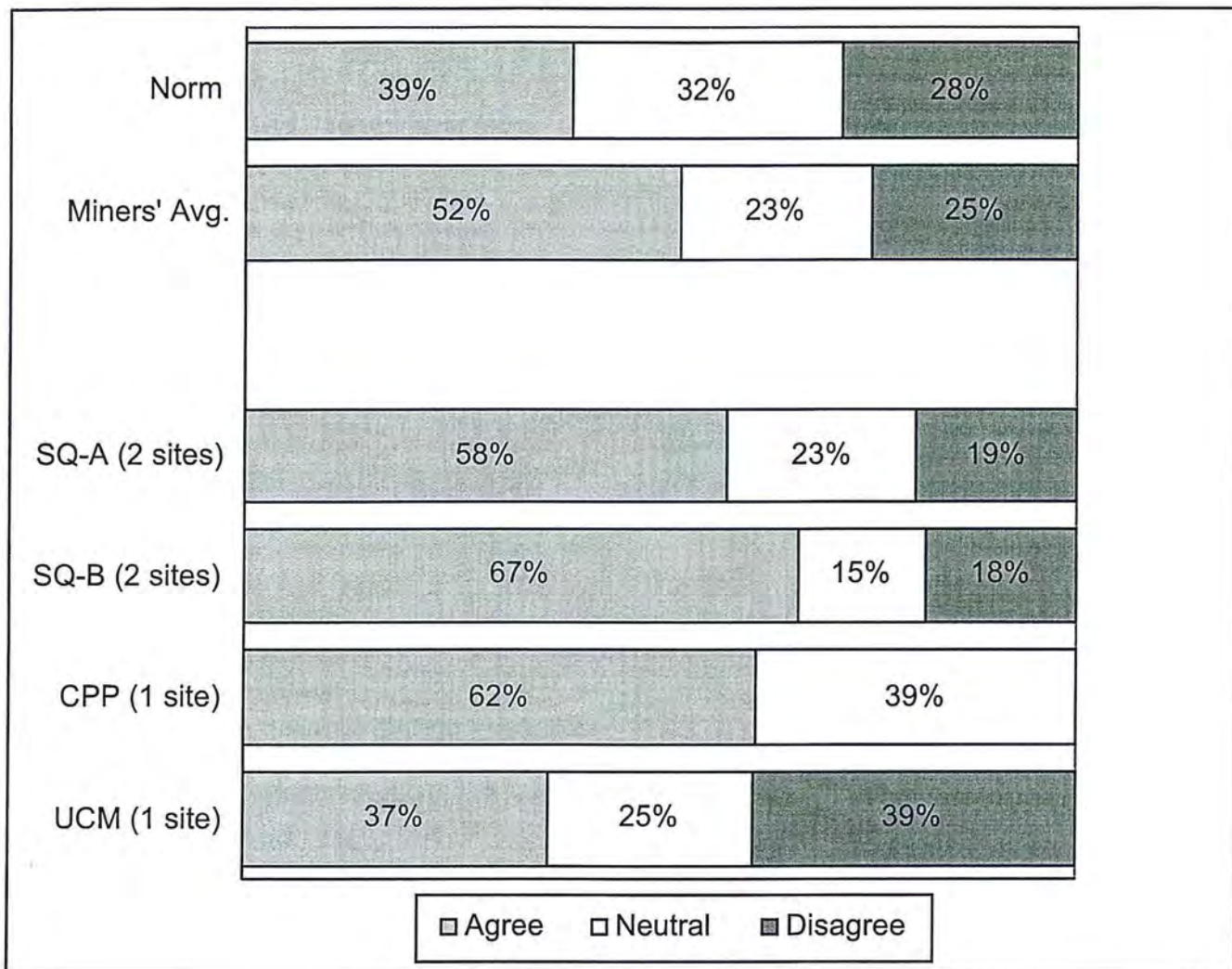


Overall Safety Suggestions by Company



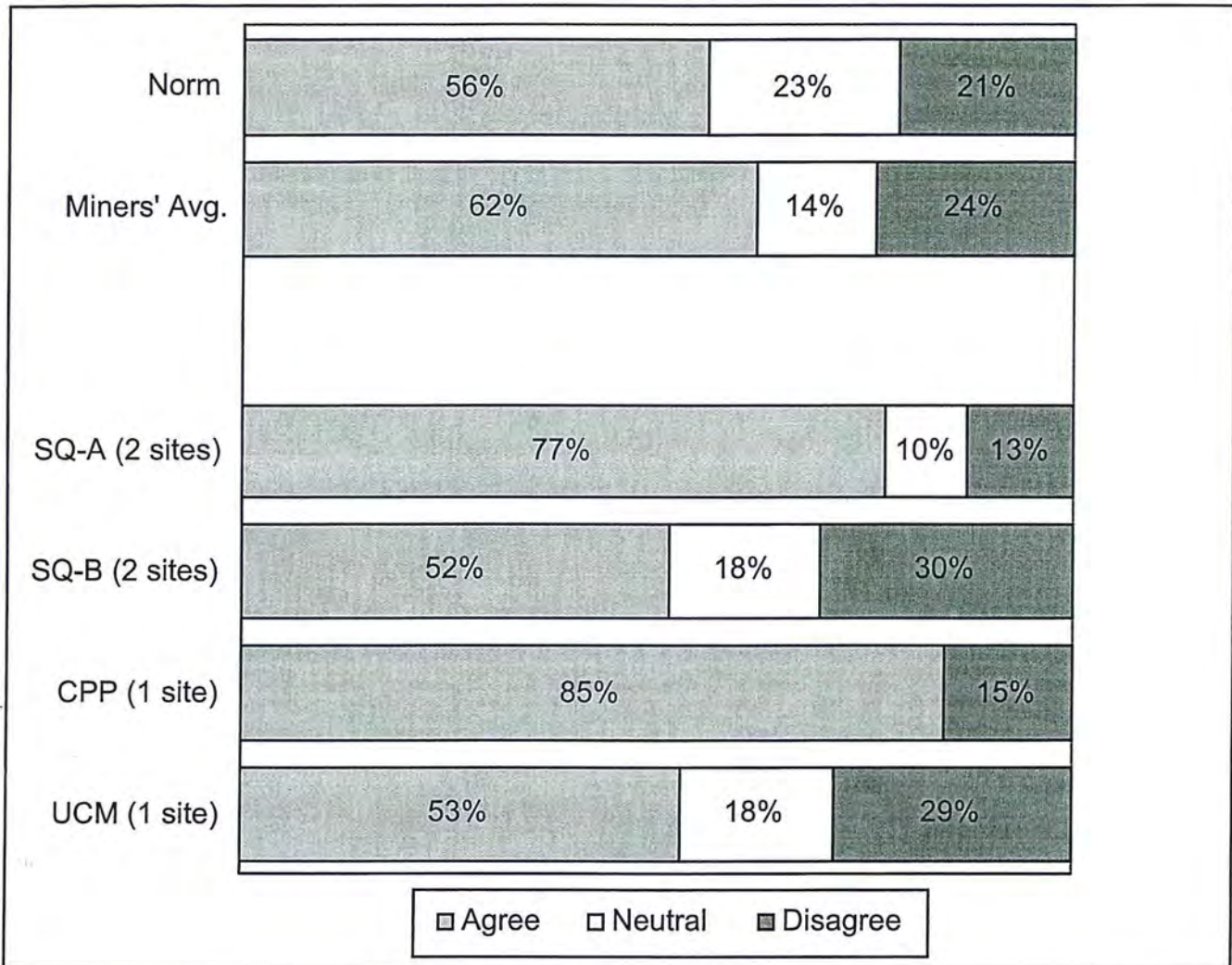
Safety Suggestions by Question

126. My supervisor asks me what I need to do my job safer.



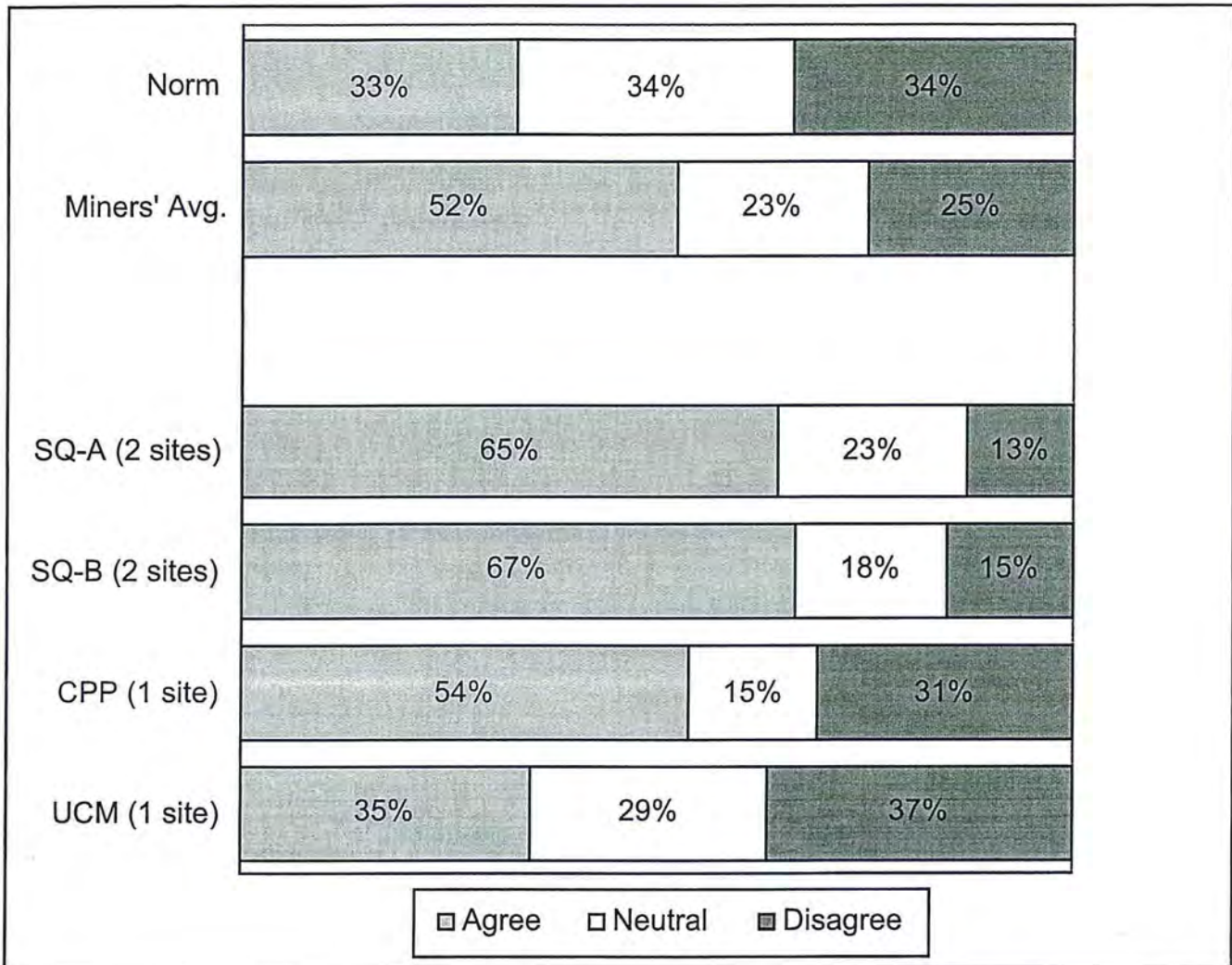
Safety Suggestions by Question (continued)

3. Employee safety suggestions are listened to and taken seriously.

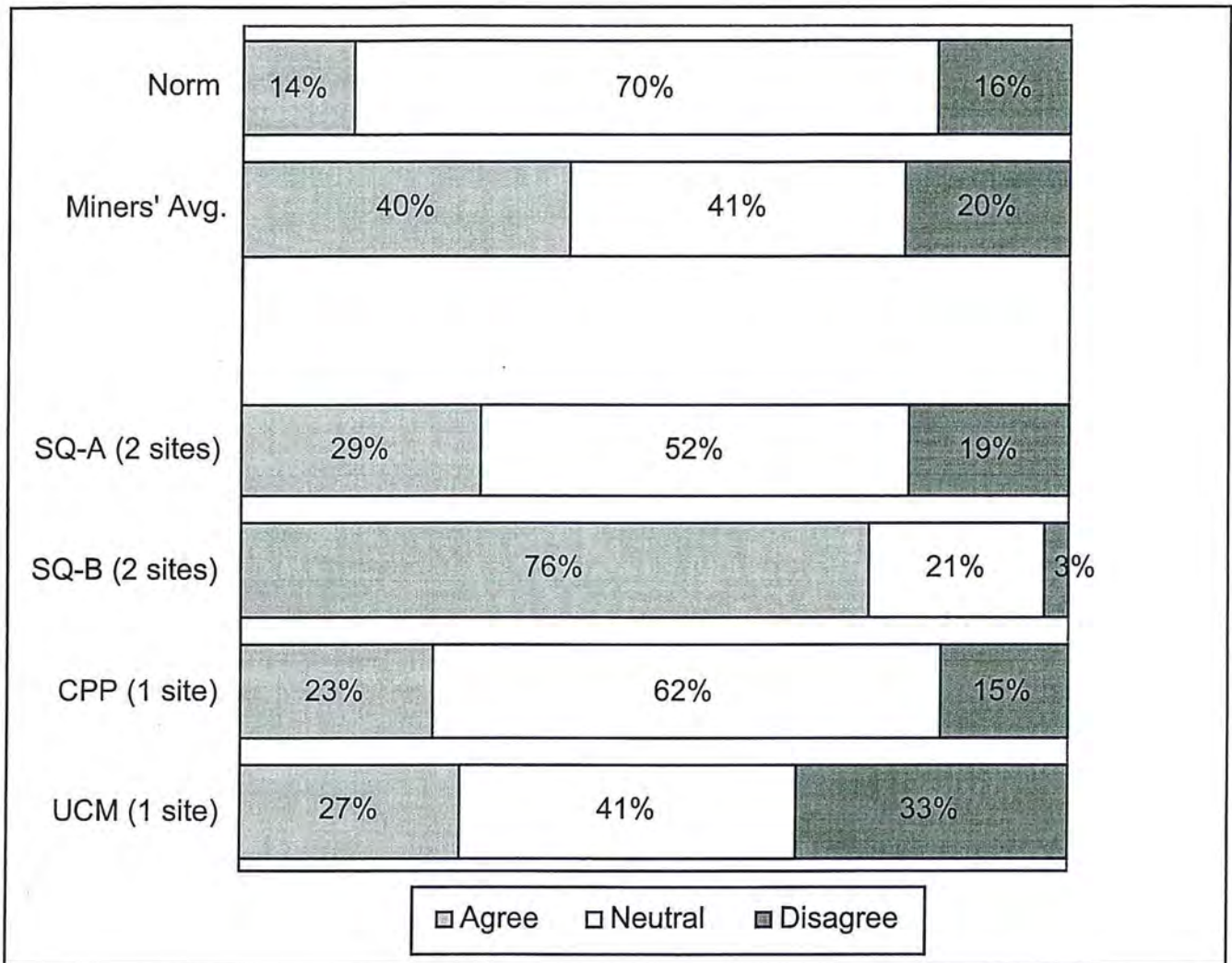


Safety Suggestions by Question (continued)

7. Employees receive prompt feedback in response to their safety suggestions.

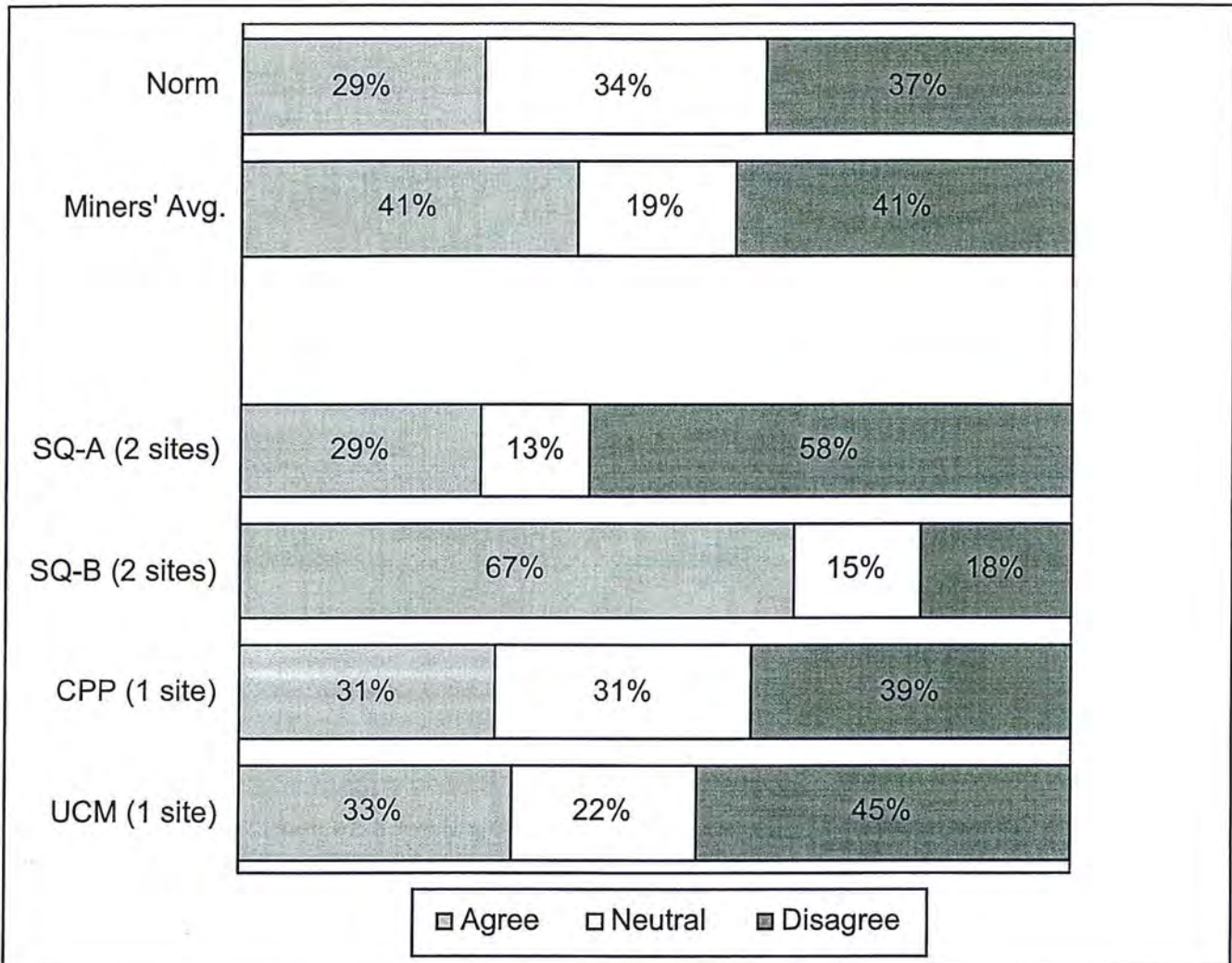


Overall Rewards and Reinforcement by Company



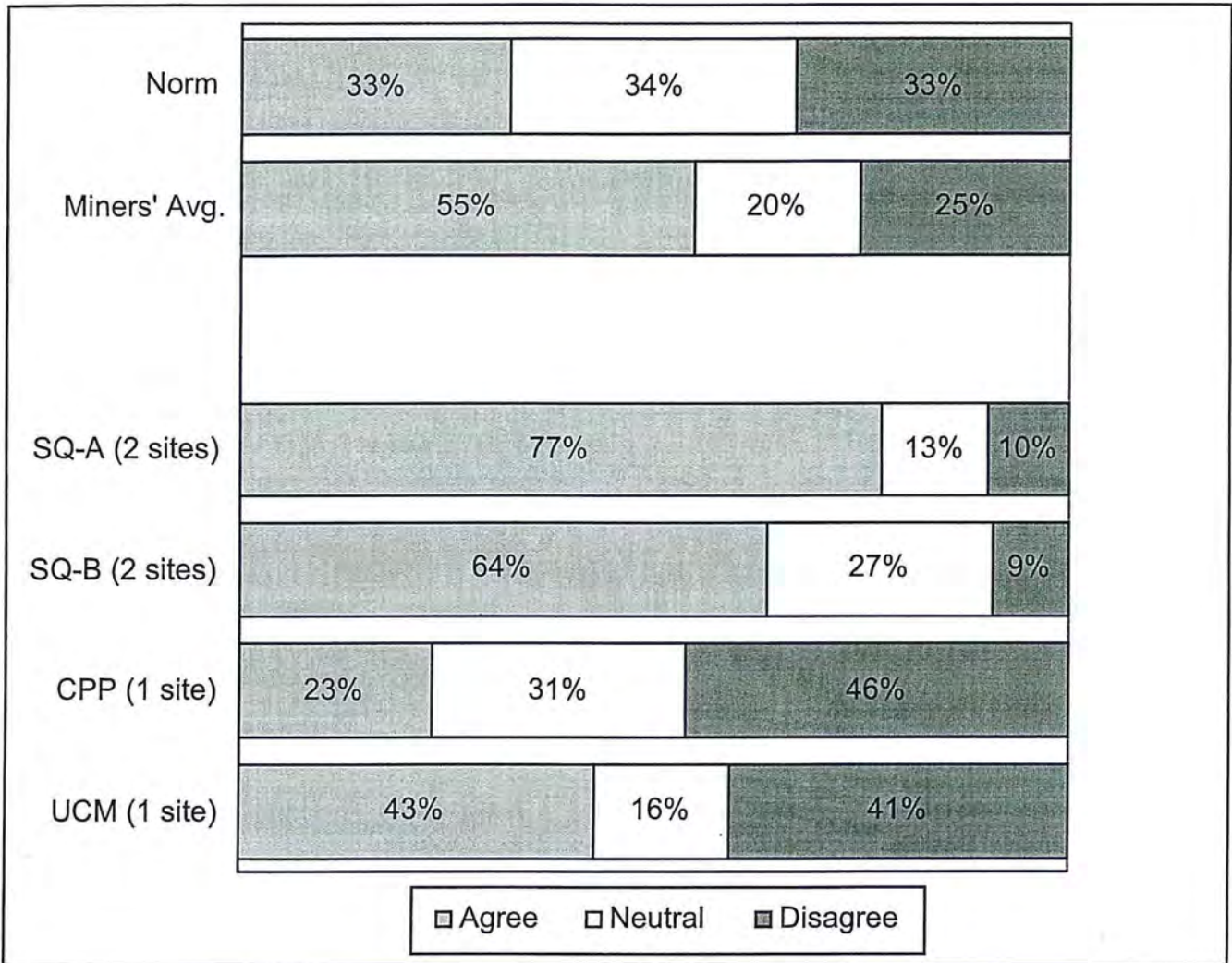
Rewards and Reinforcement by Question

81. Our safety award program(s) motivate me to work more safely.



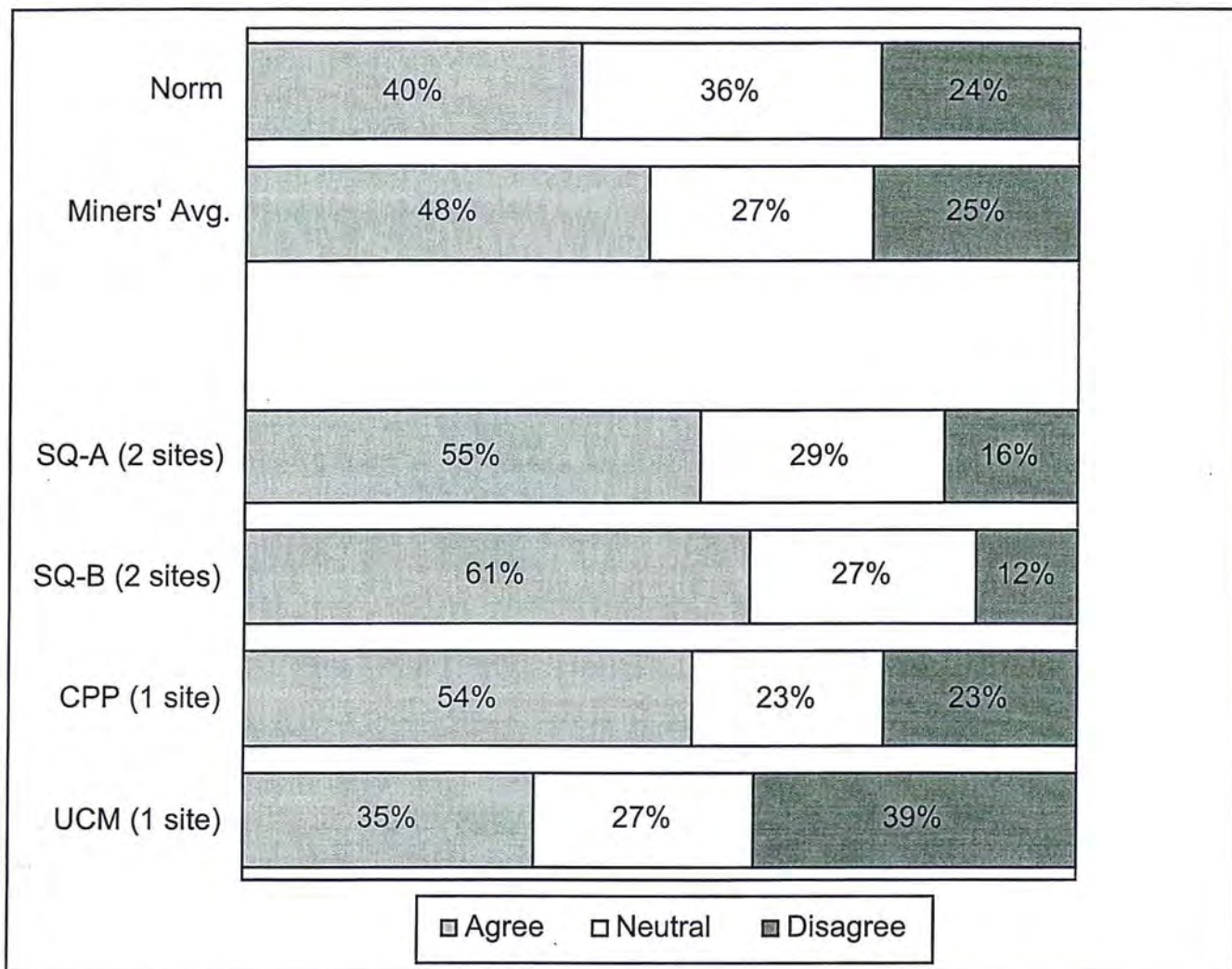
Rewards and Reinforcement by Question (continued)

66. First line supervisors acknowledge and/or reward employees for safe behaviors.



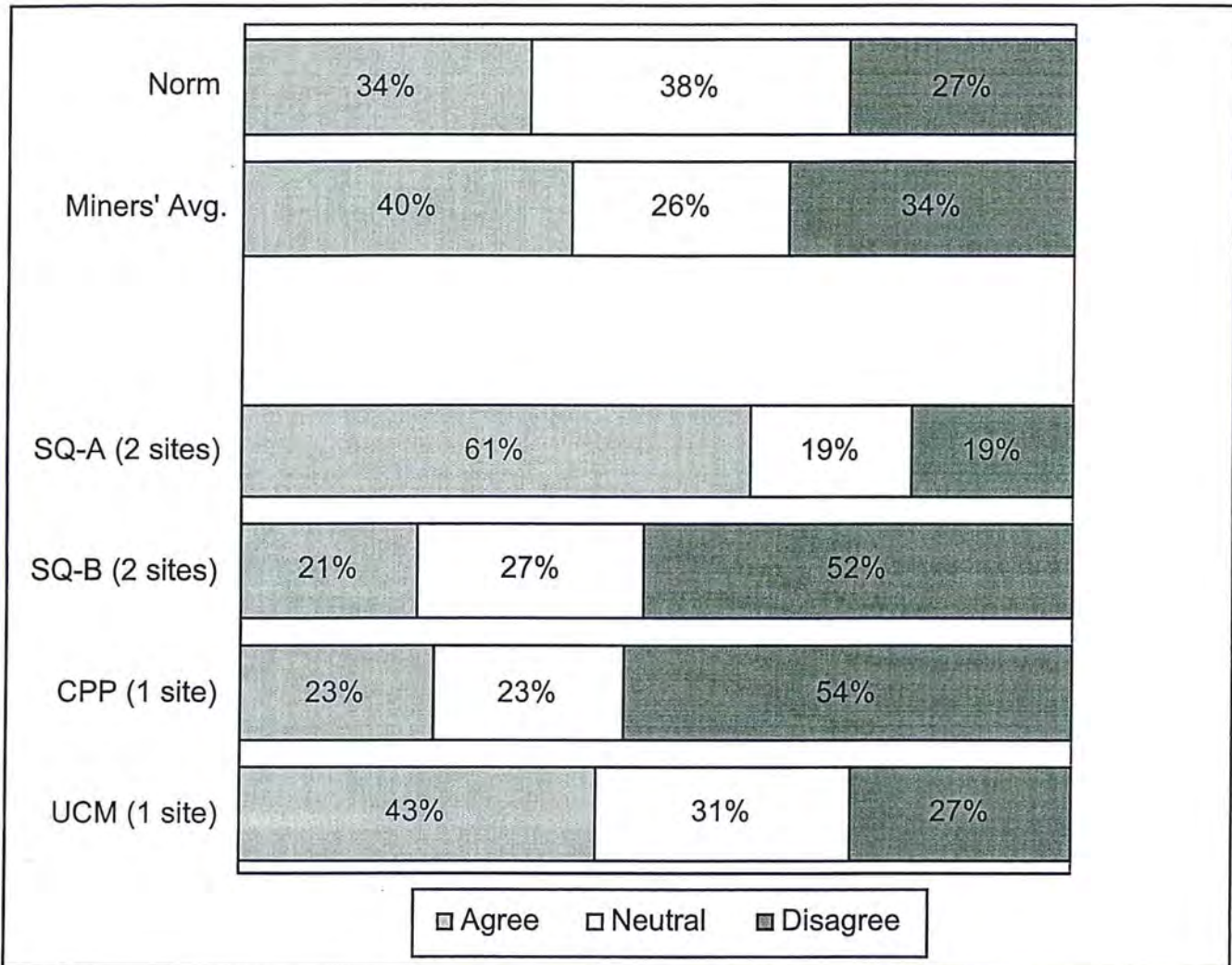
Rewards and Reinforcement by Question (continued)

97. Employees who work safely have a better chance for promotion than those who don't.

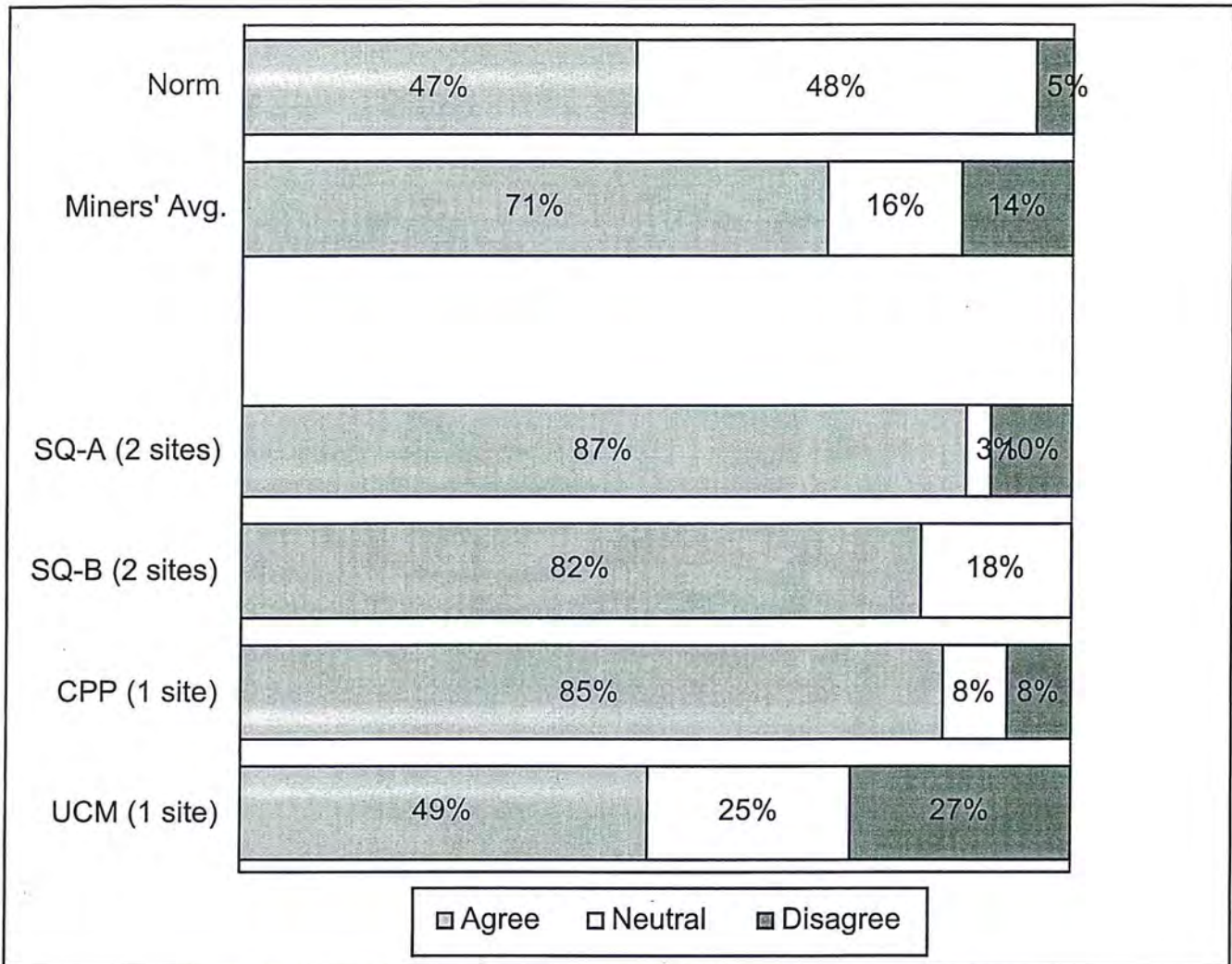


Rewards and Reinforcement by Question (continued)

91. An employee who gets injured will likely receive a poorer performance evaluation.

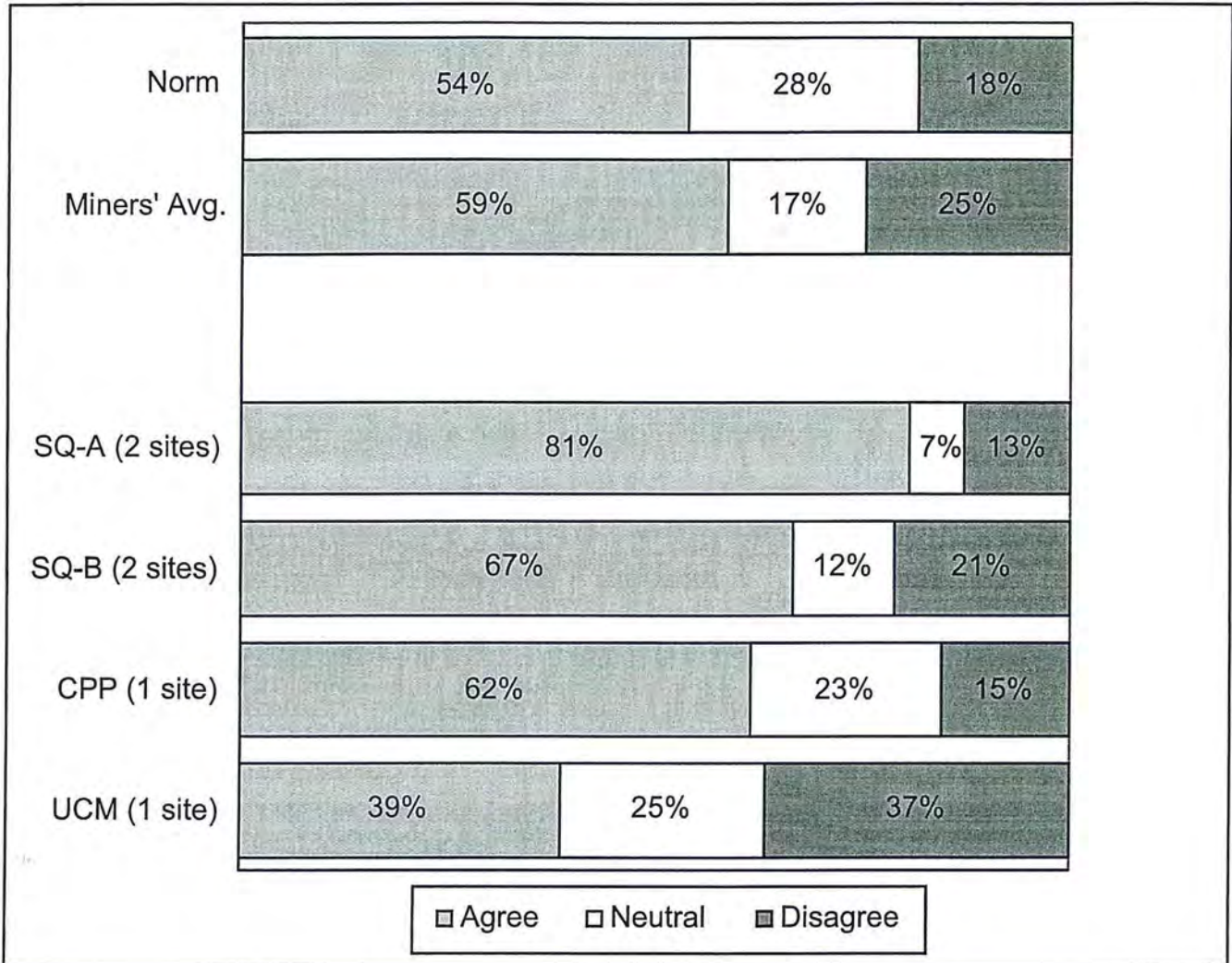


Overall Hazards Identification and Correction by Company



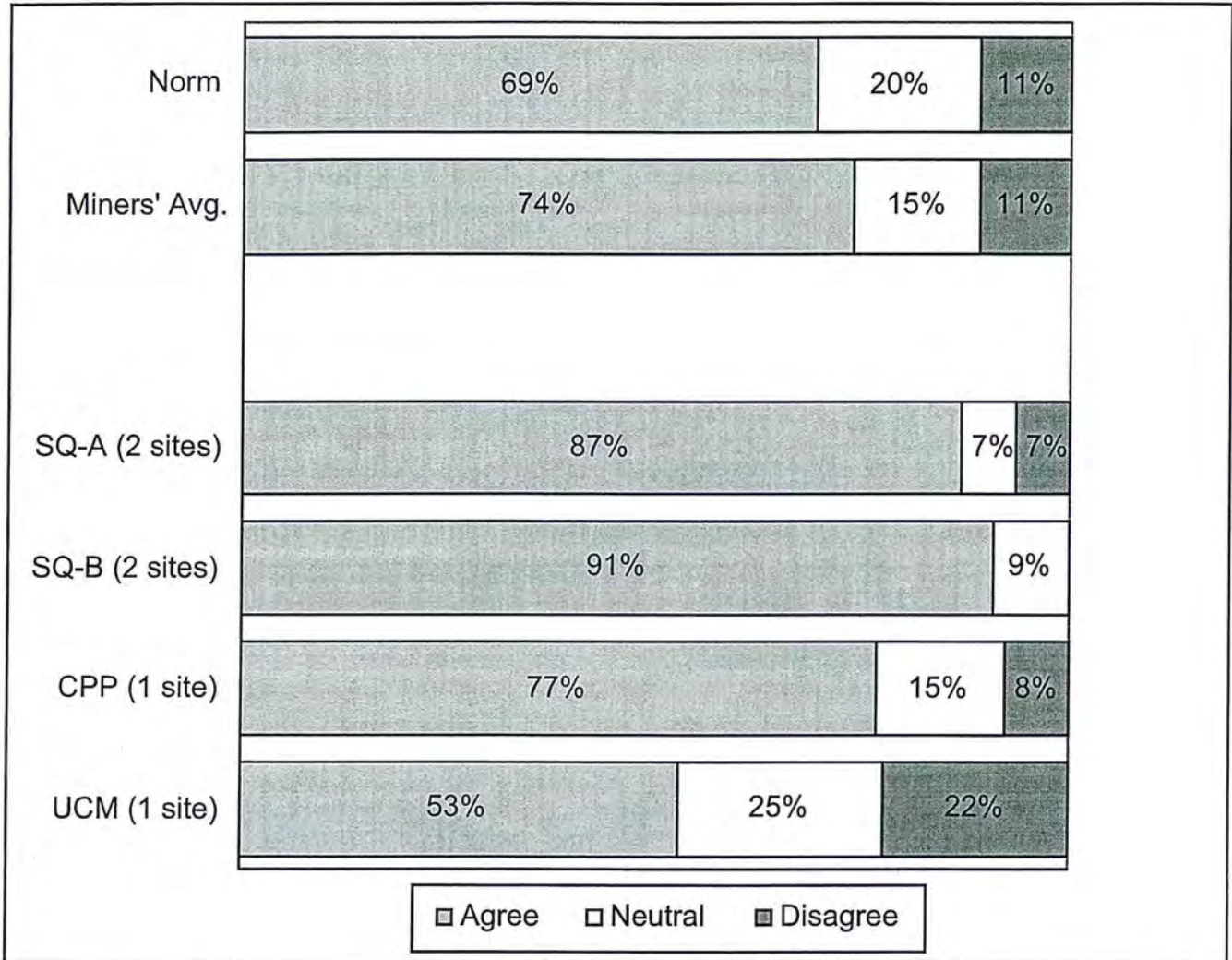
Hazards Identification and Correction by Question

131. Safety audits/inspections are conducted regularly in my department.



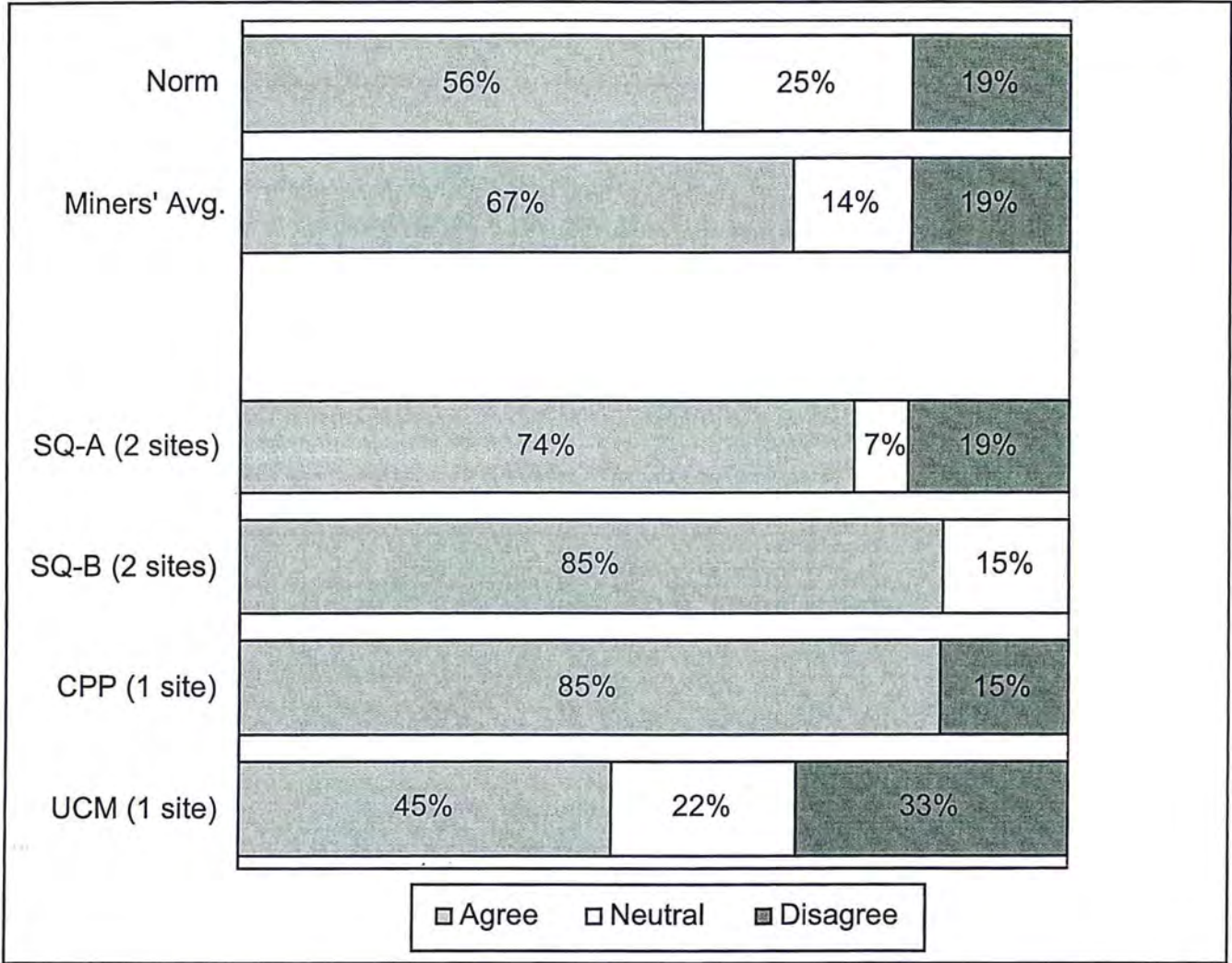
Hazards Identification and Correction by Question (continued)

49. Safety audits/inspections are effective in identifying and correcting safety hazards.



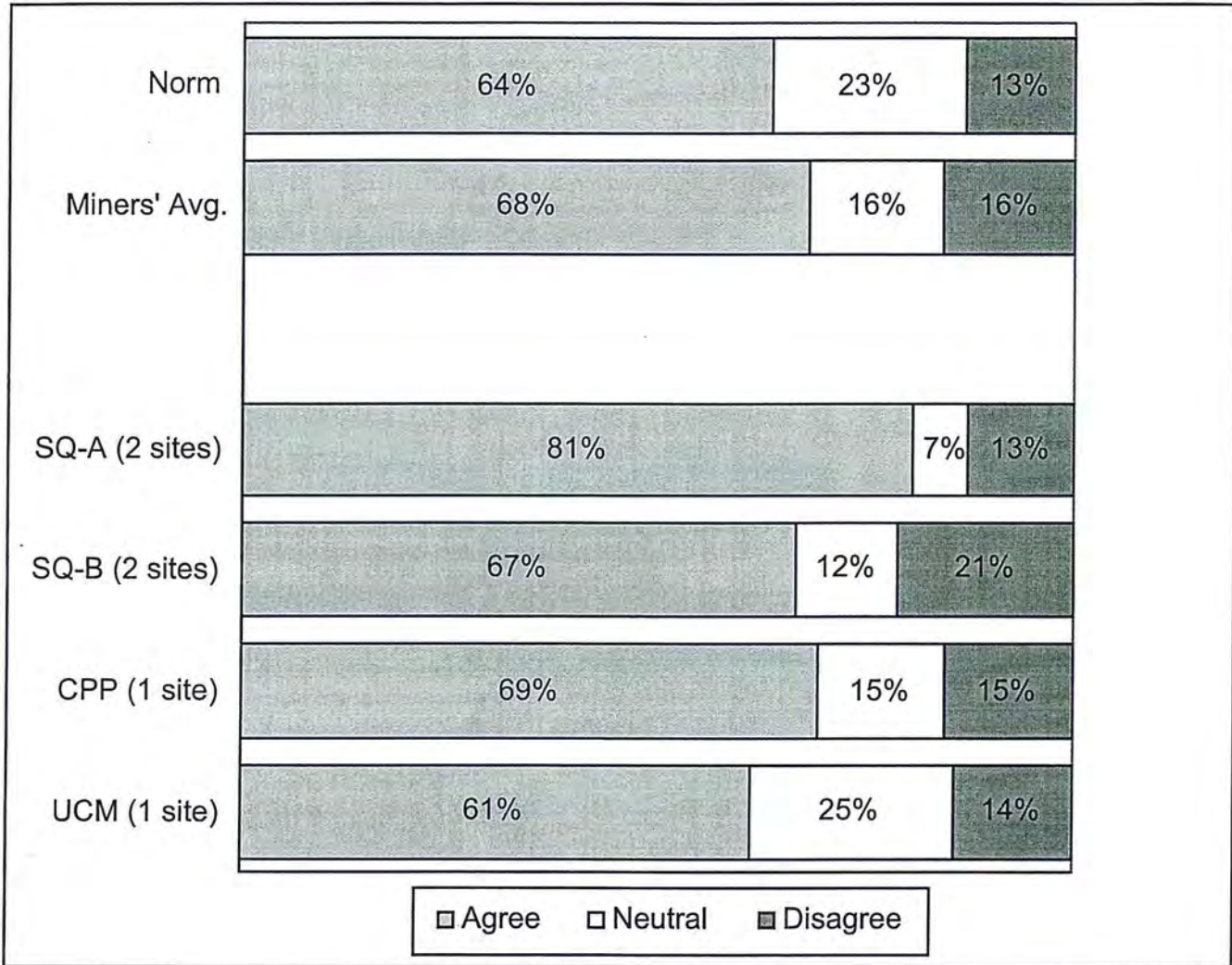
Hazards Identification and Correction by Question (continued)

13. Safety hazards found during inspections are usually followed-up on quickly.

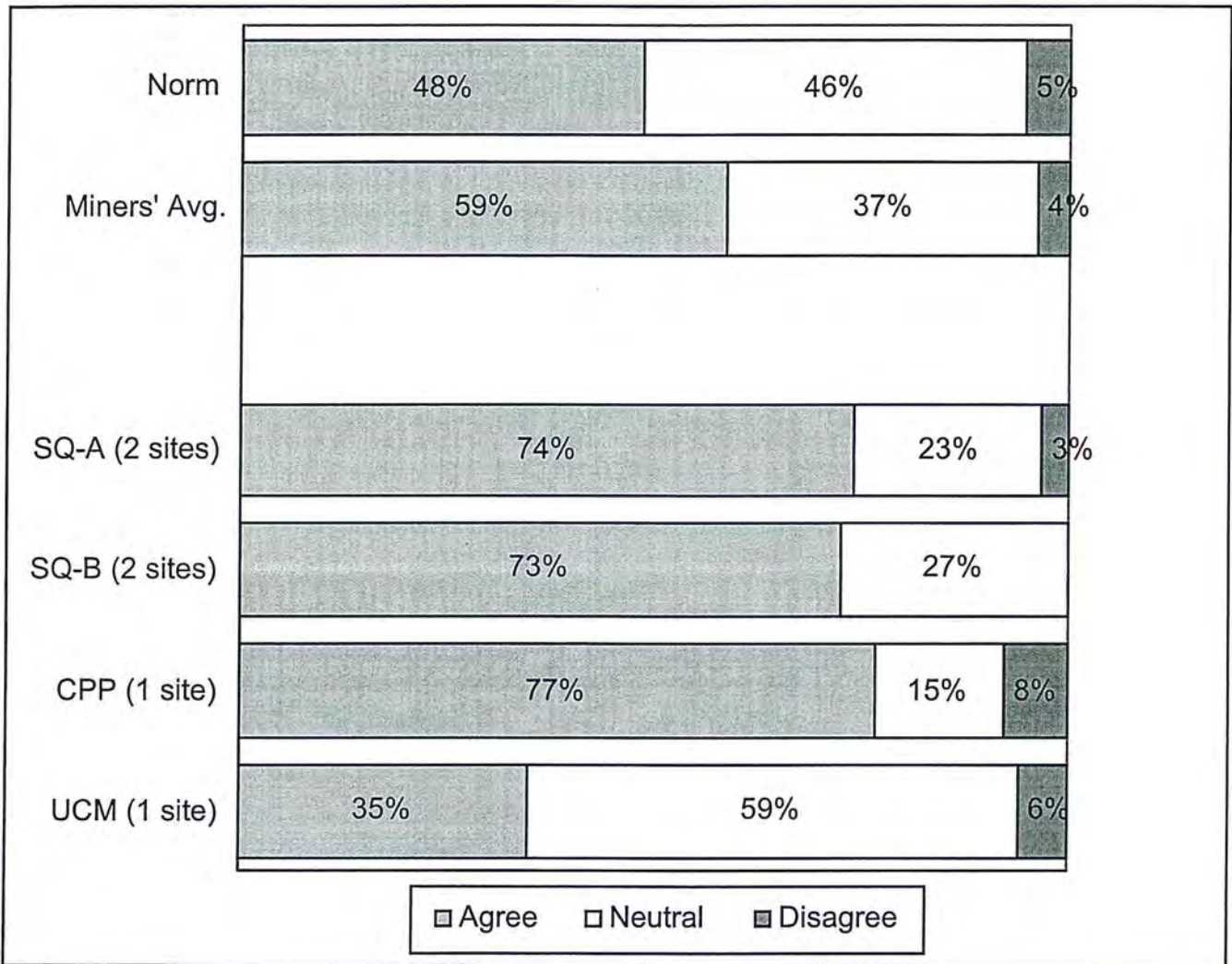


Hazards Identification and Correction by Question (continued)

45. Employees are encouraged to correct safety problems themselves wherever possible.

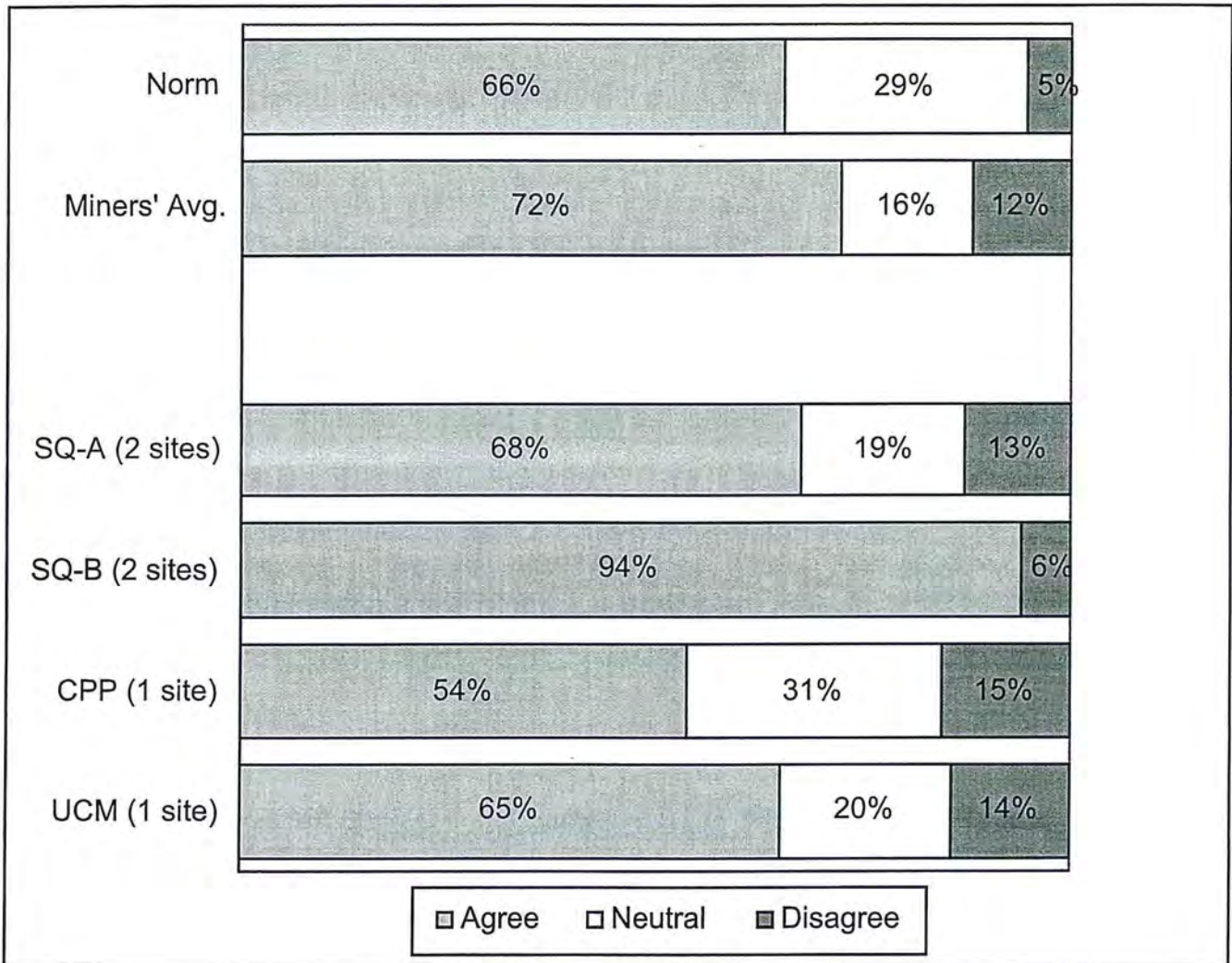


Overall Employee Involvement by Company



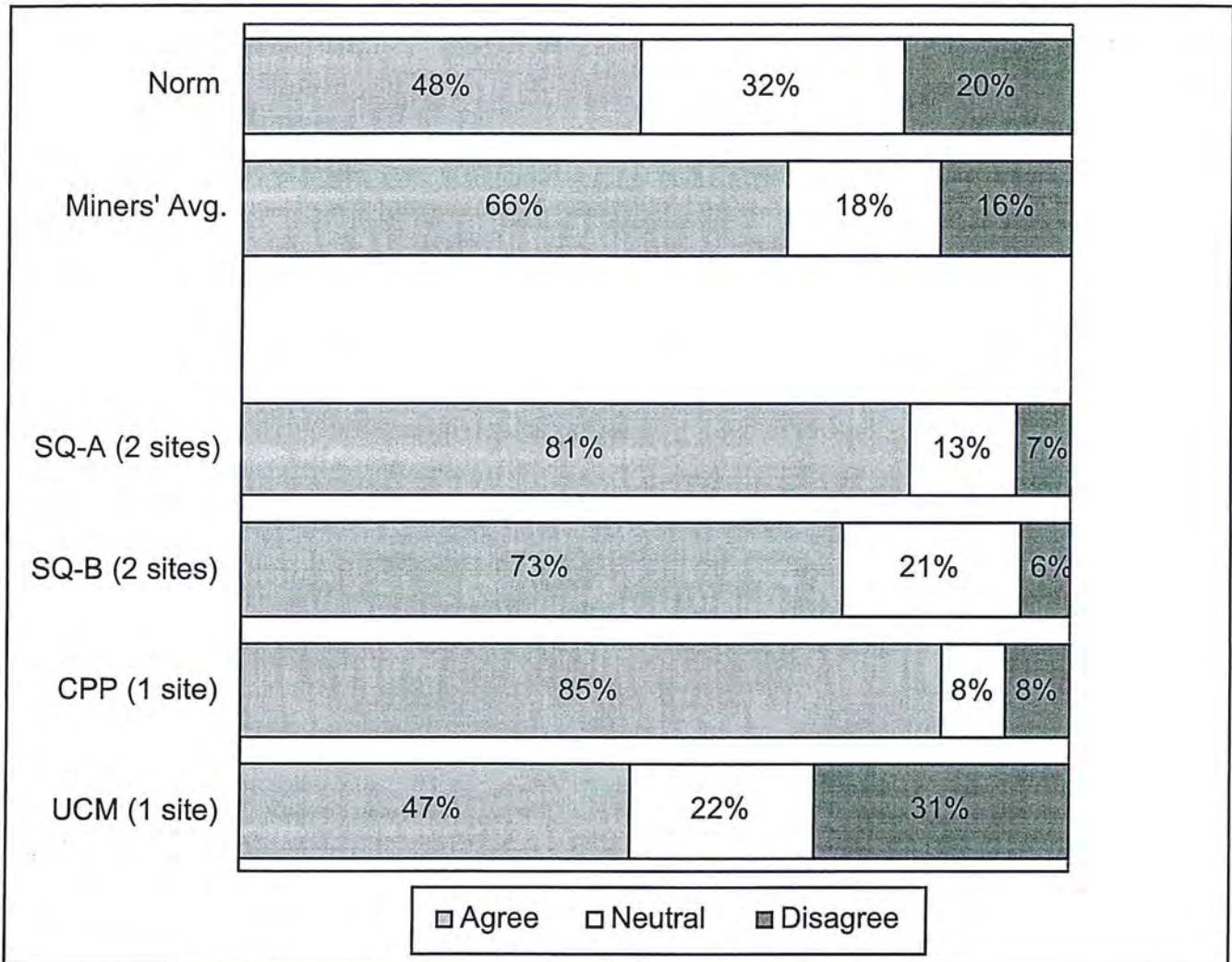
Employee Involvement by Question

105. Employees should be given more opportunities to become involved in safety improvement efforts.



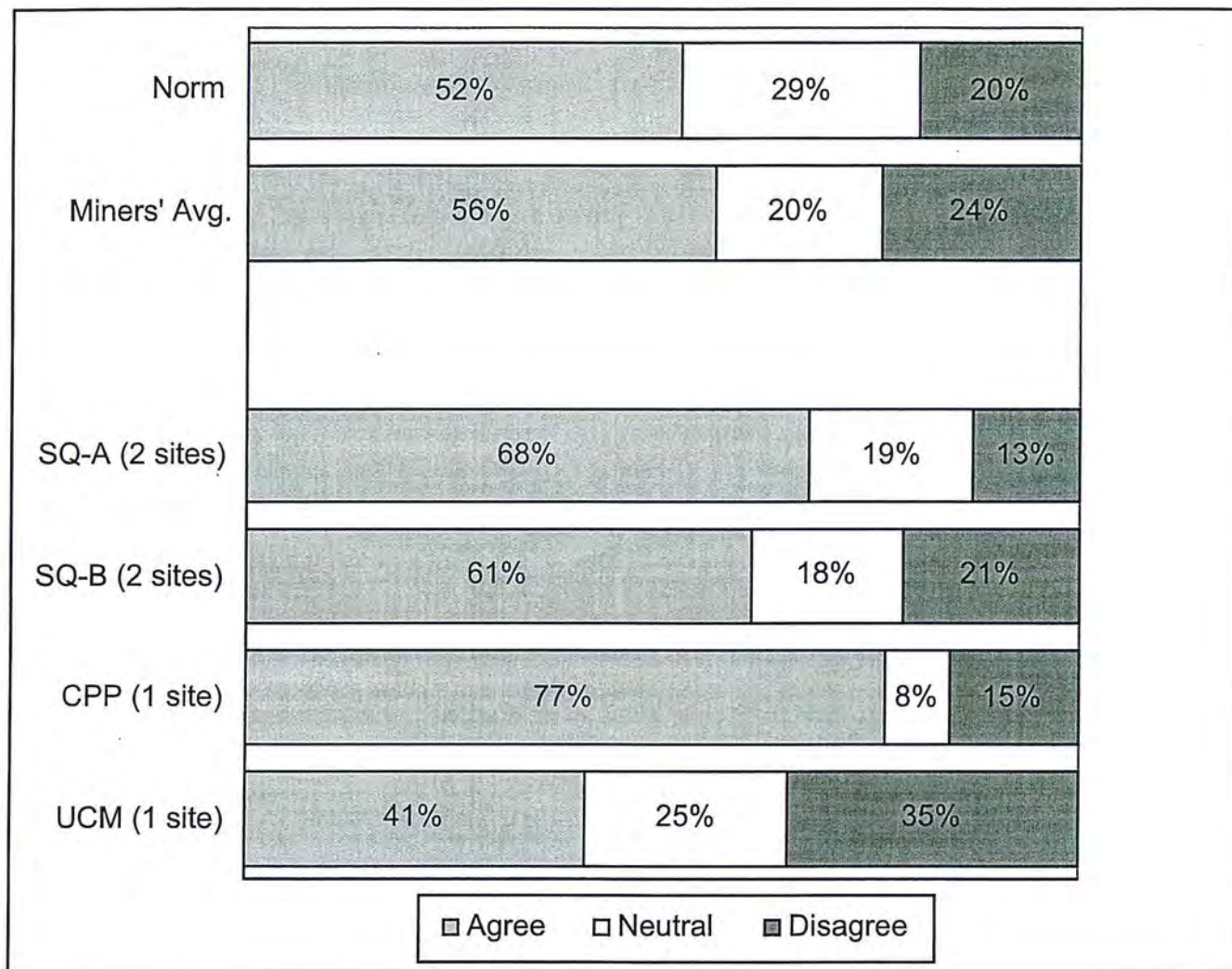
Employee Involvement by Question (continued)

112. Employees in my work group participate in defining safe work practices.

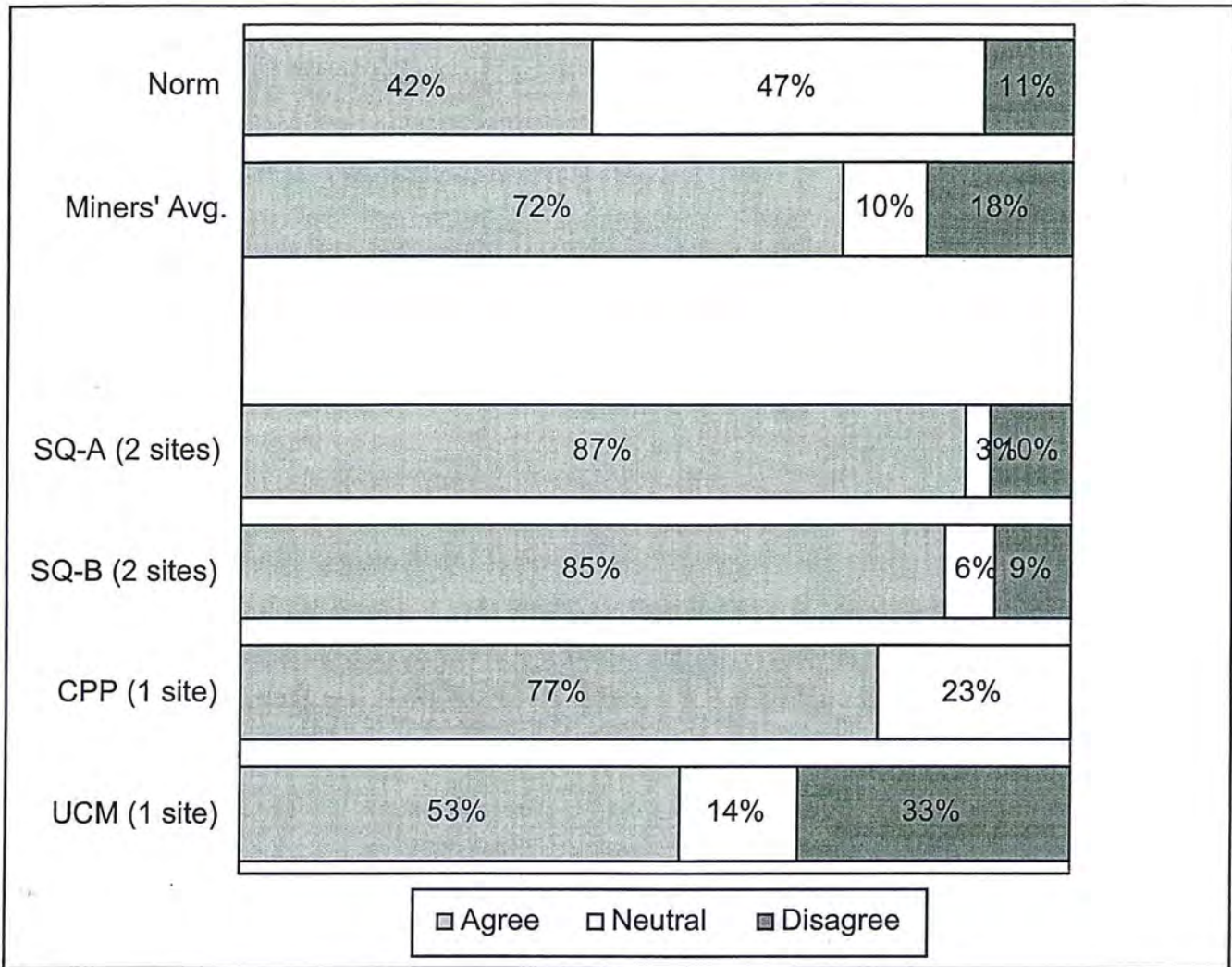


Employee Involvement by Question (continued)

107. Employees participate in inspections for potential hazards.

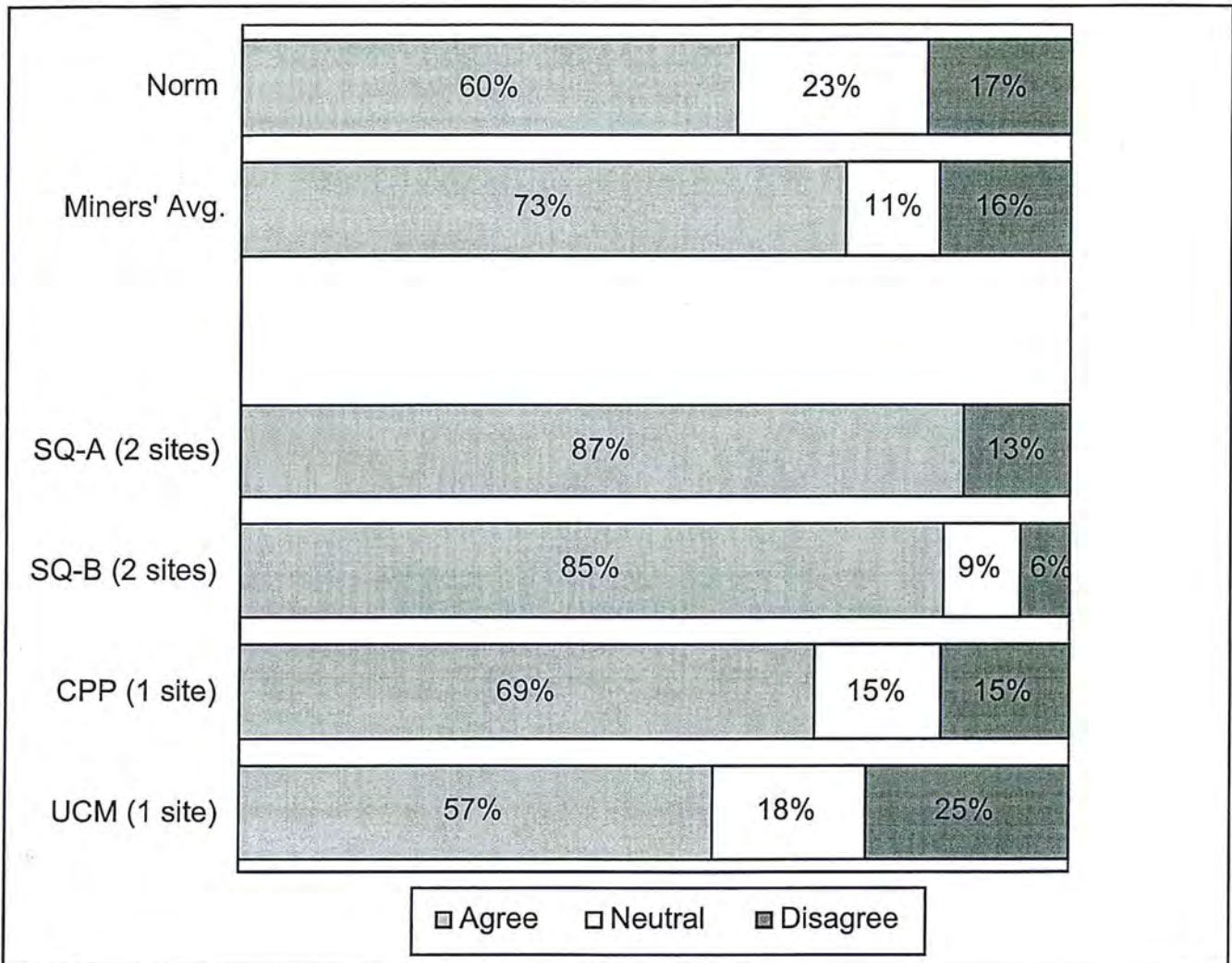


Overall Other Safety Management Systems by Company



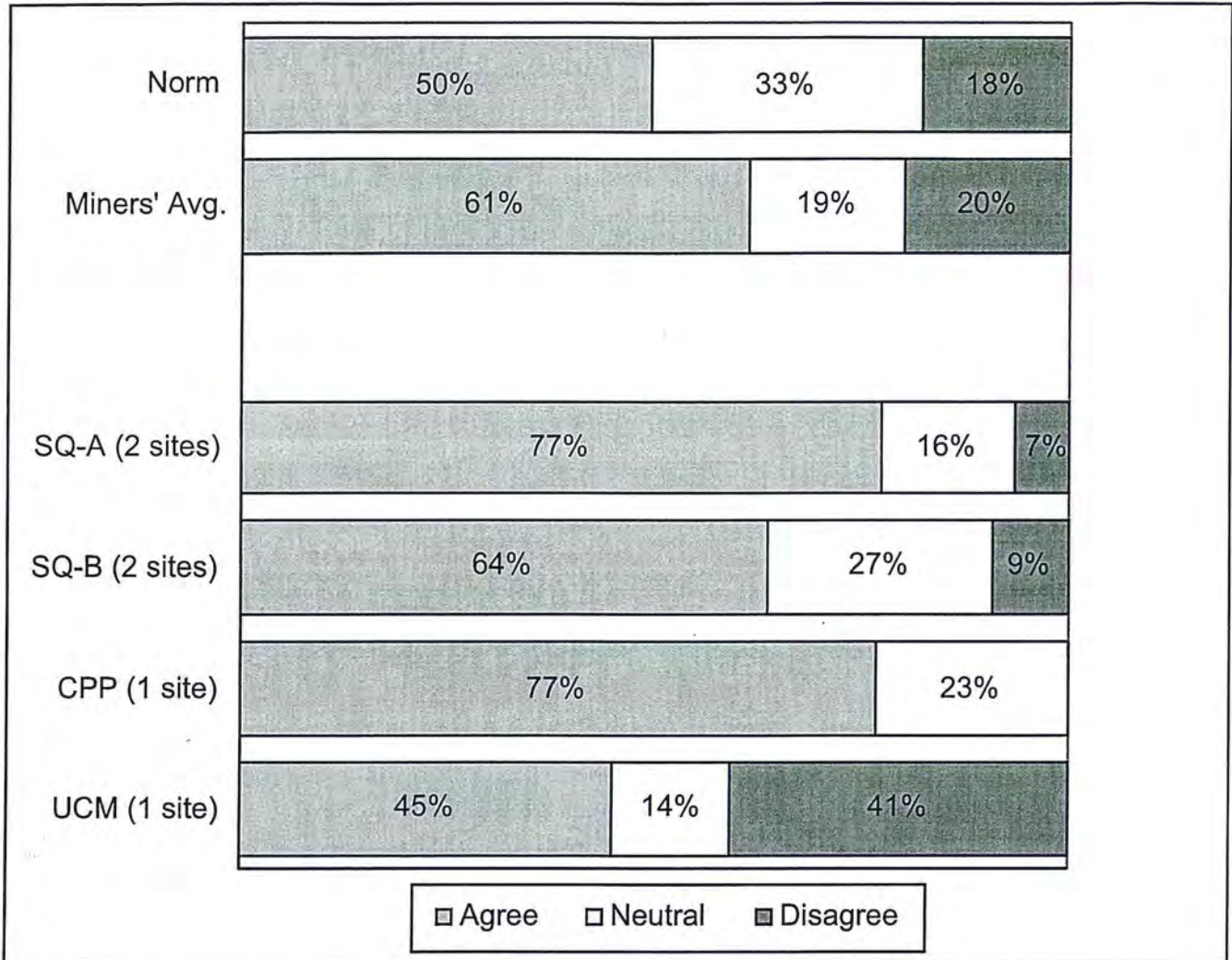
Other Safety Management Systems by Question

12. Safety meetings are effective at making this a safer place to work.



Other Safety Management Systems by Question (continued)

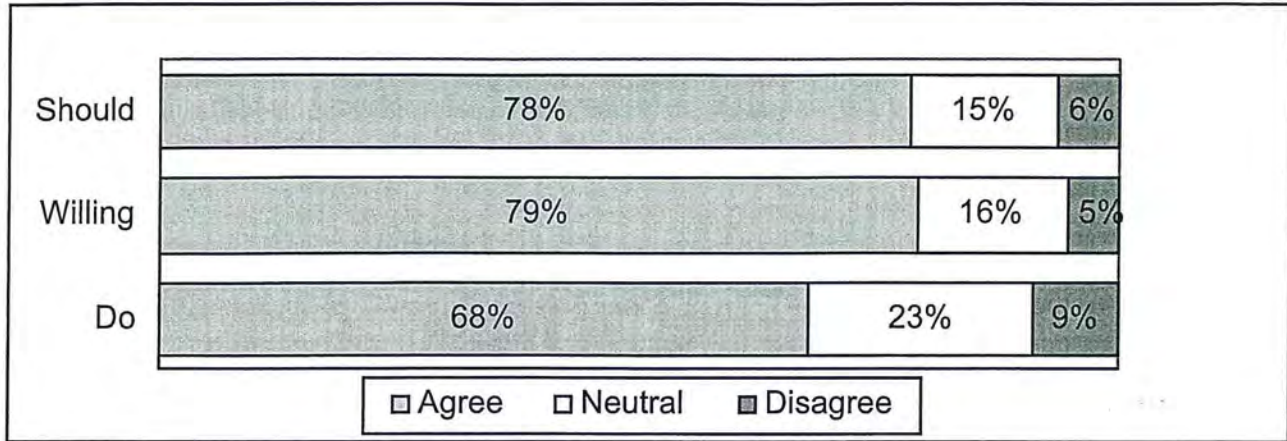
17. The safety committees' efforts are effective in improving safety.



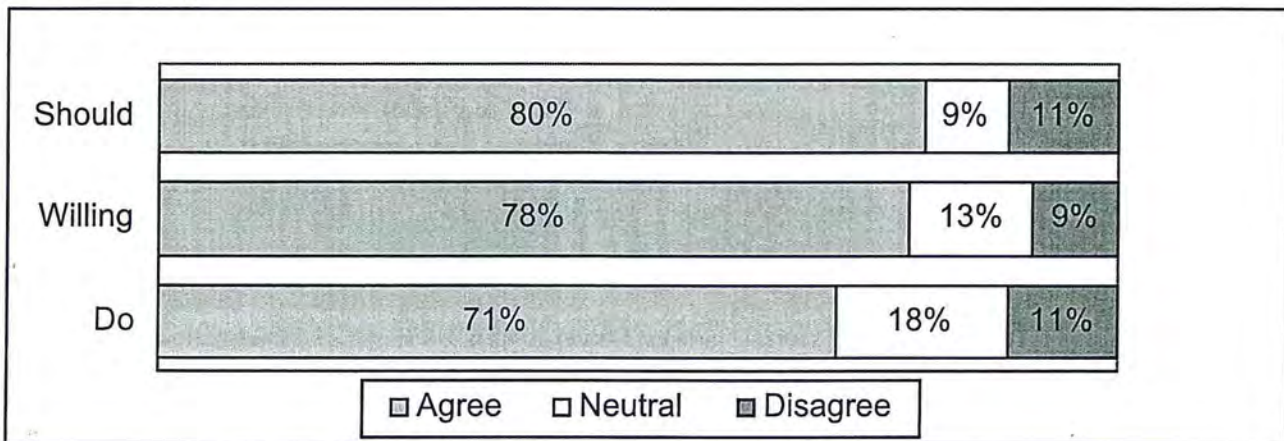
Actively Caring

Overall Actively Caring

Norm

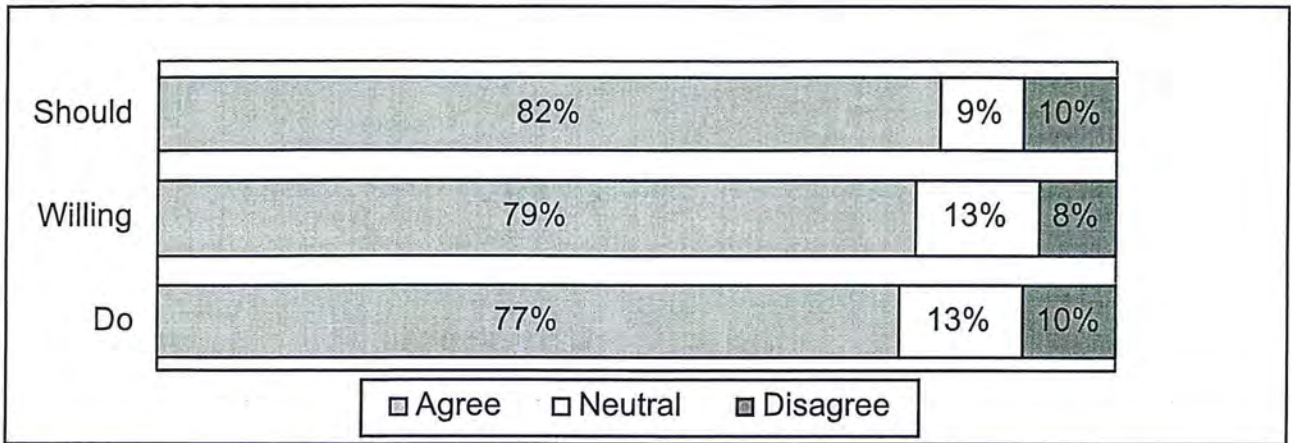


Miners' Average

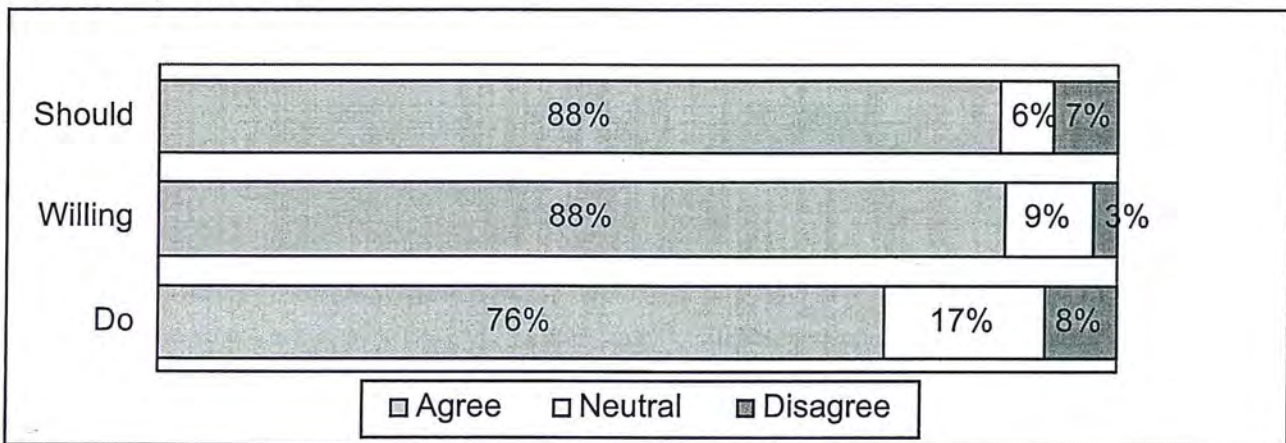


Overall Actively Caring by Company

Stone Quarry A (2 sites)

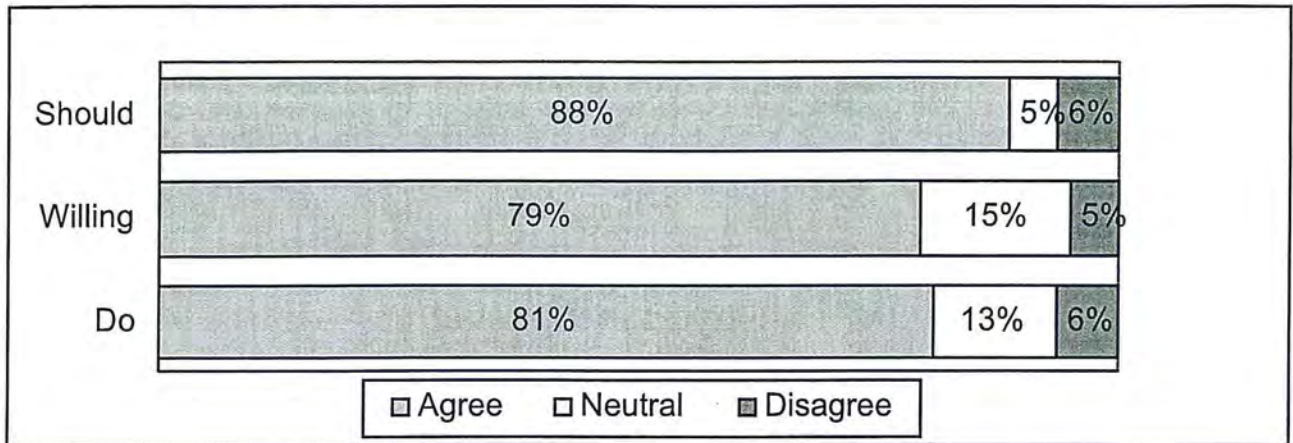


Stone Quarry B (2 sites)

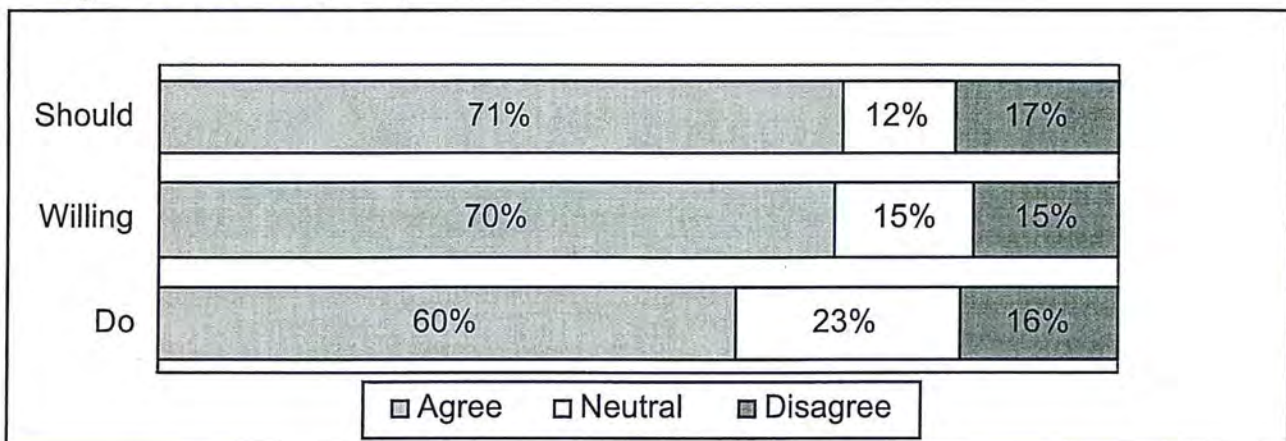


Overall Actively Caring by Company (continued)

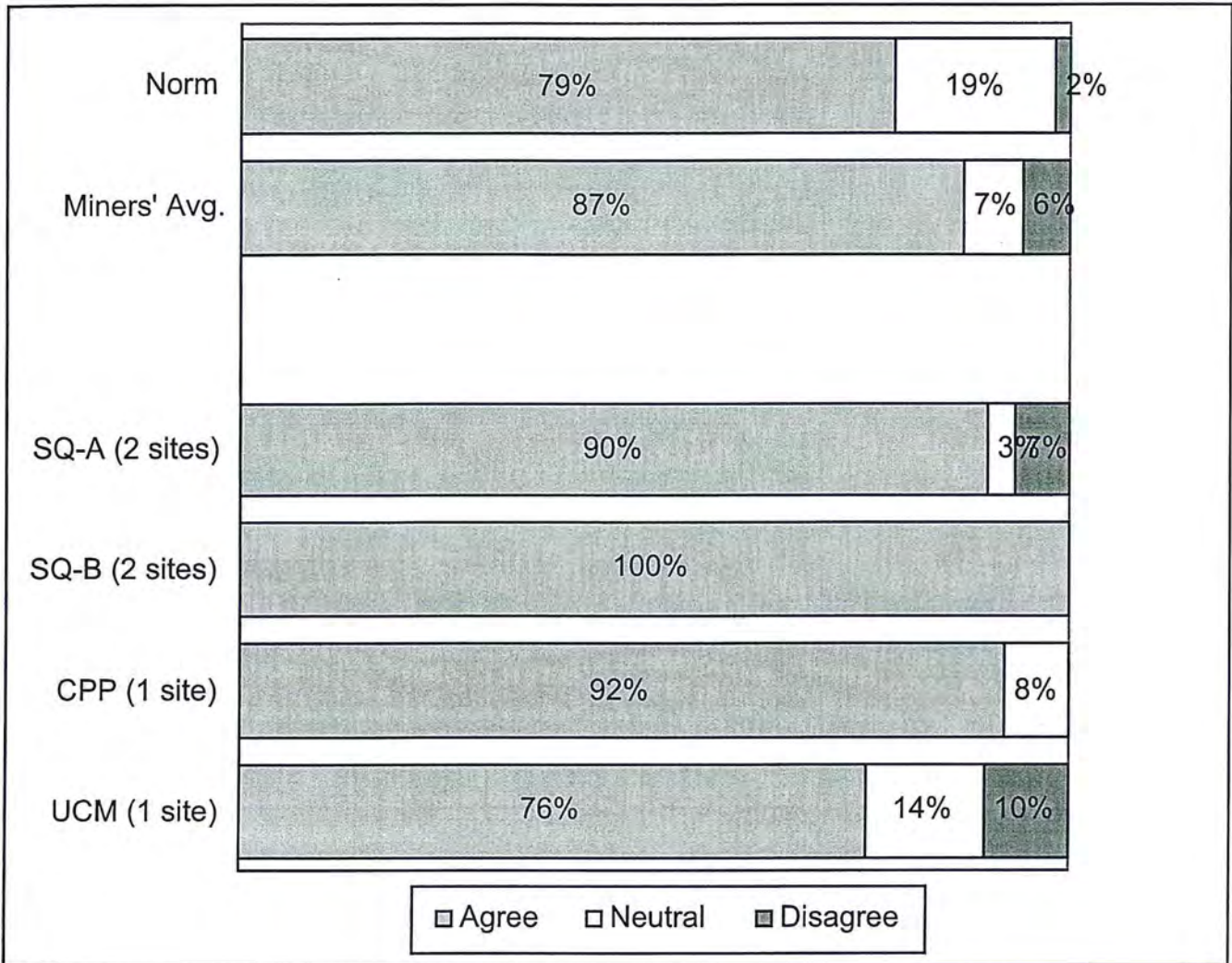
Coal Processing Plant (1 site)



Underground Coal Mine (1 site)

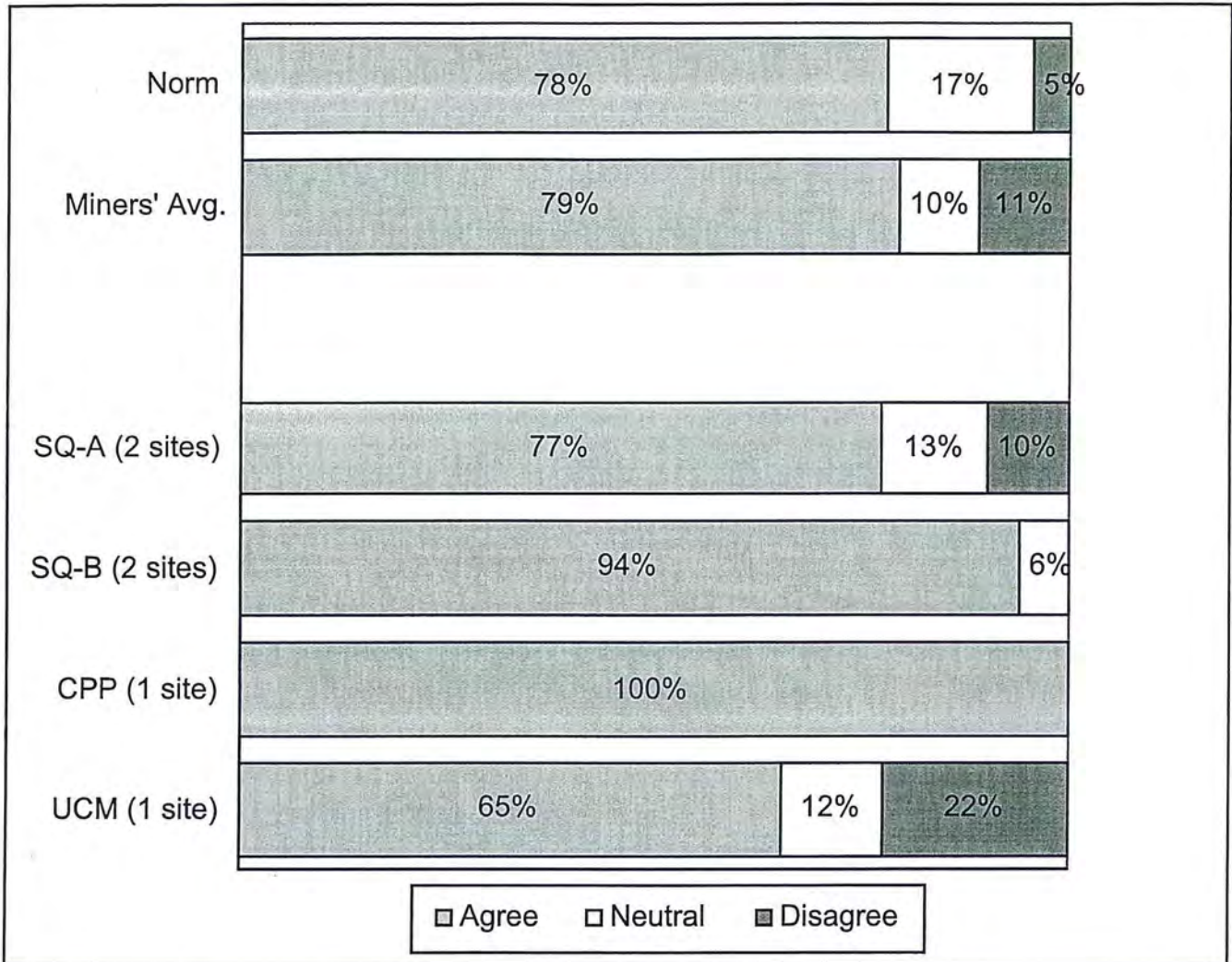


Actively Caring by Company



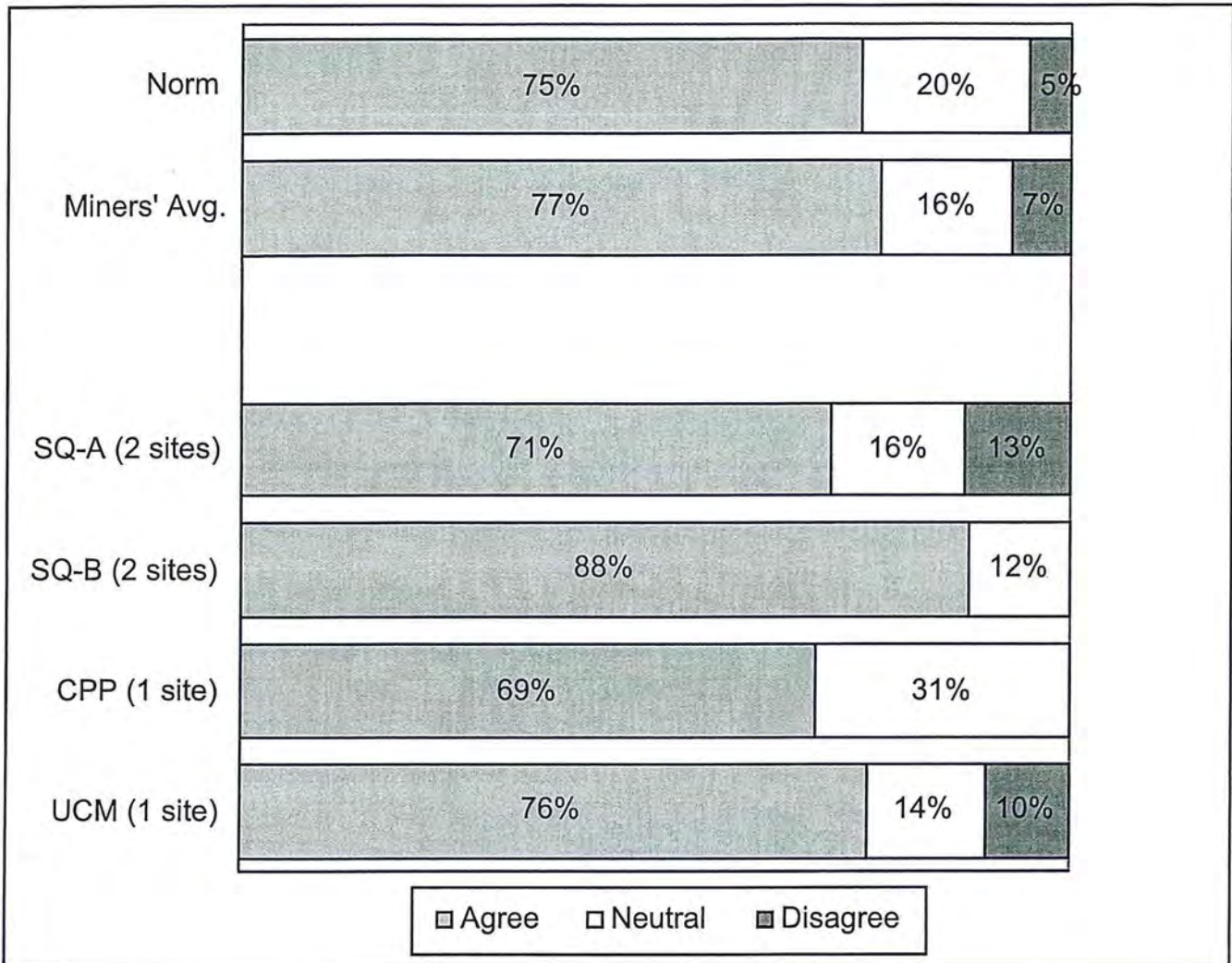
Actively Caring by Question

50. Employees should praise each other for working safely.



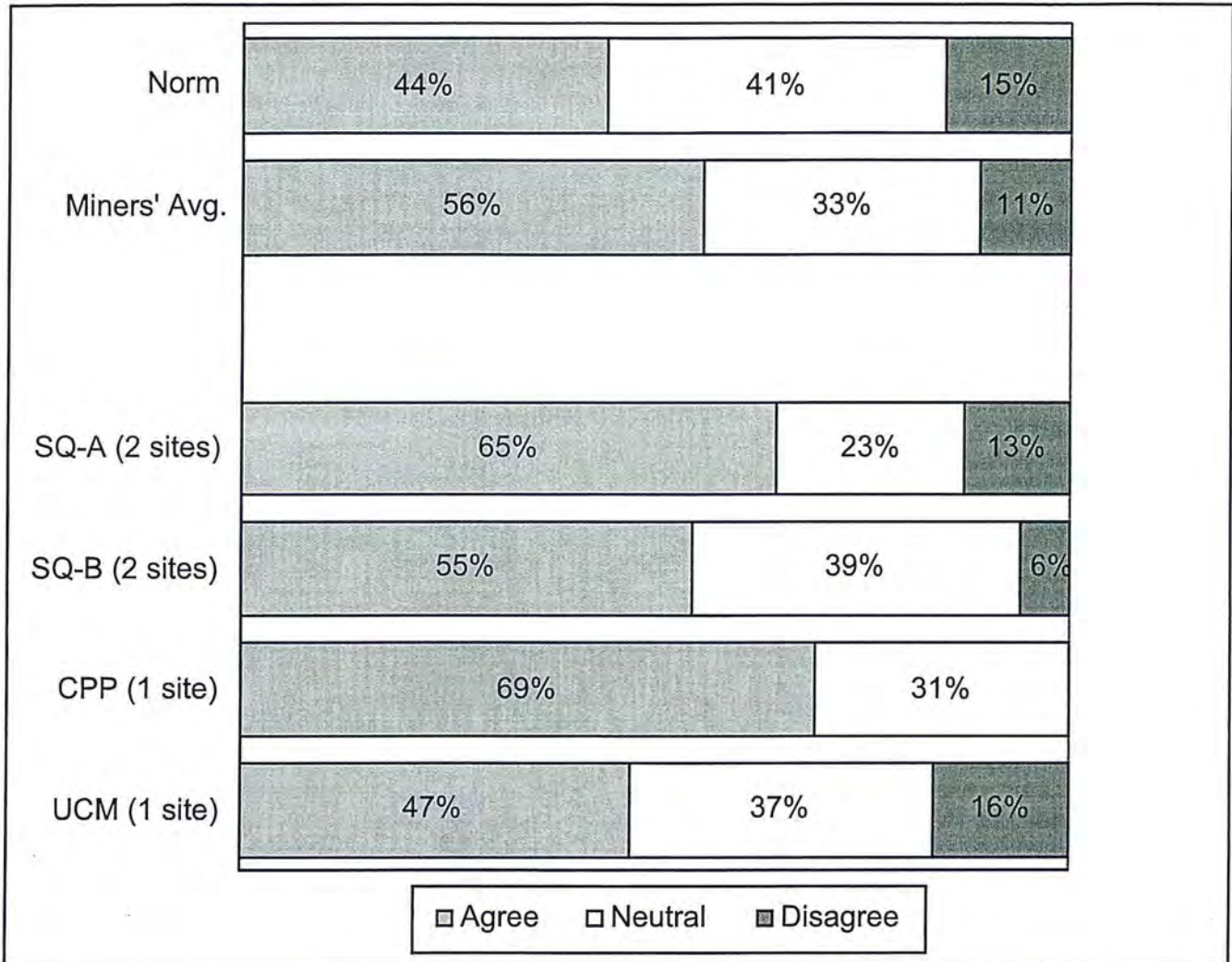
Actively Caring by Question (continued)

85. I am willing to praise my coworkers for working safely.



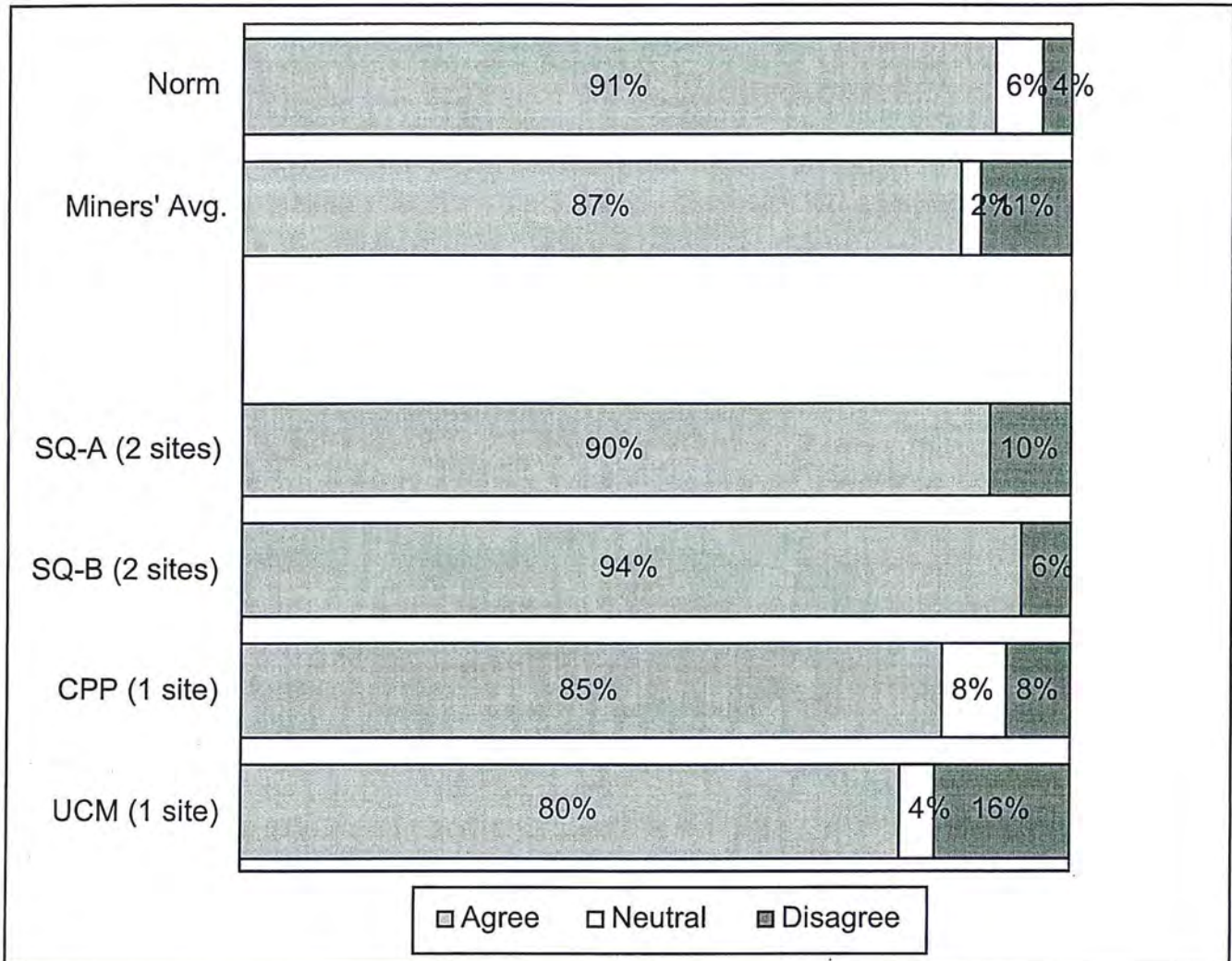
Actively Caring by Question (continued)

132. When I see a coworker working safely, I praise him/her.



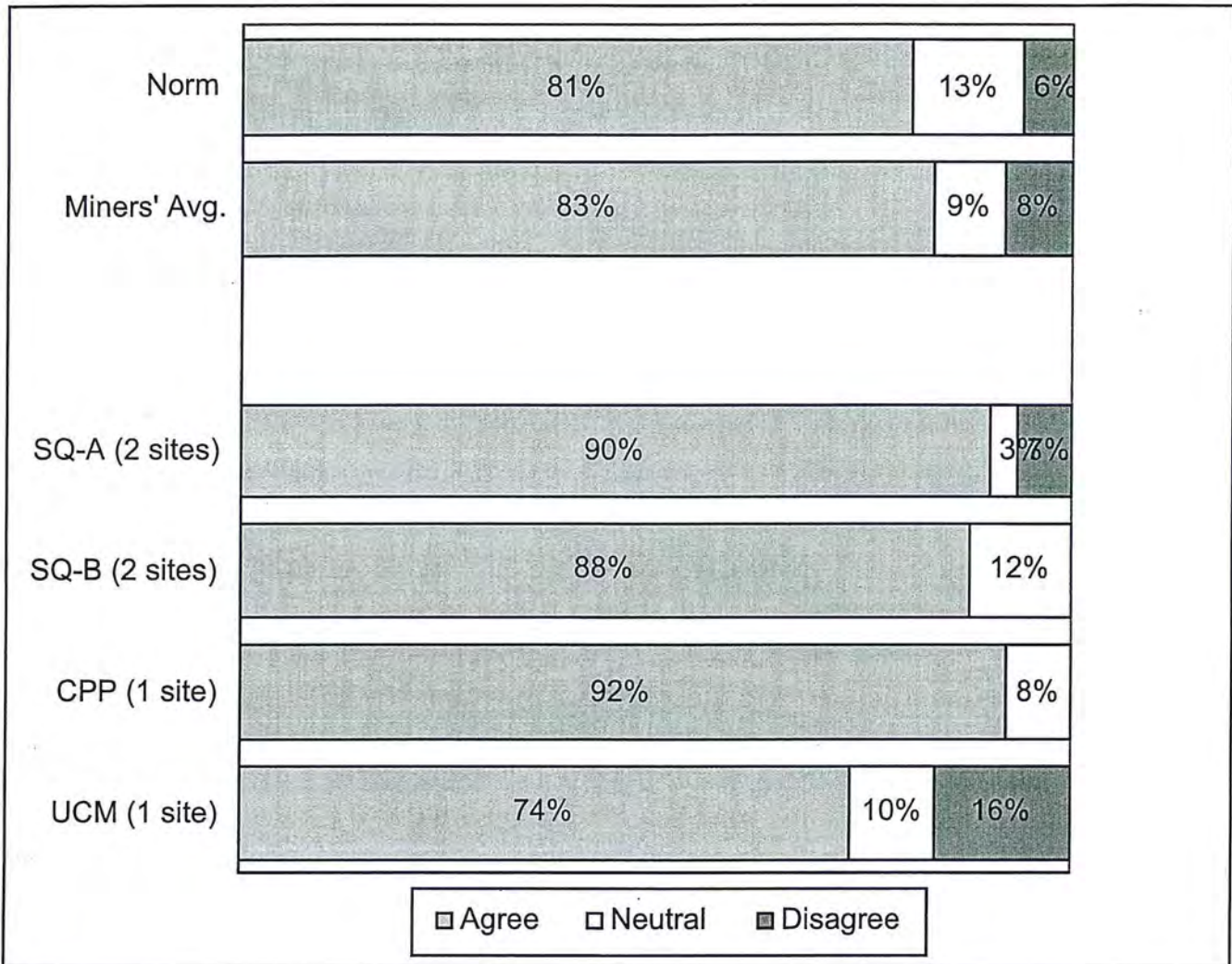
Actively Caring by Question (continued)

25. Employees should caution their coworkers when they are observed working unsafely.



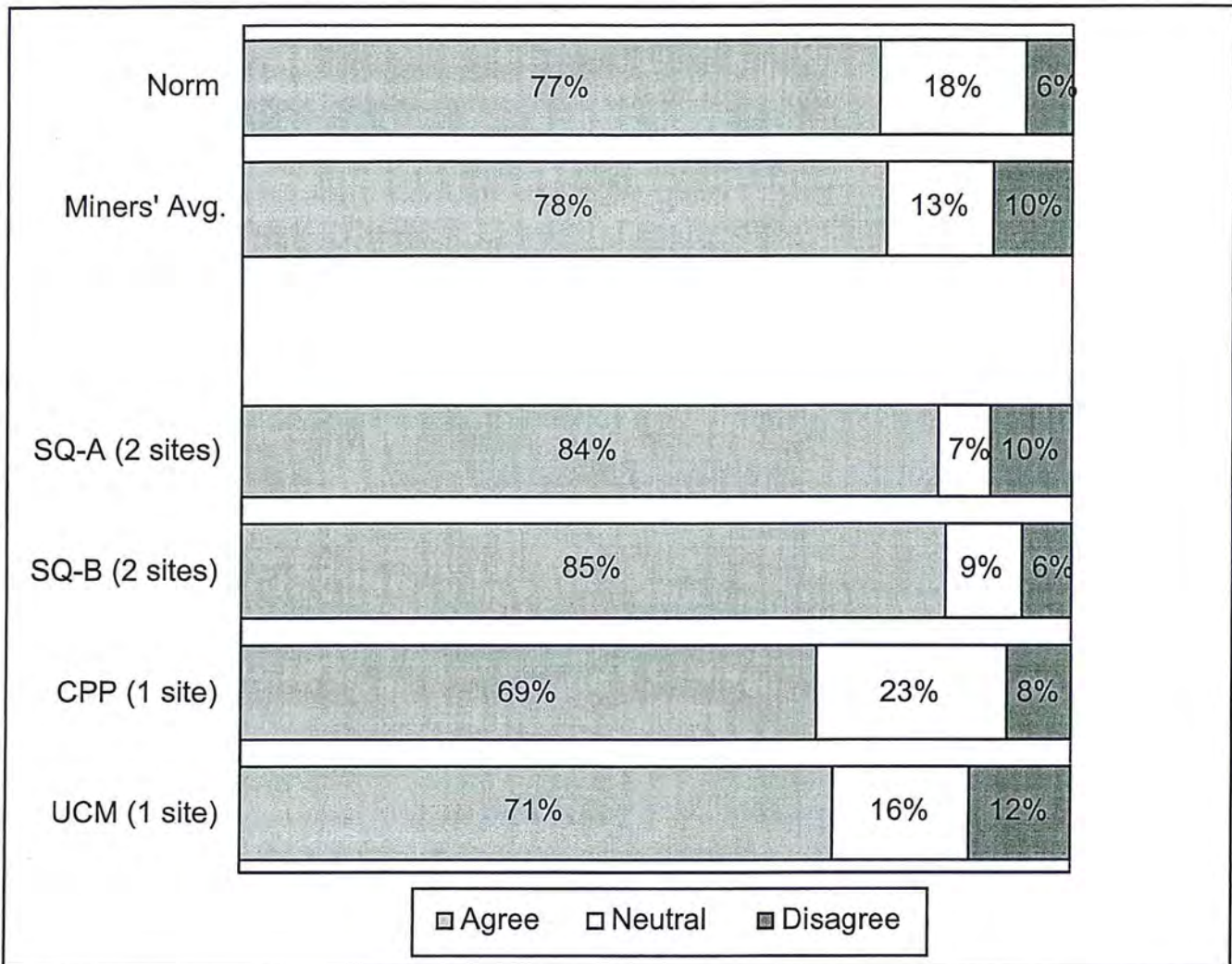
Actively Caring by Question (continued)

68. I am willing to caution my coworkers about working unsafely.



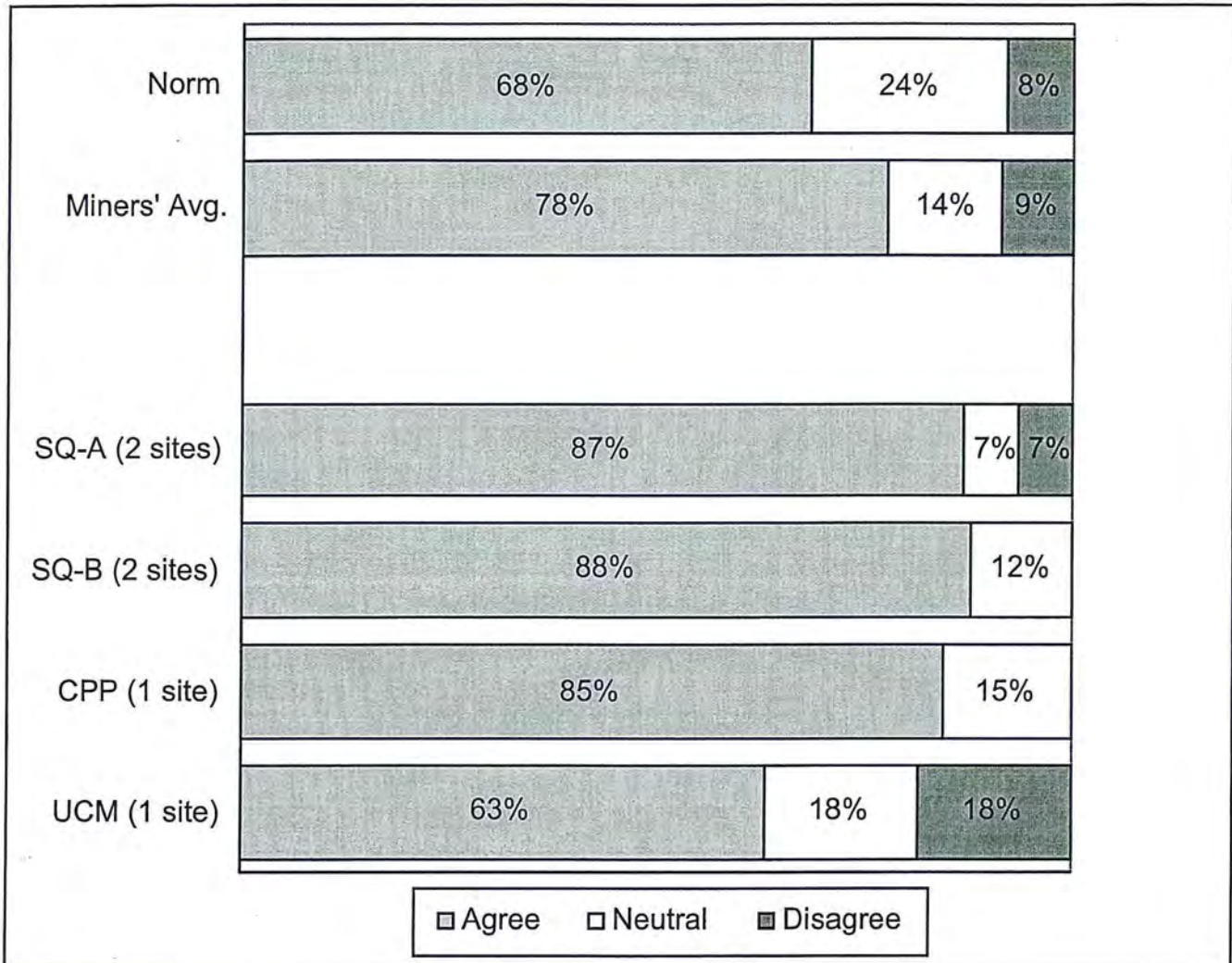
Actively Caring by Question (continued)

92. When I see a coworker working unsafely, I caution him/her.



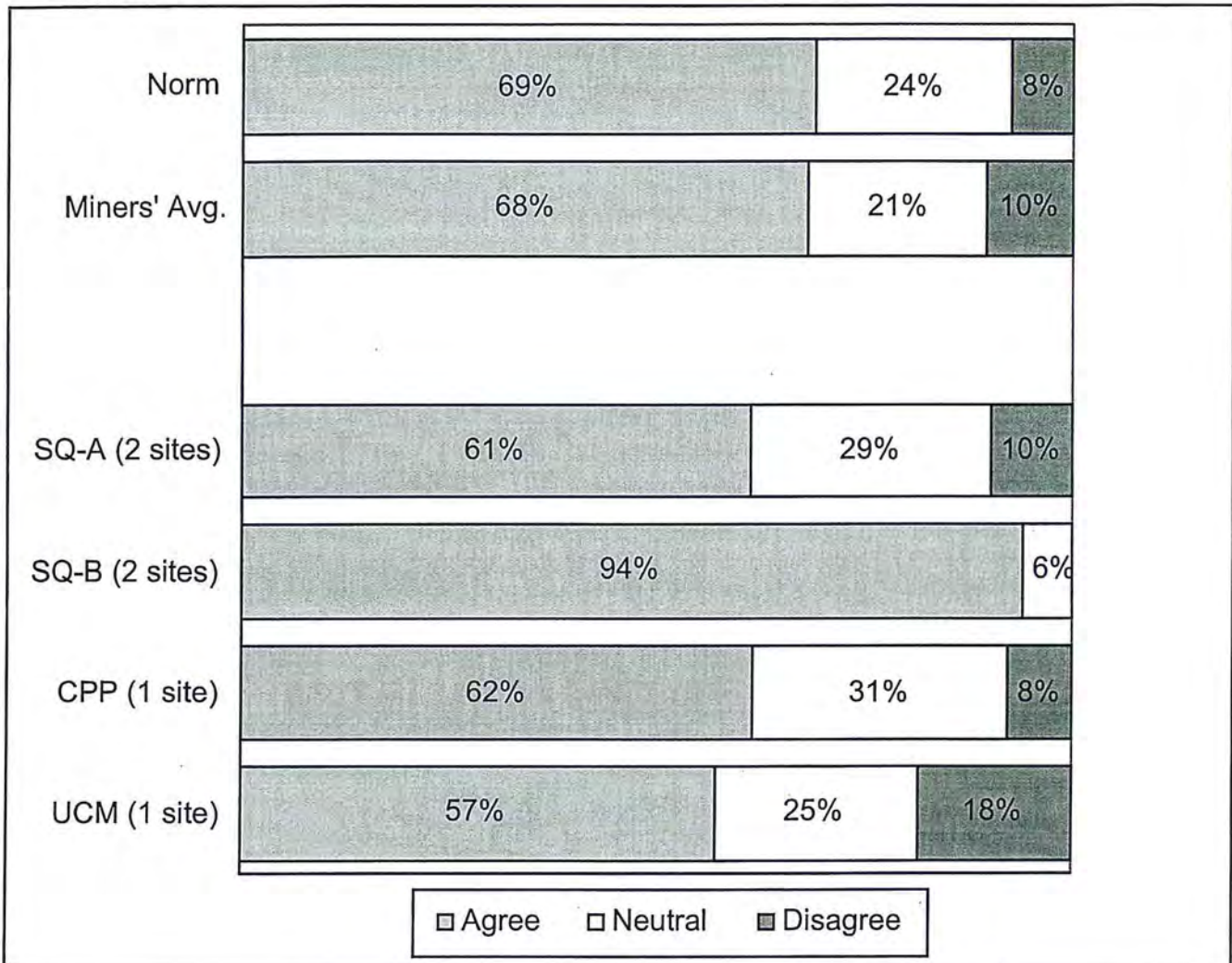
Actively Caring by Question (continued)

76. Employees should observe the work practices of their coworkers in order to provide them with safety-related feedback.



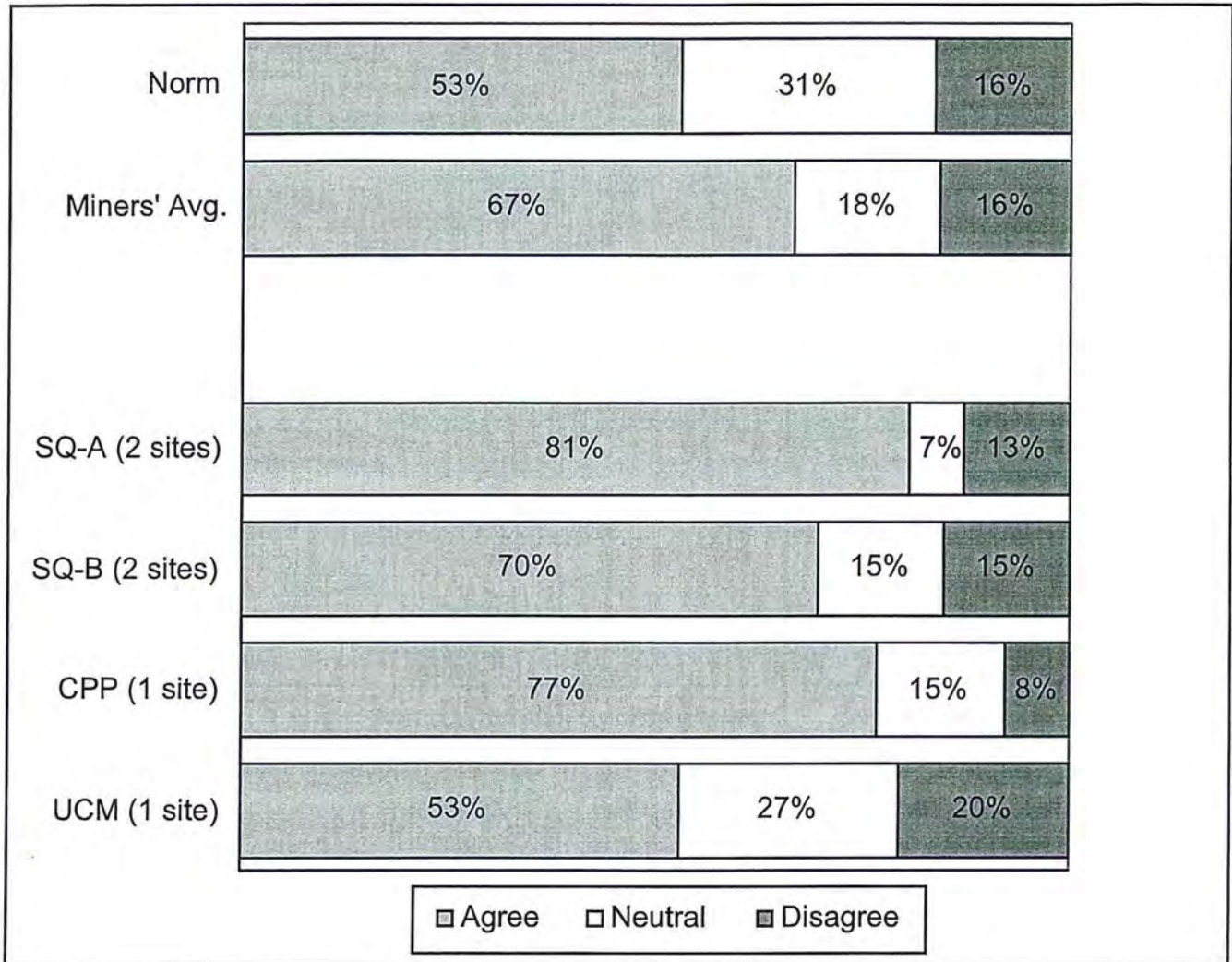
Actively Caring by Question (continued)

98. I am willing to observe the work practices of my coworkers in order to provide them with safety-related feedback.



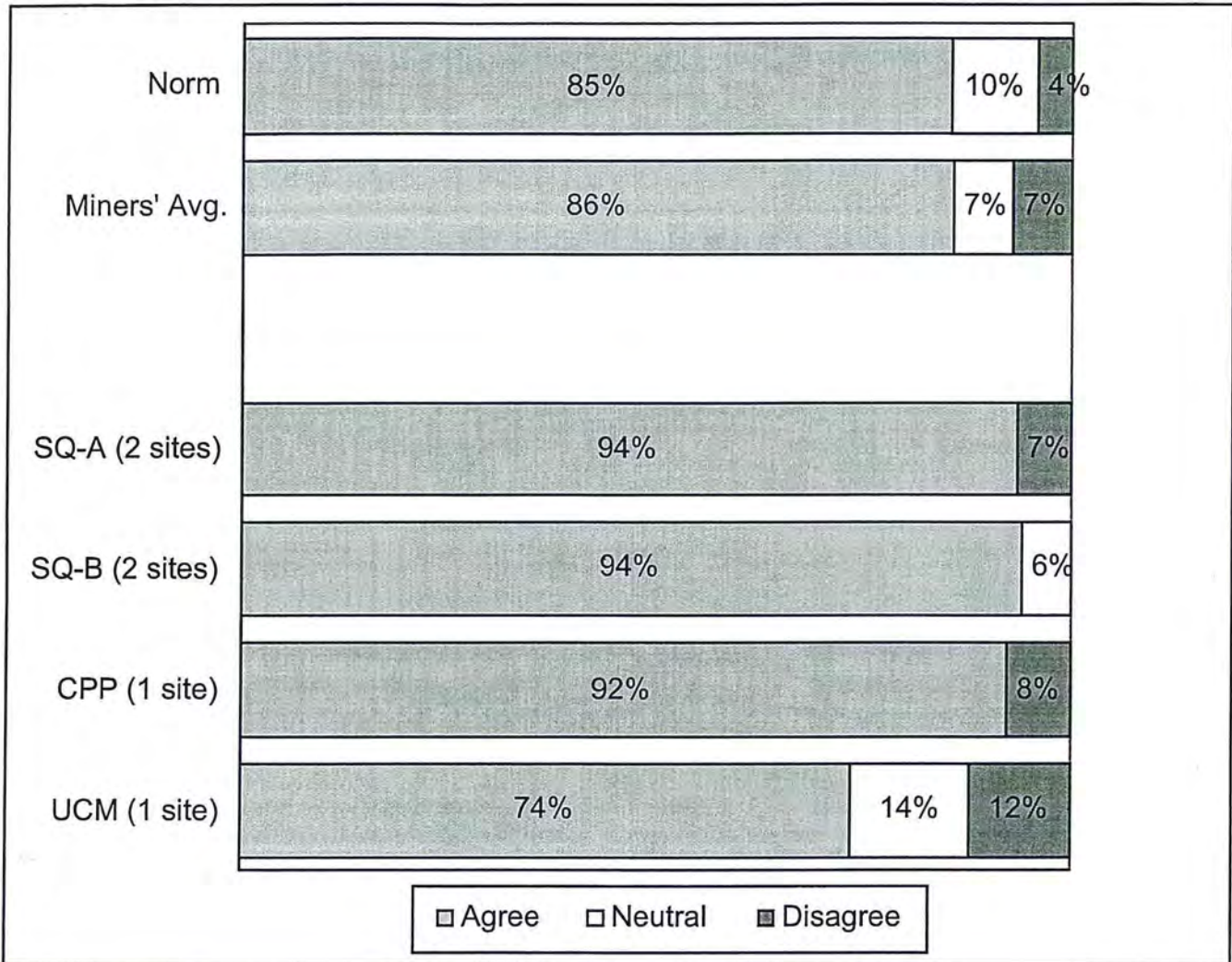
Actively Caring by Question (continued)

22. I observe the work practices of coworkers in order to provide them with safety-related feedback.



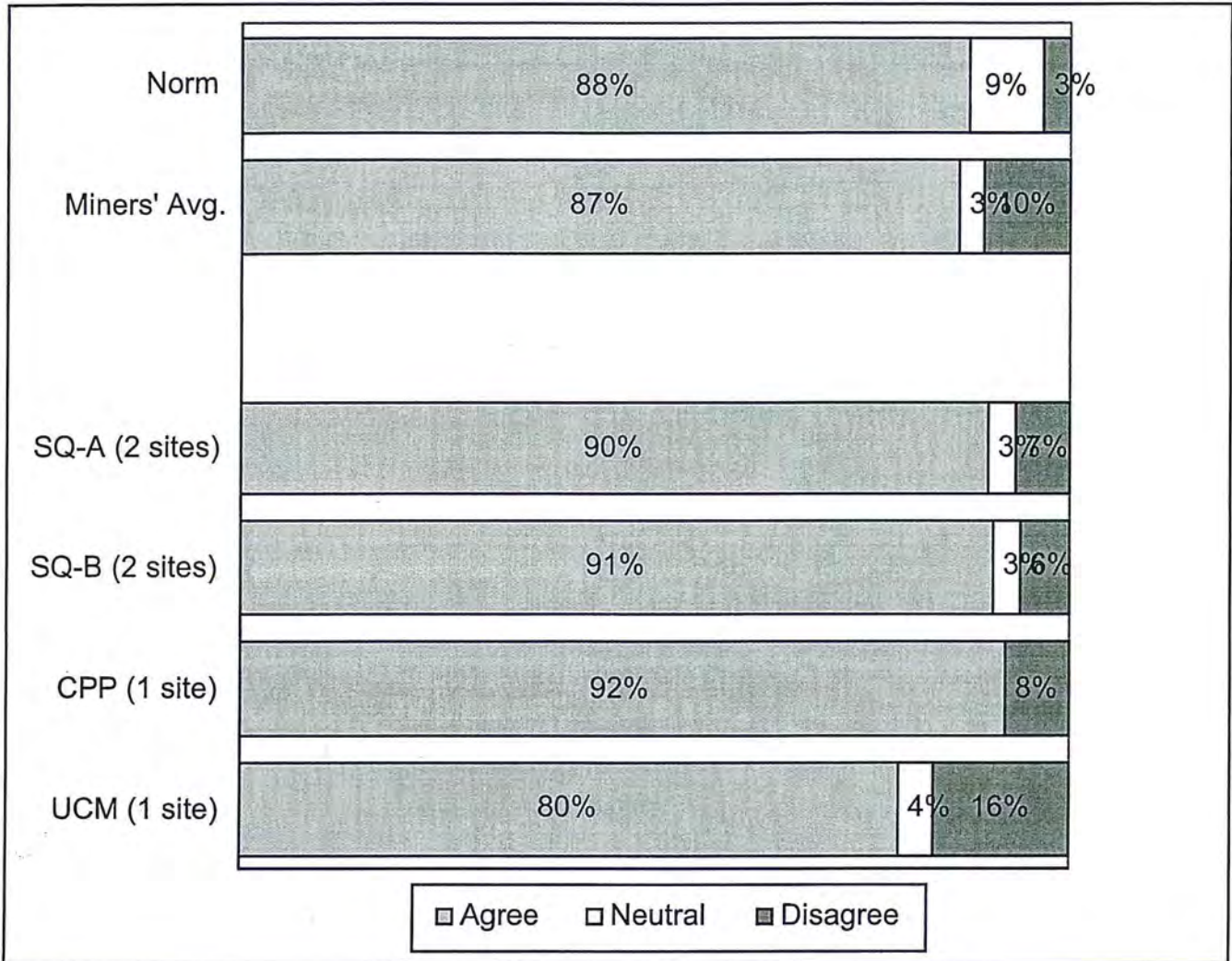
Actively Caring by Question (continued)

14. Besides performing their own jobs safely, employees should do other things to help improve workplace safety.



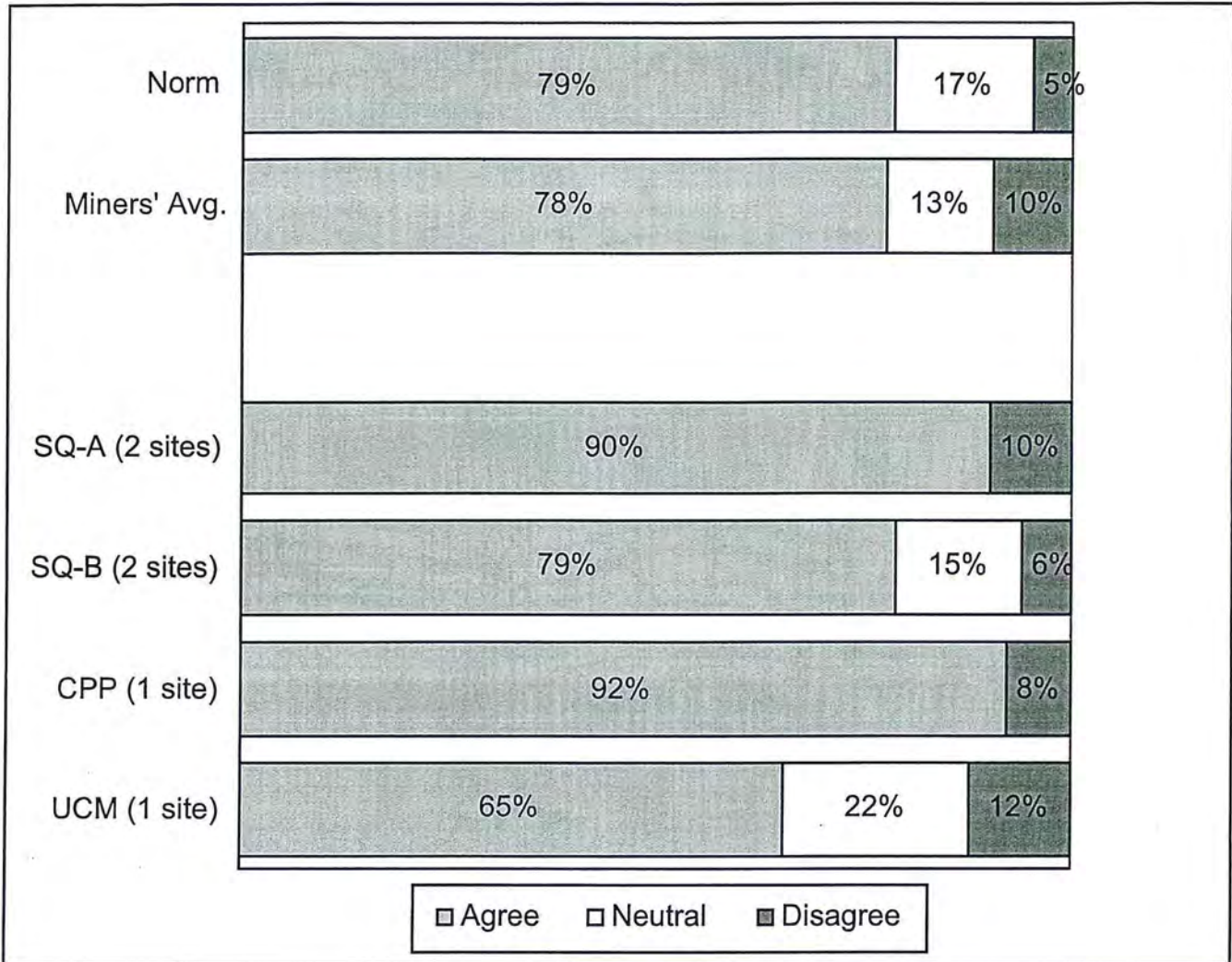
Actively Caring by Question (continued)

60. Besides working safely myself, I am willing to do other things to help improve workplace safety.



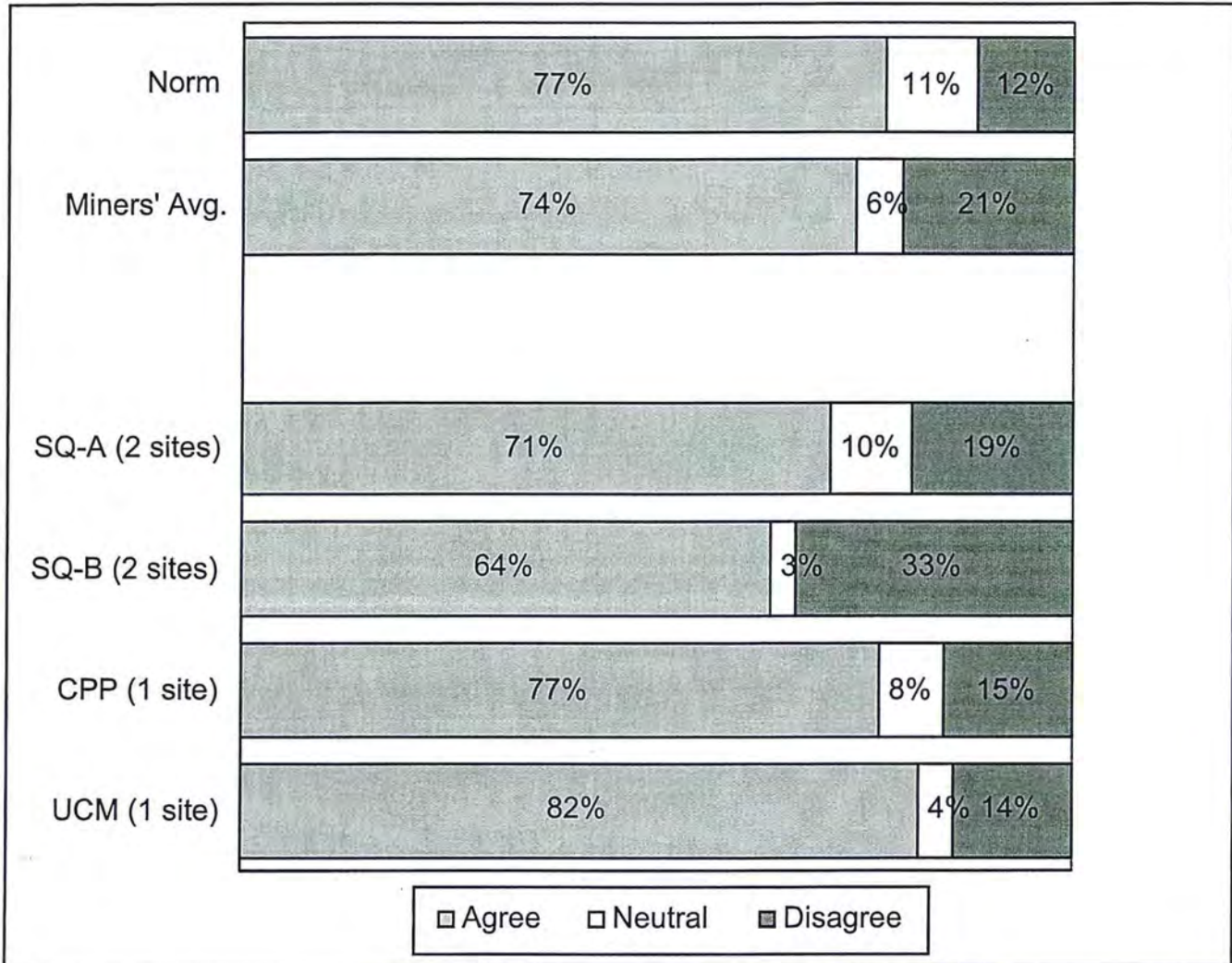
Actively Caring by Question (continued)

63. Besides working safely myself, I do other things to help improve workplace safety.



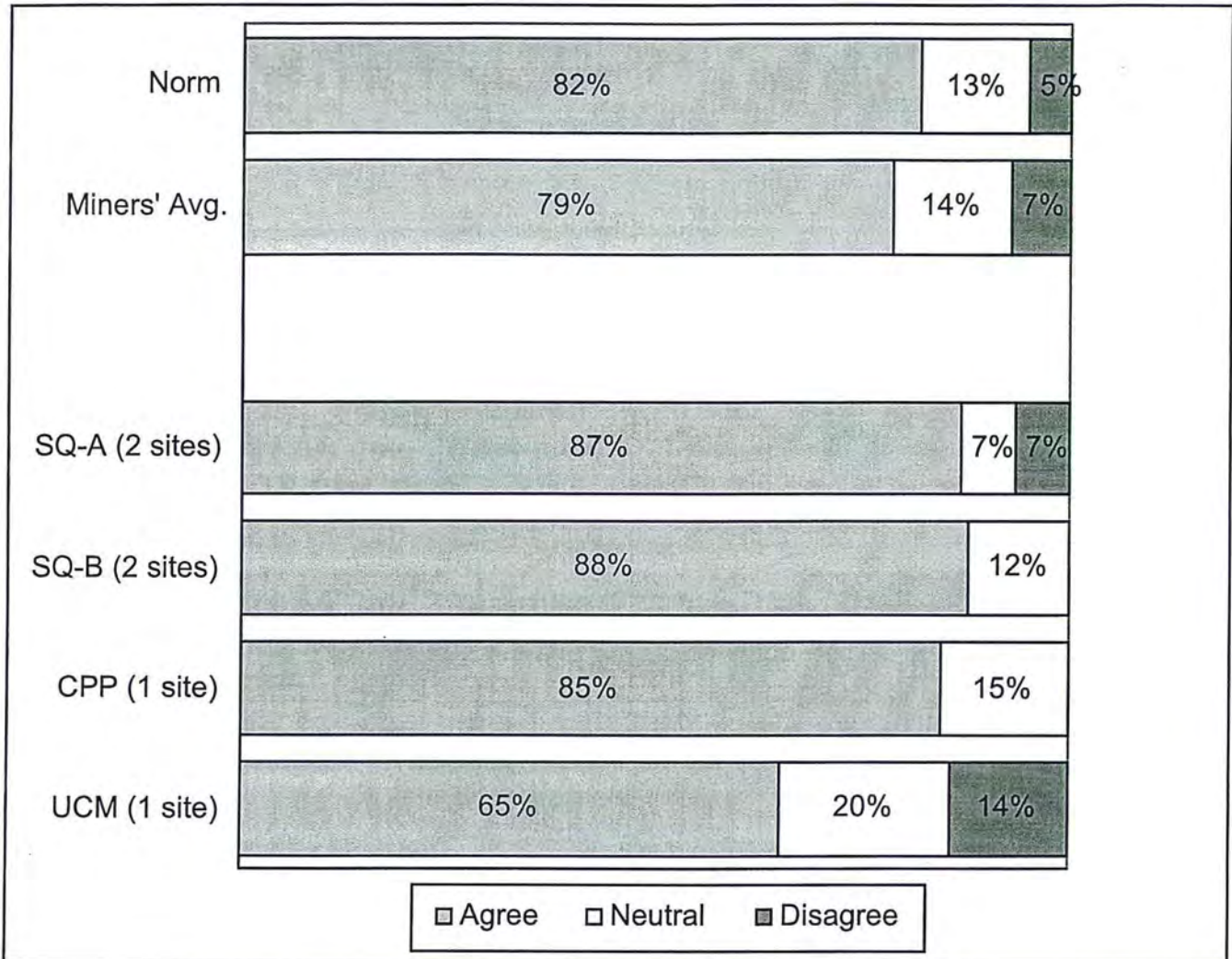
Actively Caring by Question (continued)

33. When an employee sees a potential safety hazard, they should correct it themselves if possible.



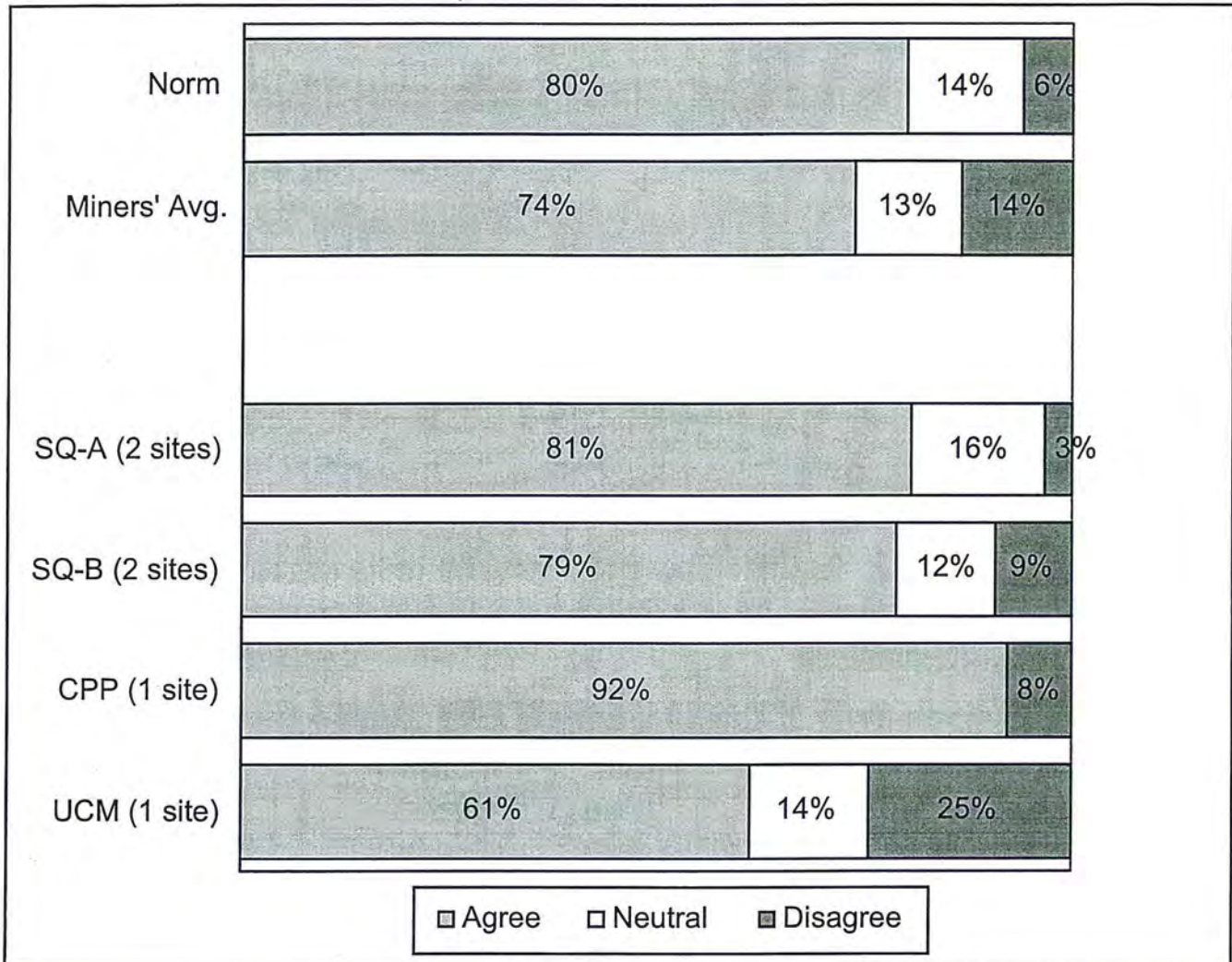
Actively Caring by Question (continued)

121. When I see a potential safety hazard, I am willing to correct it myself if possible.



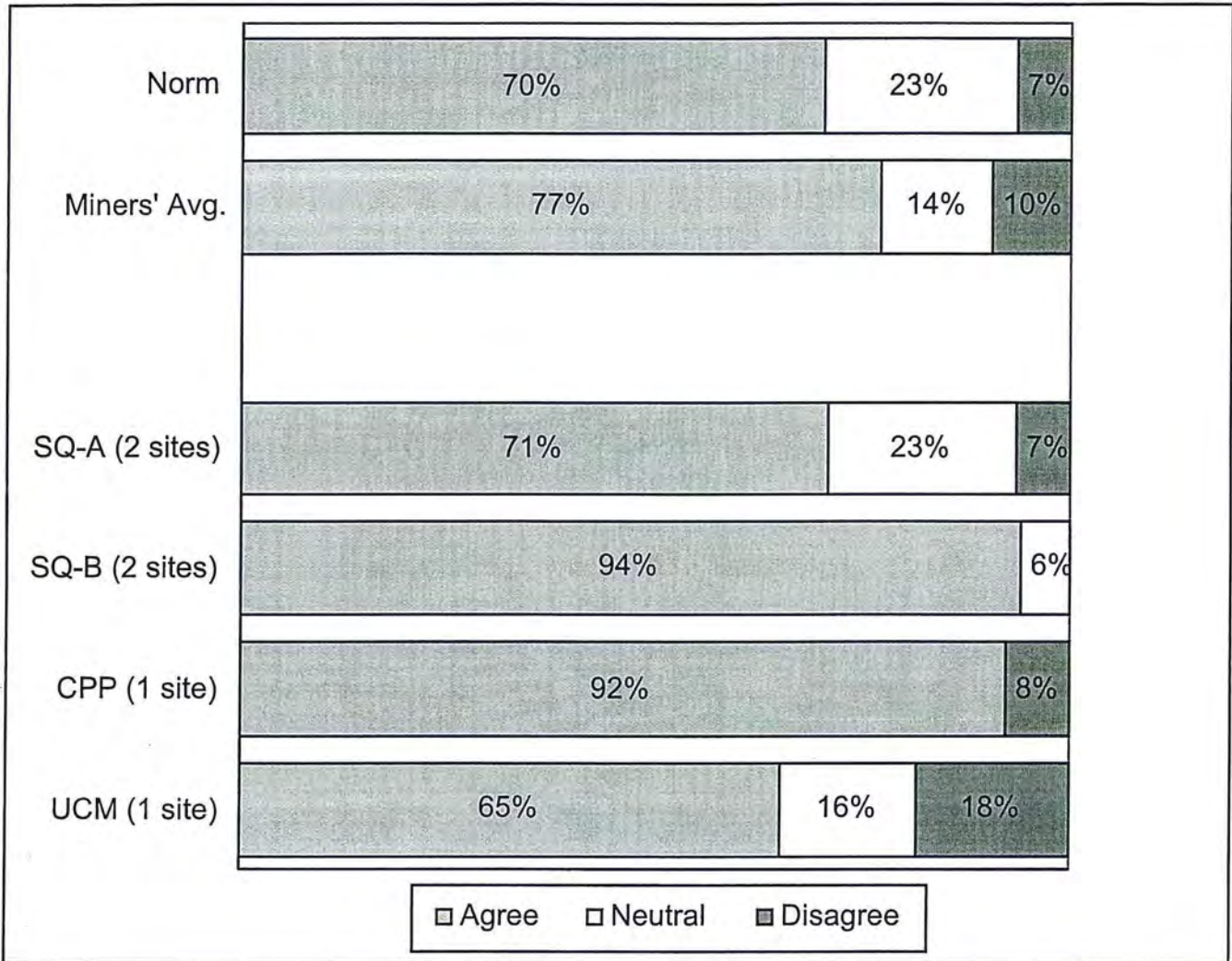
Actively Caring by Question (continued)

87. When I see a potential safety hazard, I correct it myself if possible.



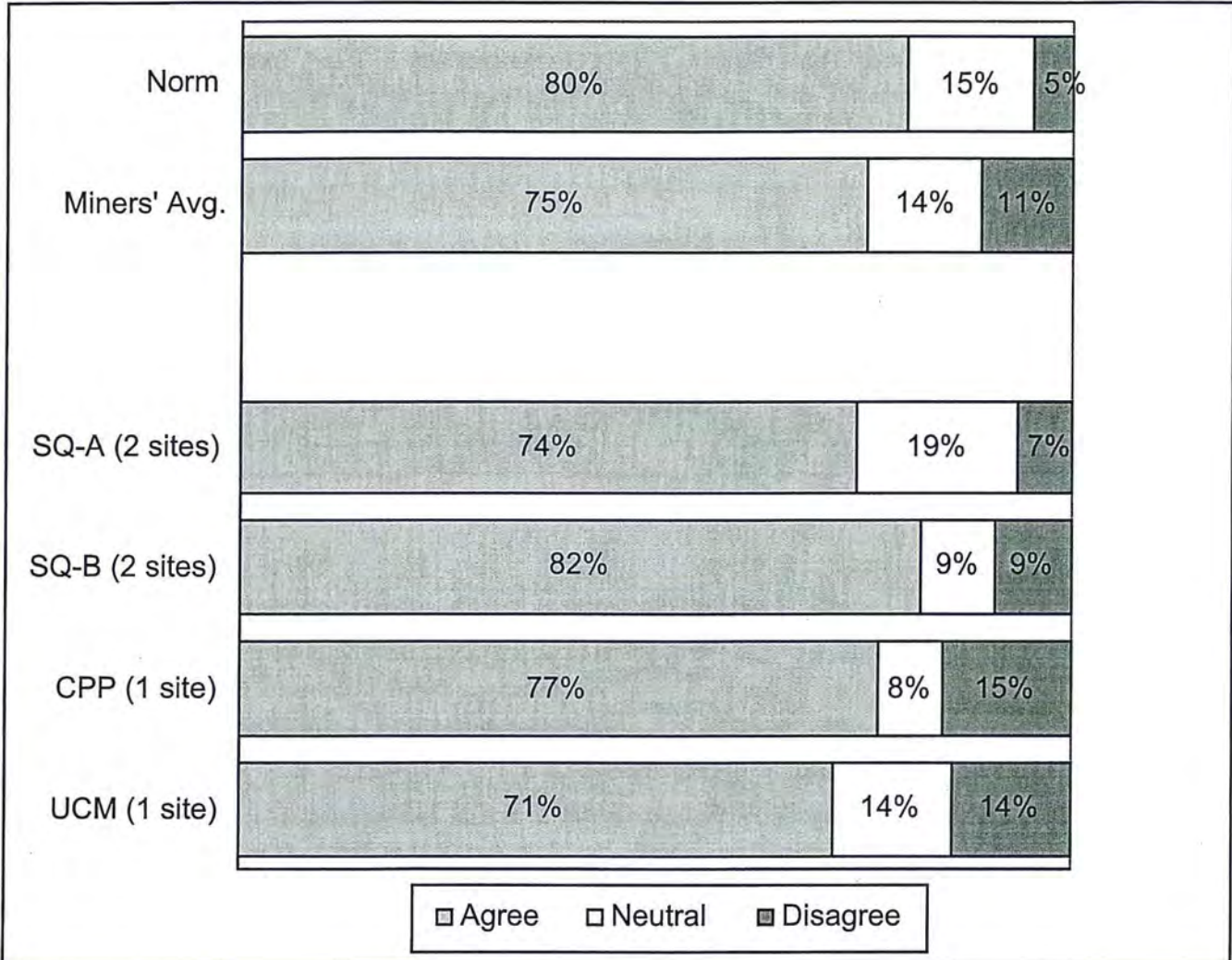
Actively Caring by Question (continued)

114. If an employee gets down or depressed, that person's coworkers should try to make him/her feel better.



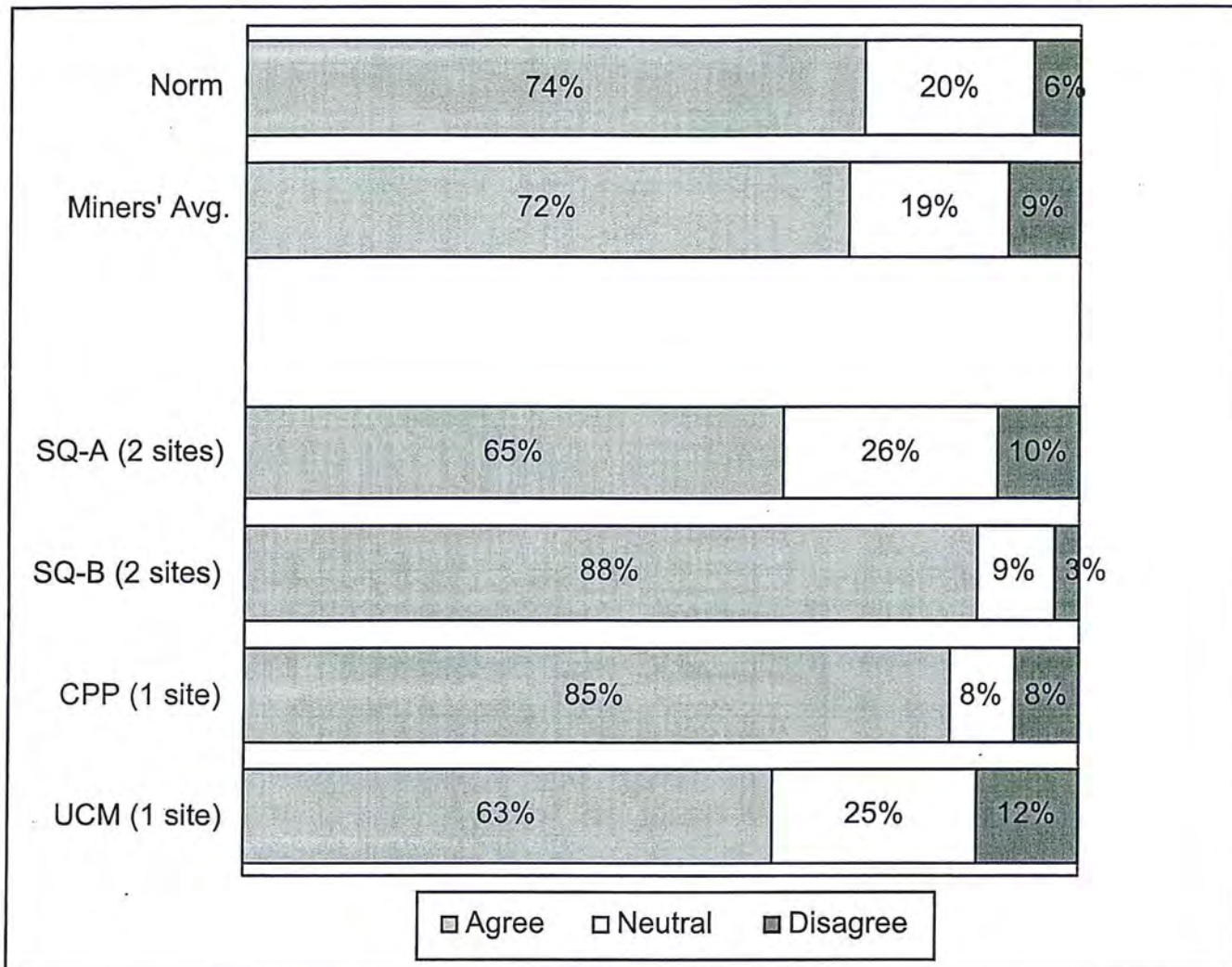
Actively Caring by Question (continued)

72. If a coworker gets down or depressed, I am willing to try to make that person feel better.



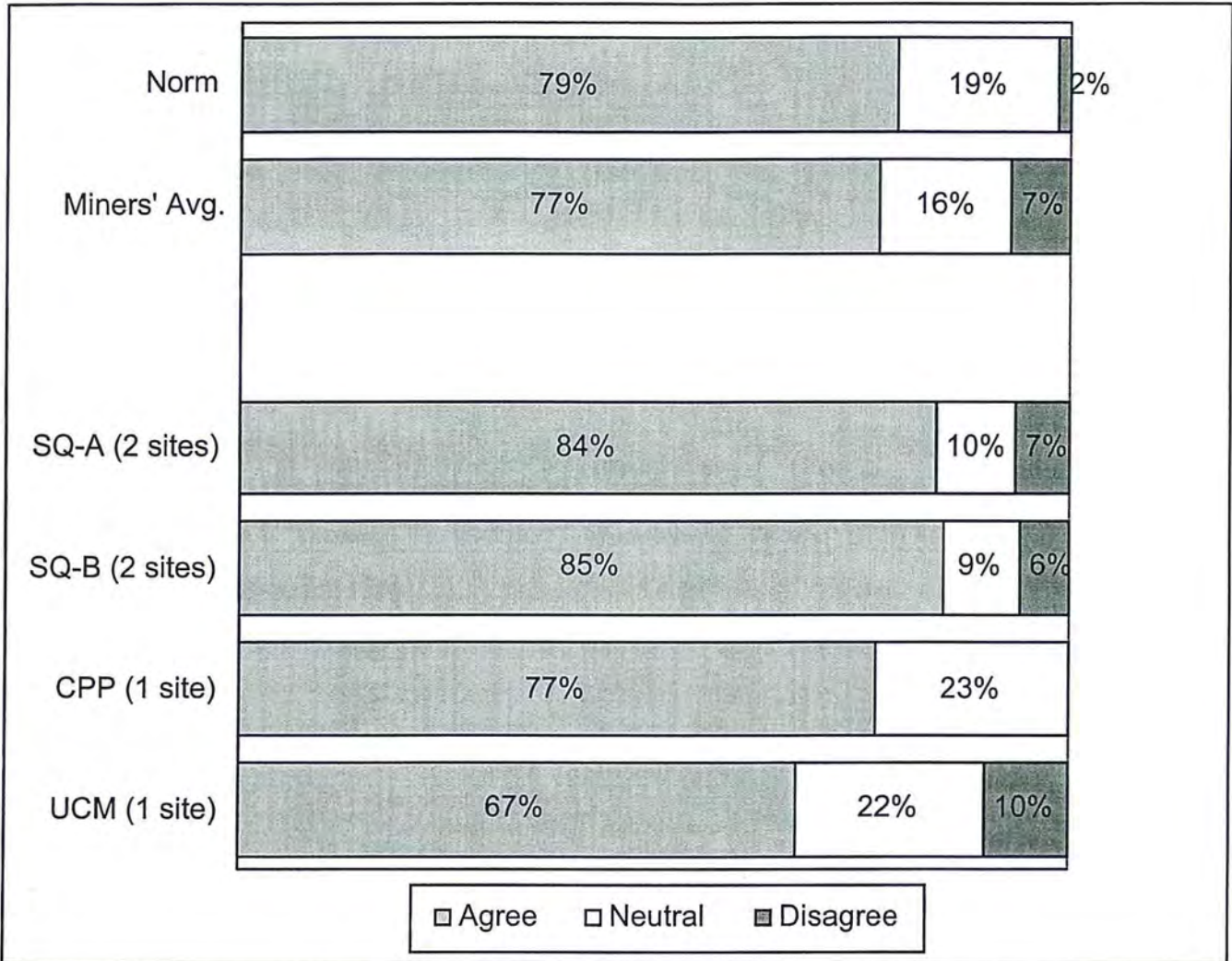
Actively Caring by Question (continued)

108. When I see a coworker looking down or depressed, I try to make that person feel better.

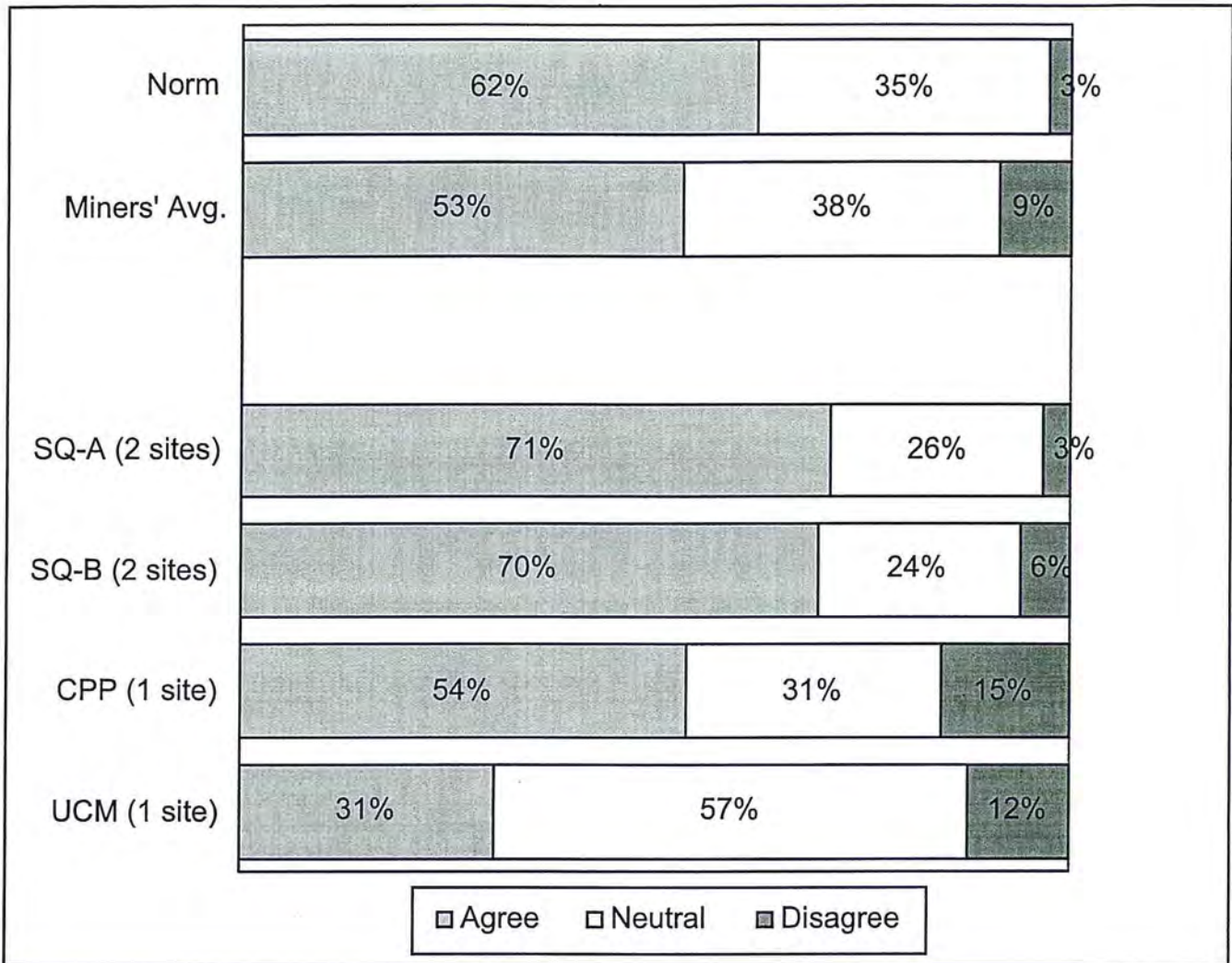


Person Factors

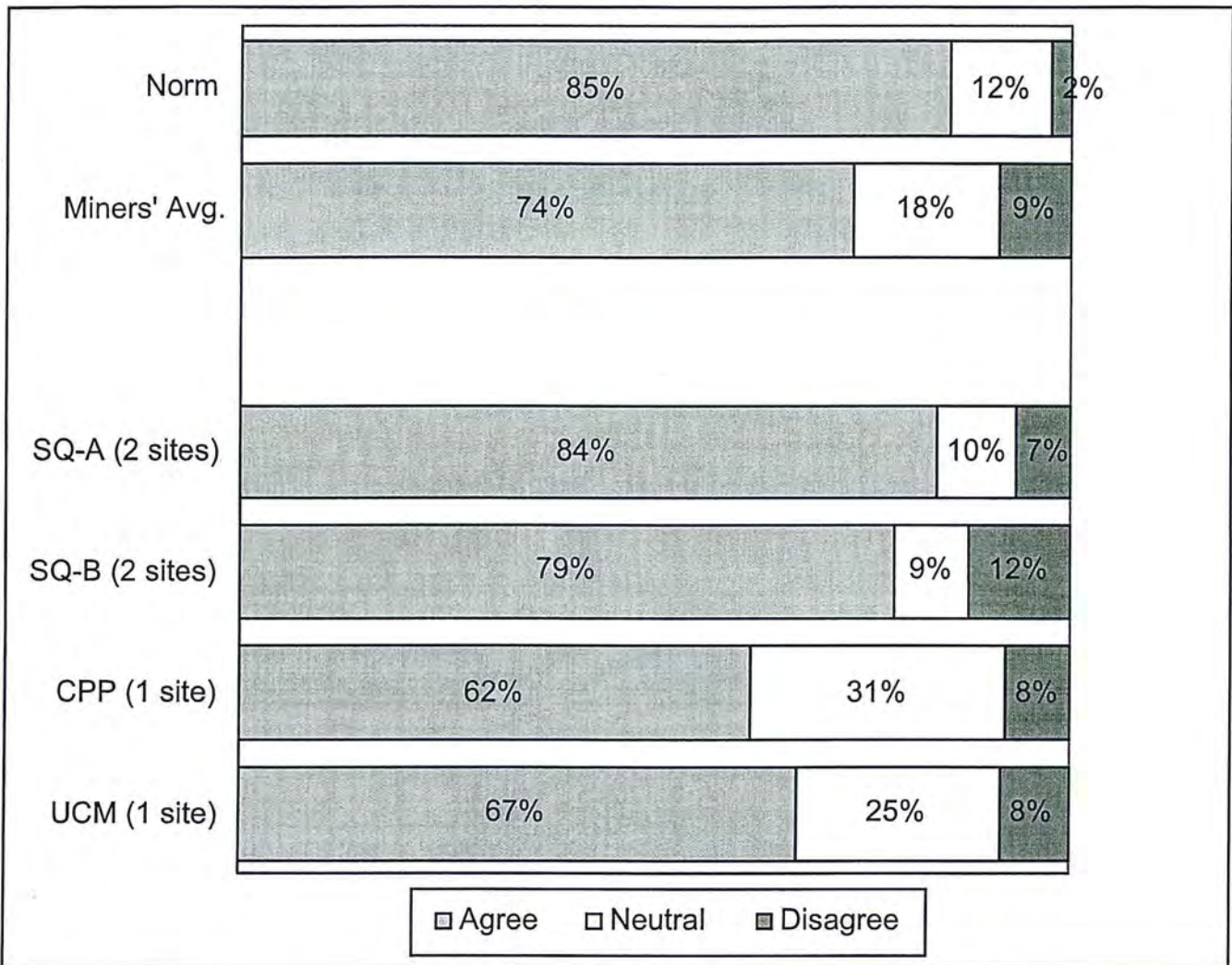
Self-Esteem by Company



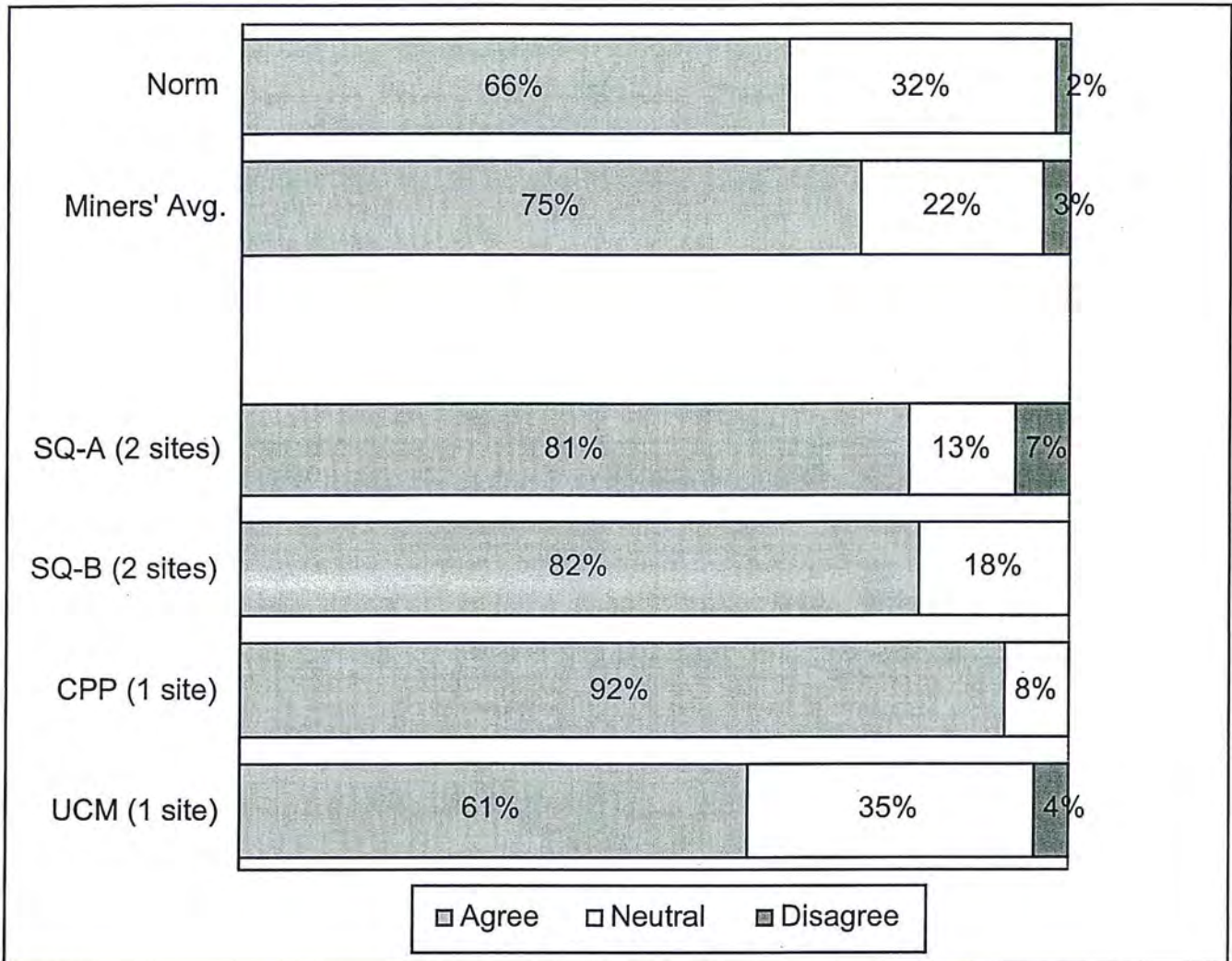
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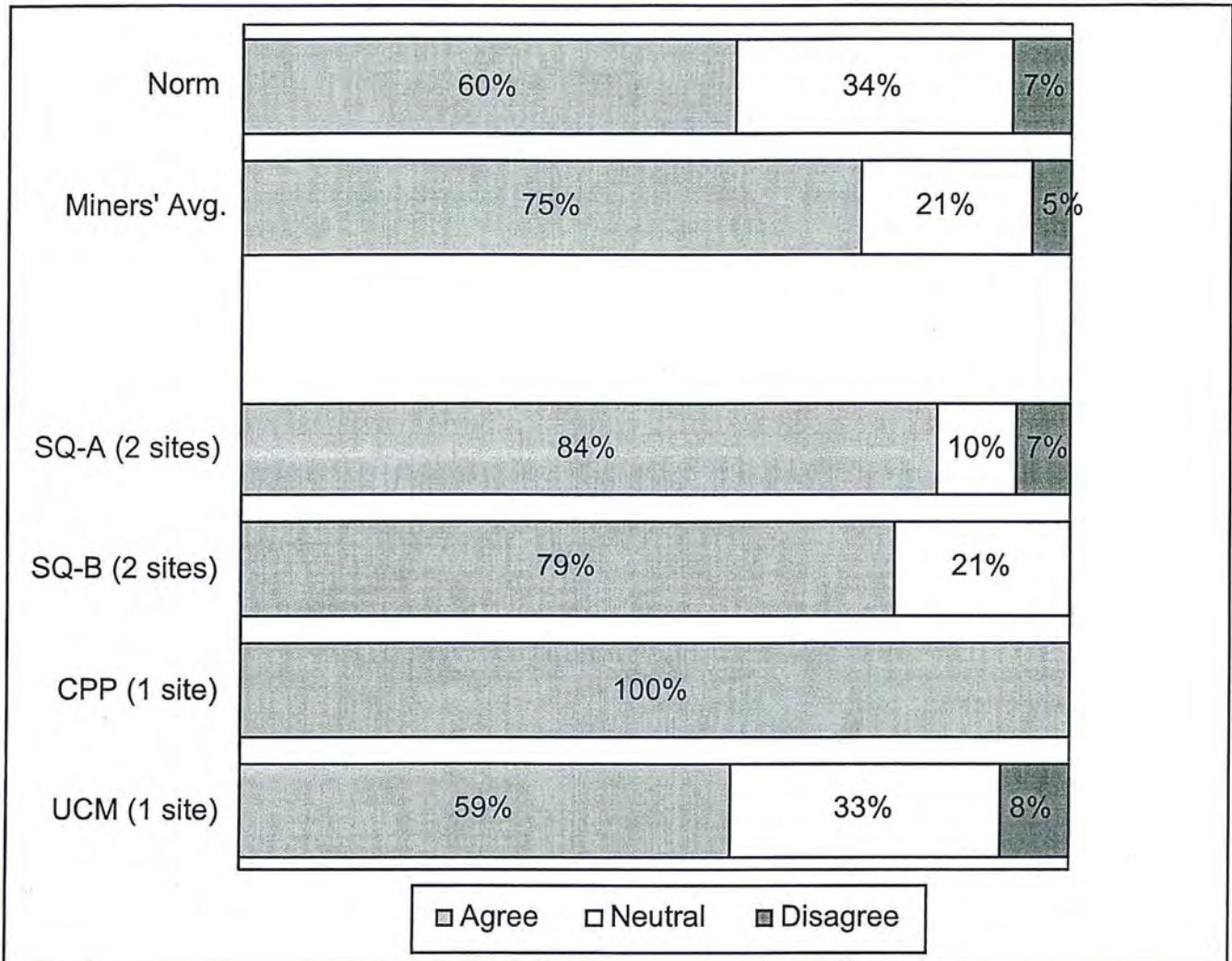
Self-Effectiveness by Company



Personal Control by Company



Belonging by Company



**Appendix J: Scholarship 1:
Addressing the Human Aspects of
Mining Safety:
From Behaviors to Attitudes to
Culture Change**

**Addressing the Human Aspects of Mining Safety:
From Behaviors to Attitudes to Culture Change**

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This paper combines the technology of applied behavior analysis with theories of motivation, learning, and social influence to provide a conceptual framework and evaluation system for implementing a cost-effective, long-term, employee-driven process for directing and motivating the occurrence of injury-prevention behaviors in mining.

Within the mining industry, tremendous progress has been made to improve on-the-job safety, particularly in ergonomic intervention (Langton, 1995). The psychological and behavioral aspects of mining safety represent the next necessary step in keeping miners safe. In this regard, our NIOSH-supported research has focused on the development of an intervention process to reduce at-risk behavior in underground and above-ground mines. This includes the development of: a) evaluation procedures to measure the progress of a behavior improvement process; b) survey techniques to assess people's readiness to actively care for the safety of others from an interdependent perspective; and c) a metric to track property damage as a predictor of unintentional injury.

Background and Significance

Injury is the principle cause of lost-person years of productive life in the U.S., accounting for more years of lost potential than cancer and cardiovascular disease combined (Waller, 1987). More specifically, injuries kill more than 142,000 Americans and require an estimated 62.5 million dollars in medical attention each year (U.S. of Labor Statistics, 1997). Annually, more than 80,000 Americans are permanently disabled by work-related injuries. In fact, injuries are the leading cause of death of individuals aged 44 and less in the U.S. (Baker, Conroy, & Johnston, 1992). Clearly, injuries occurring on the job due to unsafe (or at-risk) work behaviors remain a significant nationwide problem (Baker et al., 1992).

Social and Economic Ramifications

In addition to the traumatic personal consequences experienced by employees and their friends and families due to unexpected industrial injuries and deaths, there are also critical social and economic consequences to consider. Although the severe pain and suffering caused by these misfortunes cannot be quantified, the social and economic costs can be estimated. These costs include lost wages, medical expenses, insurance claims, production delays, lost-time of coworkers, equipment damage, fire losses, and indirect costs (National Safety Council, 1988). The overall cost of work-related injuries incurred back in 1989 has been estimated at \$48 billion.

This figure is an increase from the 1987 estimate of 42.4 billion dollars and is dramatically larger than the 1985 estimate of \$34.6 billion (National Safety Council, 1988). Although all of these estimates are enormous, the numbers also indicate the cost of industrial injuries is increasing at an alarming rate. And, it is likely these estimates underestimate the true impact of industrial injuries because of problems with current surveillance techniques and the fact that many injuries are not reported (Baker et al., 1992; The National Committee for Injury Prevention and Control, 1989; U.S. Bureau of Labor Statistics, 1997).

Significance to Mining

In 1998, 148 workers were killed in both surface and underground mines (U.S. Bureau of Labor Statistics, 1998). This accounts for more than 6% of all work-related fatalities in 1998, yet mining employees represent only .5% of the total workforce (U.S. Bureau of Labor Statistics, 1998). Also, there were more than 30,100 injury reports by miners in 1998 (U.S. Bureau of Labor Statistics, 1998). It is likely these injury numbers grossly underestimate the actual number of miners hurt on the job because so many workplace injuries are unreported or hidden (Miller, 1997).

Due to the frequency and severity of injuries, the U.S. Department of Health and Human Services has identified unintentional injury prevention as a priority for attaining the goals outlined in *Healthy People 2010: National Health Promotion and Disease Prevention Objectives* (2000). *Healthy People 2010* has 28 focus areas and 437 specific objectives. Focus Area 20 (Occupational Safety and Health) has two objectives directly related to mining: 20-1b. -- a reduction in fatalities in mining facilities, and 20-2f. -- a reduction in work-related injuries in mining facilities.

Much has been accomplished to make engineering improvements in mining. For example, video camera back-up monitors and sophisticated Doppler radar alarms have been used to try and reduce injuries involving haulage trucks (Boldt & Baker, 1995). Although such technologies are improving with laboratory and field experiments, mining experts have pointed out that the technological improvements must be supplemented with a focus on the human aspects of safety, including the application of employee surveys and behavior-based incentive programs (Peters, 1995). With this in mind, "the U.S. Bureau of Mines identified fundamental psychological principles that could be employed to enhance the ability of miners to recognize and respond to threats in their dangerous work environment" (Kowalski, Fotta, & Barrett, 1995, p. 95). This defines the direct relevance of behavior-based safety (BBS) to mining.

It's impossible to protect the miner completely with environmental manipulations. Therefore, mining experts have pointed out the need to complement technological advancements with a focus on the human dimensions of safety, including the application of employee surveys, training series, incentive programs, and feedback presentations (Langton, 1995; Peters, 1995; Peters, Bockosh, & Fotta, 1997). In fact, the U.S. Bureau of Mines referred to the need to apply fundamental psychological principles in the enhancement of miners' ability to recognize and react appropriately to threats in their risky work environment (Kowalski, Folta, & Barrett, 1995).

The leading-edge technology in applying psychological principles to keeping workers safe is BBS. As Boling (1995) points out, "Today the progressive, productive and safe companies around the world have one common denominator, an innovative safety program that is behavior-based" (p. 2). The components of behavior-based technology go beyond behavioral observation and feedback methods and statistical techniques for charting safety performance improvement. They include ways to enhance interpersonal communication, individual responsibility, teamwork, morale,

involvement, peer support, follow-up intervention, and other factors needed for continuous safety improvement (Geller, 1996, 1997b, 1998a, in press).

Applications of Behavioral Science to Improve Mine Safety

The term "behavior-based safety" has become quite popular among safety professionals, consultants, and members of safety steering committees. It is commonly used to reflect a proactive upstream approach to safety by focusing attention on at-risk behaviors that can lead to an injury and on safe behaviors that can contribute to injury prevention. Beyond this general definition, however, there seems to be substantial misperception, misunderstanding, and misapplication. Here we offer a brief review of BBS principles, procedures, and benefits.

Principle 1: Focus Intervention on Observable Behavior

Whatever intervention strategy is used to improve a human dimension of safety, the process should focus on behavior. Whether using training, feedback, injury analysis, coaching, or incentives to benefit safety, target behavior. Why? First you can be objective and impersonal about behavior. You can talk about behavior independently from people's opinions, attitudes, and feelings. Behavior varies according to factors in the external world, including equipment design, management systems, the behaviors shown by others, and various social dynamics. An open discussion about the environmental and interpersonal determinants of safe versus at-risk behavior can lead to practical modifications of the work culture to encourage safe behavior and discourage at-risk behavior.

Behavior-based intervention *acts people into thinking differently*, whereas person-based intervention *thinks people into acting differently*. The person-based approach is used successfully by many psychiatrists and clinical psychologists in professional therapy sessions, but it is not cost-effective in a group or organizational setting. To be effective, person-focused intervention requires extensive one-on-one interaction between a client and a specially-trained intervention specialist. Even if time and facilities were available for an intervention to focus on internal and nonobservable attitudes and person states, few safety professionals or consultants have the education, training, and experience to implement such an approach. Internal person factors can be improved indirectly, however, by directly focusing on behaviors in certain ways.

The key is to focus on behavior and you'll be on the right track, whatever the intervention approach it's **behavior-based** commitment, **behavior-based** goal-setting, **behavior-based** feedback, **behavior-based** training, **behavior-based** recognition (Geller, 1997a), **behavior-based** incentives/rewards, and so on.

Principle 2: Look for External Factors to Improve Performance

Internal person dimensions like attitudes, perceptions, and cognitions are difficult to define objectively and change directly. In fact, most of us don't have the education, training, experience, nor time to deal with people's attitudes or person states directly. Instead, look for external factors that influence behavior independent of individual feelings, preferences, and perceptions. When you empower people to analyze behavior from a systems perspective and implement interventions to improve behavior, you will indirectly improve their attitude, commitment, and internal motivation.

Careful observation and analysis of ongoing work practices can pinpoint many potential causes of safe and at-risk behaviors. Those causes external to people -- including reward and penalty contingencies, policies, or management mandates -- can often be altered for the improvement of

both behavior and attitude. In contrast, internal person factors are difficult to identify, and if defined, they are even more difficult to change directly. So with BBS the focus is placed on external factors -- environmental conditions and behaviors -- which can be changed upstream from a potential injury.

Principle 3: Focus on Positive Consequences to Motivate Safety Improvement

The ABC three-term contingency is a basic tool of BBS. "A" stands for "activator," or the antecedent events that precede behavior (B) and direct it. "C" refers to "consequence," or the environmental stimuli or events that follow behavior and determine its future occurrence. We do what we do to gain a positive consequence or to escape or avoid a negative consequence. And, we stop doing what we're doing when our behavior results in an immediate negative consequence.

The most powerful motivating consequences are "soon" and "certain." That's why most at-risk behavior occurs. Compared to safe behavior, at-risk behavior provides the performer with such soon and certain consequences as comfort, convenience, and faster job completion.

As this third principle specifies, using positive over negative consequences is critically important. It's relevant to "attitude," and many other internal feelings of people. Think about it. How does a reward, personal recognition, or a group celebration make you feel compared to a reprimand or criticism? Both types of consequences can have similar direct effects on behavior. There is usually a big difference, however, in the accompanying attitude or feeling state.

As detailed elsewhere (Geller, 1996, 1997a, 1998b), when positive recognition is delivered correctly, it does more than increase the frequency of the behavior it follows. Through stimulus and response generalization it also increases the probability other safe behaviors will occur (Ludwig & Geller, 1997, 2000). The popular belief that we learn more from our mistakes than our achievements is actually wrong. Our errors tell us what to stop doing, but our successes show us what to keep doing. So recognizing people's safe behavior will facilitate more learning and positive motivation than will criticizing people's at-risk behavior. Only with positive consequences can you improve both behavior and attitude at the same time.

Don't Rely on Common Sense

More explanations for these and additional principles of BBS are presented elsewhere (Geller, 1996, 1997b, 1998b). However, these three principles are most pertinent with regard to developing of interventions to improve the psychological aspects of mine safety. Do they seem like plain old common sense to you? If so, congratulations. But please note that others will not necessarily feel the same. Common sense or intuition is often incorrect. What sounds good to one person will not necessarily sound right to another. Consider, for example, the following strategies managers or safety leaders have implemented intuitively in an attempt to deal with the human dynamics of safety.

- Punish a person who returns to work after a lost-time injury.
- Implement a safety incentive program whereby everyone in an organization gets a prize if no one reports an injury.
- Set up a "safe employee of the month" program in which one individual in a large facility is publicly recognized for having the "Best Safety Attitude."
- Establish an observation system whereby employees must observe one unsafe condition or behavior each day and "stop" it.

- Invite a motivational speaker to address all employees with themes like "Try Harder," "Change Your Attitude About Safety," "Self-Affirmation is the Key to Motivation," or "Safety Awareness and a Positive Attitude are Key to Behavior Change."
- Post signs with slogans like "Think Safety," "Safety is a Condition of Employment," "Zero Accidents is Our Goal," "Safety is a Priority," or "All Injuries are Preventable."

Do any of these psychological tactics sound familiar? All of these approaches are ineffective in the long run, and run counter to the three behavior-based principles described above. Some of these techniques can actually do more harm than good to the human aspects of mining safety. Yet, I'm sure you've seen, perhaps even experienced, some of these motivation or persuasion techniques. Why? Because they seemed like good common sense to someone.

The development and implementation of an improvement intervention, requires guidance from empirical investigation, not common sense. This is true for repairing a bridge, constructing a building, designing an underground mine, or administering a safety incentive program. "Contrary to popular belief, there is not too little common sense in business, there is too much" (Daniels, 1999, p. 10).

BBS, as reflected in the three principles described above, is based on 50 years of rigorous research. And with additional research, the methods and tools of BBS will continuously improve. Let's consider a general behavioral safety method which has been used by several researchers to evaluate the effectiveness of specific intervention techniques to prevent injury (e.g., Fellner & Sulzer-Azaroff, 1984; Geller, 1988; Komaki, Heinzmann, & Lawson, 1980; Ludwig & Geller, 1997; Sulzer-Azaroff & DeSantamaria, 1980). It has also been used by numerous organizations to improve their safety performance (cf. Geller, 1996, 1998b, in press).

The Do It Process

The DO IT process puts people in control of improving behaviors directly related to injury prevention. It's a basic tool for addressing the behavioral aspects of a safety problem. It provides an objective way to analyze why certain safety-related behaviors occur or don't occur (Geller, 1999b), and to evaluate the effect of interventions implemented to decrease at-risk behavior or increase safe behavior. If an intervention does not influence the desired impact, it is either refined or replaced with a completely different behavior-change technique.

"D" for Define

The DO IT process begins by defining specific behaviors to influence – the targets of the continuous improvement process. They are safe behaviors that need to occur more often, or undesirable at-risk behaviors that need to occur less often. Usually the focus can be on certain safe behaviors that need to be substituted for particular at-risk behaviors. The definition of a safe behavior could be as basic as wearing particular personal protective equipment (PPE) or "walking within pedestrian walkways." Alternatively, the safe target could be a process that requires a designated series of safe behaviors, as when parking a truck for unloading, locking out energy sources, or lifting a package.

Arriving at a precise definition of a DO IT target is facilitated with the development of an observation checklist to determine how safely a certain target behavior or process is being performed. Just developing the precise behavioral definitions for such a checklist is a valuable learning experience. And, when workers get involved in developing a behavioral checklist, they

own a training process that can improve the human factors of occupational safety on both the outside (behaviors) and the inside (feelings and attitudes) .

“O” for Observe

When miners observe each other for certain safe or at-risk behaviors, they learn that everyone performs at-risk behavior, often without even realizing it. This observation stage is not fault-finding, but is a fact-finding process to facilitate the discovery of behaviors and conditions that need to be altered to prevent injuries. In addition, safe behaviors and conditions are identified for interpersonal support or recognition.

Behavioral observations are only made with the permission of the worker being observed. Although unannounced observations might give a more realistic picture of the frequency of at-risk behavior, such audits would reduce interpersonal trust and give the impression of a negative "gotcha" program. Furthermore, from a performance-improvement perspective, interpersonal observations without permission cannot raise safety "mindfulness" (Geller, 1999a; Langer, 1989). It's likely the mindfulness developed and increased from up-front and voluntary use of a behavioral checklist is critical for improving safety-related behavior and preventing unintentional injury.

It's easy to fall into a mindless job routine, and be unprepared to handle unanticipated events in a safe and timely manner. Also, some mindless activity can put miners at significant risk for personal injury. A behavior-based observation and feedback process provides the mechanism for increasing peoples mindfulness on the job.

The same observation procedure is not suitable for all situations. In fact, the customization and refinement of an observation process for a particular setting should never stop. Often it's best to begin with a limited number of behaviors and a relatively simple checklist. This reduces the possibility of some people feeling overwhelmed and frustrated. Starting small also facilitates the broadest range of voluntary participation. Subsequently, the process is successfully expanded in the number of behaviors and work areas covered.

“I” for Intervene

This is the heart of the DO IT process. Now interventions are designed and implemented in an attempt to increase safe behavior and/or decrease at-risk behavior. As reflected earlier in Principle 2, intervention refers to changing external conditions of the work environment in order to make safe behavior more likely and at-risk behavior less likely. When developing interventions, use Principle 3 as your guide. That is, the most motivating consequences are soon, certain, and sizable, and positive consequences are preferable to negative consequences.

The process of observing and recording the occurrences of safe and at-risk behavior on a checklist provides an opportunity to give individuals and groups constructive behavioral feedback. When the results of a behavioral observation are shown to individuals or groups, they receive the kind of information that enables practice to improve performance. Considerable research has shown that providing workers with feedback regarding their safe and at-risk behaviors is a very cost-effective intervention approach for improving safety performance (e.g., Geller, 1996; Krause et al., 1996; Reber, Wallin, & Chhoker, 1990; Sulzer-Azaroff & DeSantamaria, 1980; McAfee & Winn, 1989; Petersen, 1989).

Besides behavior-based feedback, researchers have found a number of other intervention strategies to be effective at improving safety related work practices. These include worker-designed safety slogans, near miss analysis and corrective action, individual and group goal-setting, safe behavior promise cards, actively caring thank-you cards, behavioral safety coaching, as well as incentive/reward programs that target specific behaviors of individuals or groups. These intervention strategies are described elsewhere (Geller, 1996, 1998b, in press), some having been applied in mining settings (Fox, Hopkins, & Anger, 1987; Rhoton, 1980).

“T” for Test

This fourth phase of DO IT furnishes work teams with information they need to refine or replace a behavior-focused intervention, thereby improving the process. If observations indicate the target behavior have not improved, the work team analyzes and discusses the situation, and alters the intervention or selects another intervention approach. On the other hand, if the behavior-focused goal is reached, the team members turn their attention to another set of behaviors. New critical behaviors might be added to the observation checklist, thus expanding the domain of behavioral observation and feedback. A new intervention procedure might be added that targets only the new behaviors.

Each time a work team tests the impact of an intervention approach, they learn more about how to improve safety performance. In this way they have become behavioral scientists, using the DO IT process to: a) analyze and diagnose a human factors problem, b) monitor the impact of a behavior-focused intervention, and c) refine interventions for continuous improvement. The results from this testing process provide motivating consequences to support this learning and keep the team members involved.

Applications in Above-Ground Rock Quarries

Our recent attempts to apply BBS and the DO IT process at three above-ground rock quarries in southwest Virginia taught us valuable lesson and suggested directions for future research. We have developed a behavior-based training program for mining environments, and found miners very receptive to the basic principles. However, training alone was not sufficient to increase safe work practices. Nor was our training sufficient to motivate participation in a behavioral observation and feedback process. But, the fact that research assistants made periodic observations of ongoing work practices influenced a significant increase in critical safe behaviors.

Procedure

At each mining site, the employees were given four hours of BBS training. The training included an educational component teaching the employees the basic principles of BBS as well as a training component giving the employees an opportunity to practice observing a co-workers behavior, completing an observation checklist, and providing feedback regarding the co-workers safe and at-risk behaviors.

After the training session, the employees participated in a focus group to help develop an observation checklist tailored for each site. This important component empowers the employees. By encouraging employees to be involved in the actual development of their safety process, they will feel a sense ownership, and, therefore, be more likely to work for the survival of the process.

Safety leaders at each site designated a convenient place to display the checklists and provided a drop-box nearby for the employees to deposit completed checklists. It is important to note that the checklists are anonymous; the checklists cannot be traced to any one employee. This is to ensure honesty and to reassure the employees that this is not a tattle-tale program.

The completed checklists were collected by research assistants and analyzed. The data were provided to each site periodically, updating the safety leaders and the employees on their safety progress.

Results

The data from the mining sites indicate that BBS is effective at increasing safe work practices. Training alone was not sufficient to increase safe work behaviors. For example, the percentage of employees wearing safety goggles was nearly identical in Baseline ($M=.52$) and Training ($M=.51$) conditions for Site A. However, the percentage of employees wearing safety goggles increased substantially following the implementation of the observation and feedback process ($M=.68$).

Consistent with past research, the behavior-based observation and feedback process in the current field study led to clear improvements in subsequent safety performance. Based on 3,898 observations over an eight-month period, overall percent safe scores increased from 80.6% to 90.1%. The current results support the use of a BBS process to increase safe work practices.

Participation Difficulties

Limiting the impact of behavioral safety at the mining sites was the lack of employee participation. The employees never took ownership of the process. Some of the managers were seemingly against the safety process and stressed production ahead of safety. Also, employees frequently completed the observation process incorrectly (e.g., by marking down only at-risk behaviors, tattling on fellow employees, and sometimes handing in blank observation cards).

To increase participation, a participant-focused incentive/reward program was implemented. Participation increased by 600% and the number of different employees increased by 500% following the incentive program. Although this program did increase participation, this increase was short lived. A focus group was held at one site to find out from the employees why they were not participating. When asked about the value of the rewards, the inexpensive items -- a tool kit and food coupons -- were valued by the employees, but most employees were under the impression that a select few employees were "stuffing" the box. In other words, some employees were filling out bogus checklists just to increase their chances of winning the reward.

Another problem discussed during the focus group was the perception of "just more paper work." Over half of the employees indicated they were observing their co-workers and providing feedback, but they just didn't have the time or the desire to complete the checklist.

Other employees were still concerned about getting in trouble or getting their co-workers in trouble for reporting at-risk behaviors. The employees were reassured on several occasions that this was not a tattle-tail process, however, this concern remained an issue.

Procedural Limitations

One factor contributing to a ceiling effect observed across all sites was our inability to observe all possible work behaviors. Since our research assistants were dependent on the quarry foreman to chaperon them around the sites, we were only allowed to make observations when he was present. If

a piece of equipment broke down, or the miners had a problem that needed his assistance, we were unable to make behavioral observations that day. As such, the data we collected only reflects occasions when the mining operations were running smoothly.

Future Directions

After making several visits to the mines it became apparent that miners in above-ground rock quarries are essentially solitary workers. Many mining tasks are accomplished by a lone worker. There's no supervisor or coworker around to hold the employee accountable for performing the job safely. So the challenge for safety professionals and corporate leaders in mining environments is to build the kind of work culture that enables or facilitates responsibility or personal accountability for safety (Geller, 1998a). The only time employees would get an opportunity to observe and give peer feedback to a coworker was when some piece of equipment broke down.

Thus, a broad-based and long-term set of guidelines are needed for designing practical intervention strategies to reduce the risk of unintentional injury in occupations where employees work alone and cannot be held accountable for their actions by another individual. Geller and Clarke (1999) refer to such a process as safety self-management. At the mining sites we observed this would likely be a more appropriate intervention approach.

Self-Management Interventions

Self-management (Mahoney, 1971, 1972) is a behavioral improvement process whereby individuals change their own behavior in a goal-directed fashion by: a) manipulating behavioral antecedents, b) observing and recording specific target behaviors, and c) self-administering rewards for personal achievements (Geller & Clarke, 1999; Kazdin, 1993; Watson & Tharp, 1997).

The practical benefits of a self-management process has been demonstrated in numerous clinical settings, including the reduction of alcohol consumption (Garvin, Alcorn, Faulkner, & Kim, 1992; Sitharthan, Kavanagh, & Sayer, 1996; Sobell & Sobell, 1995), the control of weight (Baker & Kirschenbaum, 1993), and the cessation of smoking (Curry, 1993; Shiffman, 1984). Unfortunately, the potential benefits of using self-management techniques to improve safety-related occupational behaviors have not been systematically evaluated.

Research indicates that five self-management procedures can facilitate behavioral improvement; including: a) activator management (Heins, Lloyd, & Hallahan, 1986), b) social support (Stuart, 1967), c) goal setting (Latham & Yukl, 1975; Locke & Latham, 1990), d) self-observation and self-recording (Ericsson, Krampe, & Tesch-Romer, 1993; Lau, Bradley, & Parr, 1993), and e) self-rewards (Sohn & Lanal, 1982). See Geller (1998a) and Geller and Clarke (1999) for details on how these safety self-management techniques can be applied to safety performance

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**Appendix K: Scholarship 2:
Applications of Behavioral Science to
Improve Mine Safety**

Applications of Behavioral Science to Improve Mine Safety¹

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Applications of Behavioral Science to Improve Mine Safety

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As discussed in other chapters of this text, engineering intervention from improved lighting to vehicle and machinery design have improved mine safety dramatically. However, because the environmental context of both surface and underground mining is often hazardous, continuously changing, and sometimes unpredictable, it's impossible to protect the miner completely with environmental manipulations. Therefore, mining experts have pointed out the need to complement technological advancements with a focus on the human dimensions of safety, including the application of employee surveys, training series, incentive programs, and feedback presentations (Langton, 1995; Peters, 1995; Peters, Bockosh and Fotta, 1997). In fact, the U.S. Bureau of Mines referred to the need to apply fundamental psychological principles in the enhancement of miners' ability to recognize and react appropriately to threats in their risky work environment (Kowalski, Folta and Barrett, 1995). The question remains as to what these fundamental psychological principles are. The present chapter answers this important question.

H. L. Boling (1995) establishes the psychological focus of this chapter by pointing out that, "Today the progressive, productive and safe companies around the world have one common denominator, an innovative safety program that is behavior-based" (p.2). The term "behavior-based safety" has become quite popular among safety professionals, consultants, and members of safety steering committees. It is commonly used to reflect a proactive upstream approach to safety by focusing attention on at-risk behaviors that can lead to an injury and on safe behaviors that can contribute to injury prevention. Beyond this general definition, however, there seems to be substantial misperception, misunderstanding, and misapplication.

A number of recent books detail the principles and procedures of behavior-based safety, and they provide solid evidence for the success of this approach to injury prevention (e.g., Geller, 1996a, 1998a,d; Krause, 1995; Krause, Hidley and Hodson, 1996; McSween, 1995; Sulzer-Azaroff, 1998). Each of these books is consistent with regard to certain basic principles and methods, as well as the beneficial outcomes of behavior-based safety. We offer a brief review of these principles, procedures, and benefits here, and recommend these texts for your follow-up study and continued learning. We start with a definition and rationale for three basic principles reflecting the behavior-based approach.

PRINCIPLE 1: FOCUS INTERVENTION ON OBSERVABLE BEHAVIOR

The behavior-based approach to safety is founded on behavioral science as conceptualized and researched by B. F. Skinner (1938, 1953, 1974). Experimental behavior analysis, and later applied behavior analysis, emerged from Skinner's research and teaching. He laid the groundwork for numerous therapies and interventions to improve the quality of life of individuals, groups, and entire communities (Geller, Winett and Everett, 1982; Goldstein and Krasner, 1987; Greene et al., 1987). Whether working one-on-one in a clinical setting or with work teams throughout an organization, the intervention procedures always target specific behaviors in order to produce constructive change. In other words, the behavior-based approach focuses on observing what people do, analyzes why they do it, and then applies a research-supported intervention strategy to improve what people do.

Whatever the intervention strategy used to improve a human aspect of safety, the process should target behavior. Whether using training, feedback, injury investigation, coaching, or incentives to benefit safety, focus on behavior. Why? Well, first you can be objective and impersonal about behavior. You can talk about behavior independently from people's opinions,

attitudes, and feelings. Behavior varies according to factors in the external world, including equipment design, management systems, the behaviors shown by others, and various social dynamics. An open discussion about the environmental and interpersonal determinants of safe versus at-risk behavior can lead to practical modifications of the work culture to encourage safe behavior and discourage at-risk behavior.

Behavior-based intervention *acts people into thinking differently*, whereas person-based intervention *thinks people into acting differently*. The person-based approach is used successfully by many psychiatrists and clinical psychologists in professional therapy sessions, but it is not cost-effective in a group or organizational setting. To be effective, person-focused intervention requires extensive one-on-one interaction between a client and a specially-trained intervention specialist. Even if time and facilities were available for an intervention to focus on internal and nonobservable attitudes and person states, few safety professionals or consultants have the education, training, and experience to implement such an approach. Internal person factors can be improved indirectly, however, by directly focusing on behaviors in certain ways.

The key is to focus on behavior and you'll be on the right track, whatever the intervention approach. It's **behavior-based** commitment, **behavior-based** goal-setting, **behavior-based** feedback, **behavior-based** training, **behavior-based** recognition (Geller, 1997a), **behavior-based** incentives and rewards (Geller, 1996b), and so on.

PRINCIPLE 2: LOOK FOR EXTERNAL FACTORS TO IMPROVE PERFORMANCE

Internal person dimensions like attitudes, perceptions, and cognitions are difficult to define objectively and change directly. So stop trying! Most of us don't have the education, training, experience, nor time to deal with people's attitudes or person states directly. Instead, you should look for external factors influencing behavior independent of individual feelings,

preferences, and perceptions. When you empower people to analyze behavior from a systems perspective and implement interventions to improve behavior, you will indirectly improve their attitude, commitment, and internal motivation.

In the first widely-used American textbook in psychology, *Principles of Psychology*, William James (1890) explained the reciprocity between behavior and attitude as follows:

Sit all day in a moping posture, sigh, and reply to everything with a dismal voice, and your melancholy lingers ... If we wish to conquer undesirable emotional tendencies in ourselves, we must ... go through the outward movements of those contrary dispositions which we prefer to cultivate.

Careful observation and analysis of ongoing work practices can pinpoint many potential causes of safe and at-risk behaviors. Those causes external to people -- including reward and punishment contingencies, policies, or supervisory behaviors -- can often be altered for the improvement of both behavior and attitude. In contrast, internal person factors are difficult to identify, and if defined, they are even more difficult to change directly. So with behavior-based safety the focus is placed on external factors -- environmental conditions and behaviors -- which can be changed upstream from a potential injury.

PRINCIPLE 3: FOCUS ON POSITIVE CONSEQUENCES TO MOTIVATE SAFETY IMPROVEMENT

The ABC contingency is a basic tenet of behavior-based safety. "A" stands for "activator," or the antecedent events that direct behavior (B). And "C" refers to "consequence," or the environmental stimuli that motivate behavior. We do what we do to gain a positive consequence or to escape or avoid a negative consequence. And, we stop doing what we're doing when our behavior results in immediate negative consequences.

The most powerful motivating consequences are "soon" and "certain." That's why most at-risk behavior occurs. Compared to safe behavior, at-risk behavior provides the worker with

such soon and certain consequences as comfort, convenience, perceived efficiency, and faster job completion.

As this third principle indicates, using positive over negative consequences is critically important. It's relevant to "attitude," and many other internal dimensions of people. Think about it. How does a reward, personal recognition, or a group celebration make you feel compared to a reprimand or criticism? Both consequences can be significant with regard to behavioral impact. The difference is in the accompanying attitude or feeling state.

As detailed elsewhere (Geller, 1996a, 1997a, 1998d), when positive recognition is delivered correctly, it does more than increase the frequency of the behavior it follows. It also increases the likelihood other safe behaviors will occur, and that positive recognition will be used more often to benefit both behavior and attitude. The popular common sense belief that we learn more from our mistakes than our achievements is wrong. We learn more from our successes. So recognizing people's safe behavior will facilitate more learning and positive motivation than will criticizing people's at-risk behavior. Remember that only with positive consequences can you improve both behavior and attitude at the same time.

DON'T RELY ON COMMON SENSE

More explanations for these and additional principles of behavior-based safety are presented elsewhere (Geller, 1997b, 1998c). These three principles are most critical with regard to the development of interventions to improve the human dynamics of mine safety. Do they sound like plain old common sense to you? If so, we're glad. But we must warn you that others will not necessary feel the same without appropriate education, training, or experience. Common sense or intuition is often incorrect. What sounds good to one person will not necessarily sound

right to another. Consider, for example, the following common-sense strategies people have implemented in an attempt to deal with the human dynamics of safety.

- Punish a person who returns to work after a lost-time injury.
- Implement a safety incentive program whereby everyone in an organization gets a prize if no one reports an injury.
- Set up a "safe employee of the month" program in which one individual in a large facility is publicly recognized for having the "Best Safety Attitude."
- Establish an observation system whereby employees must observe one unsafe condition or behavior each day and "stop" it.
- Invite a motivational speaker to address all employees with themes like "Try Harder," "Change Your Attitude About Safety," "Self-Affirmation is the Key to Motivation," or "Safety Awareness and a Positive Attitude are Key to Behavior Change."
- Post signs with slogans like "Think Safety," "Safety is a Condition of Employment," "Zero Accidents is Our Goal," "Safety is a Priority," or "All Injuries are Preventable."

Do any of these psychological tactics sound familiar? All of these strategies are ineffective and run counter to the three behavior-based principles described above. Some of these techniques can actually do more harm than good to the human dynamics of industrial safety and health. Yet, I'm sure you've seen, perhaps even experienced, some of these intervention approaches. Why? Because they seemed like good common sense to someone.

It takes empirical investigation, not common sense, to guide the development and implementation of an improvement intervention, whether repairing a bridge, constructing a

building, or administrating an incentive/reward process. “Contrary to popular belief, there is not too little common sense in business, there is too much” (Daniels, 1994, p. 10).

Behavior-based safety, as reflected in the three principles described here, is based on more than 40 years of rigorous research. And with additional research, the methods and tools of behavior-based safety will continuously improve. Let's consider a general behavioral safety method which has been used by several researchers to evaluate the effectiveness of specific intervention techniques to prevent injury (e.g., Fellner and Sulzer-Azaroff, 1984; Geller, 1988; Komaki, Heinzmann and Lawson, 1980; Ludwig and Geller, 1997; Sulzer-Azaroff and DeSantamaria, 1980). It has also been used by numerous organizations to improve their safety performance (cf. Geller, 1996a, 1998d).

THE DO IT PROCESS

The DO IT process puts people in control of improving behaviors and thereby preventing injuries. It is a general method for solving the behavioral dimensions of safety problems. It provides objective data for exploring why certain safety-related behaviors occur or don't occur and for evaluating the impact of interventions designed to increase safe behavior or decrease at-risk behavior. If an intervention does not produce a desired effect, it is either refined or replaced with a completely different behavior-change approach.

"D" for Define

The process begins by defining certain behaviors to work with. These are the targets of the behavior improvement process. They are safe behaviors that need to increase or at-risk behaviors that need to decrease. Avoiding at-risk behaviors often requires certain safe behaviors, and therefore safe targets might be behaviors that substitute for particular at-risk behaviors. On the other hand, a safe target behavior can be defined independently of an associated at-risk

behavior. The definition of a safe target might be as basic as using certain personal protective equipment (PPE) or "walking within pedestrian walkways." Or the safe target could be a process requiring a particular sequence of safe behaviors, as when lifting, parking a truck for unloading, or locking out energy sources.

Deriving a precise definition of a DO IT target is facilitated with the development of a checklist that can be used to evaluate whether a certain target behavior or process is being performed safely. Just developing such behavioral definitions can lead to valuable learning. When people get involved in developing a behavioral checklist, they own a training process that can improve human dynamics on both the outside (behaviors) and the inside (feelings and attitudes) of people.

"O" for Observe

When people observe each other for certain safe or at-risk behaviors, they realize everyone performs at-risk behavior, sometimes without even knowing it. The observation stage is not fault-finding, but is a fact-finding process to facilitate the discovery of behaviors and conditions that need to be changed or continued in order to prevent injuries.

The behavioral observations are only done with the awareness and permission of the person being observed. Unannounced observations might give a more realistic picture of the at-risk behaviors, but such audits reduce interpersonal trust and give the impression that behavior-based safety is a negative "gotcha" program. And from a behavior-change perspective, observations without permission cannot raise safety "mindfulness" (Geller, 1999a; Langer, 1989). It's likely the mindfulness developed and increased from an up-front and voluntary behavioral observation process is critical for behavior change and injury prevention.

It's easy to fall into a mindless job routine, and become incapable of handling unexpected events in a safe and timely manner. Plus, some mindless behavior can put a person in immediate risk for personal injury. We need to understand that this can happen to anyone and warrants a concerted effort to increase people's mindfulness on the job. A behavior-based observation and feedback process provides the mechanism for making this happen.

Regarding the development of an observation process, teams of workers need to decide:

- What kind of checklist to use during observations?
- Who will conduct the behavioral observations?
- How often will the observations be conducted?
- How will data from the checklist be summarized and interpreted?
- How will people be informed of the results from an observation process?

There is not one generic observation procedure for all situations, and the customization and refinement of a process for a particular setting should never stop. It's often advantageous to begin with a limited number of behaviors and a relatively simple checklist. This reduces the possibility that some people will feel overwhelmed at the start. Starting small also enables the broadest range of voluntary participation, and provides numerous opportunities to successively improve the process by expanding its coverage of both behaviors and work areas.

"I" for Intervene

During this stage, interventions are designed and implemented in an attempt to increase safe behavior and/or decrease at-risk behavior. As reflected in Principle 2 above, intervention means changing external conditions of the system in order to make safe behavior more likely than at-risk behavior. When designing interventions, Principle 3 is your guide. Specifically, the

most motivating consequences are soon, certain, and sizable. And, positive consequences are preferable to negative consequences.

The process of observing and recording the frequency of safe and at-risk behavior on a checklist provides an opportunity to give individuals and groups valuable behavior-based feedback. When the results of a behavioral observation are shown to individuals or groups, they receive the kind of information that enables practice to improve performance. Considerable research has shown that providing workers with feedback regarding their safe and at-risk behaviors is a very cost-effective intervention approach for improving safety performance (e.g., Geller, 1996a; Krause et al., 1996; Reber, Wallin and Chhoker, 1990; Sulzer-Azaroff and DeSantamaria, 1980; McAfee and Winn, 1989; Petersen, 1989).

In addition to behavioral feedback, researchers have found a number of other intervention strategies to be effective at increasing safe work practices. These include worker-designed safety slogans, "near hit" and corrective action reporting, safe behavior promise cards, individual and group goal-setting, actively caring thank-you cards, safety coaching, as well as incentive/reward programs for individuals or groups. These are described elsewhere (Geller, 1996a, 1998d), some having been applied in mining settings (Fox, Hopkins and Anger, 1987; Rhoton, 1980). Later in this chapter we offer guidelines for matching the intervention strategy with the behavioral target and situation.

"T" for Test

The test phase of DO IT provides work teams with the information they need to refine or replace a behavior-change intervention, and thereby improve the process. If observations indicate significant improvement in the target behavior has not occurred, the work team analyzes and discusses the situation, and refines the intervention or chooses another intervention

approach. On the other hand, if the target reaches the desired frequency level, the participants can turn their attention to another set of behaviors. They might add new critical behaviors to their checklist, thus expanding the domain of their behavioral observations. They might design a new intervention procedure to focus only on the new behaviors.

Every time the participants evaluate an intervention approach, they learn more about how to improve safety performance. They have essentially become behavioral scientists, using the DO IT process to: a) diagnose a human dynamics problem, b) monitor the impact of a behavior-change intervention, and c) refine interventions for continuous improvement. The results from such testing provide motivating consequences to support this learning process and keep the participants involved.

Let's consider some basic principles about behavior and behavior-change techniques that can facilitate the development of the most effective intervention for a particular situation. First, it's important to understand the difference between other-directed, self-directed, and automatic behavior (Watson and Tharp, 1993).

THREE TYPES OF BEHAVIOR

On-the-job behavior starts out as other-directed, in the sense that we follow someone else's instructions. Such direction can come from a training program, an operation's manual, or a policy statement. After learning what to do, essentially by memorizing or internalizing the appropriate instructions, our behavior enters the self-directed stage. In other words, we talk to ourselves or formulate an image before performing a behavior in order to activate the right response. Sometimes we talk to ourselves after performing a behavior in order to reassure ourselves we performed correctly or to figure out ways to do better next time. At this point we're usually open to corrective feedback if it's delivered well by a person we trust.

After performing some behaviors frequently and consistently over a period of time they become automatic. A habit is formed. Some habits are good and some are not good, depending on their short and long-term consequences. If implemented correctly, rewards, recognition, and other positive consequences can facilitate the transfer of behavior from the self-directed phase to the habit phase.

Of course our self-directed behavior is not always desirable. When we take a short cut, for example, we are choosing intentionally to ignore a safety precaution in order to perform more efficiently or with more comfort or convenience. In this state, people are "consciously incompetent." Attempts to change self-directed behavior from incompetent to competent is often difficult, because it usually requires a relevant change in personal motivation.

Before a bad habit can be changed to a good habit, the target behavior must become self-directed. In other words, people need to become aware of their undesirable habit (as in at-risk behavior) before adjustment is possible. Then, if the person is motivated to improve, their new self-directed behavior can become automatic.

Let's see what kinds of behavior-based interventions are appropriate for the three transitions alluded to above:

- Turning a risky habit (when the person is unconsciously incompetent) into safe self-directed behavior.
- Changing risky self-directed behavior (when the person is consciously incompetent) to safe self-directed behavior.
- Turning safe self-directed behavior (when the person is consciously competent) into a safe habit (unconscious competence).

THREE KINDS OF INTERVENTION STRATEGIES

Behavior-based safety trainers and consultants teach the ABC model (or three-term contingency) as a framework to understand and analyze behavior or to develop interventions for improving behavior. As given in Principle 3 above, the "A" stands for activators or antecedent events that precede behavior or "B", and "C" refers to the consequences following behavior and produced by it. Activators direct behavior, whereas consequences motivate behavior.

Activators and consequences are external to the performer (as in the environment), or they are internal (as in self-instructions or self-recognition). They can be intrinsic or extrinsic to a behavior, meaning they provide direction or motivation naturally as a task is performed (as in a computer game), or they are added to the situation extrinsically in order to improve performance. An incentive/reward program is external and extrinsic. It adds an activator (an incentive) and a consequence (a reward) to the situation in order to direct and motivate desirable behavior (Geller, 1996b).

Instructional Intervention

An instructional intervention is typically an activator or antecedent event used to get new behavior started or to move behavior from the automatic (habit) stage to the self-directed stage. Or it is used to improve behavior already in the self-directed stage. The aim is to get the performer's attention and instruct him or her to transition from unconscious incompetence to conscious competence. You assume the person wants to improve, so external motivation is not needed -- only external and extrinsic direction.

This type of intervention consists primarily of activators, as exemplified by education sessions, training exercises, and directive feedback. Since your purpose is to instruct, the intervention comes before the target behavior and focuses on helping the performer internalize your instructions. As we've all experienced, this type of intervention is more effective when the

instructions are specific and given one-on-one. Role playing exercises provide instructors opportunities to customize directions specific to individual attempts to improve. Plus, they allow participants the chance to receive rewarding feedback for their improvement.

Supportive Intervention

Once a person learns the right way to do something, practice is important so the behavior becomes part of a natural routine. Continued practice leads to fluency and in many cases to automatic or habitual behavior. This is an especially desirable state for safety-related behavior. But perfect practice does not come easily, and benefits greatly from supportive intervention. We need support to reassure us we are doing the right thing and to encourage us to keep going.

While instructional intervention consists primarily of activators, supportive intervention focuses on the application of positive consequences. Thus, when we give people rewarding feedback or recognition for particular safe behavior, we are showing our appreciation for their efforts and increasing the likelihood they will perform the behavior again. Each occurrence of the desired behavior facilitates fluency and helps built a good habit.

Thus, after people know what to do, they need to perform the behavior correctly many times before it can become a productive habit. Therefore, the positive reinforcement we give people for their safety-related behavior can go a long way toward facilitating fluency and a transition to the automatic or habit stage. Such supportive intervention is often most powerful when it comes from one's peers -- as in peer support.

Note that supportive intervention is typically not preceded by a specific activator. In other words, when you support self-directed behavior you don't need to provide an instructional antecedent. The person knows what to do. You don't need to activate desired behavior with a

promise (an incentive) or a threat (a disincentive). The person is already motivated to do the right thing.

Motivational Intervention

When people know what to do and don't do it, a motivational intervention is needed. In other words, when people are consciously incompetent about safety-related behavior, they require some external encouragement or pressure to change. Instruction alone is obviously insufficient because they are knowingly doing the wrong thing. In safety we refer to this as taking a calculated risk.

We usually perform calculated risks or take short cuts because we perceive the positive consequences of the at-risk behavior to be more powerful than the negative consequences. This is because the positive consequences of comfort, convenience, and efficiency are immediate and certain, while the negative consequence of at-risk behavior (such as an injury) is improbable and seems remote. Furthermore, the safe alternative is relatively inconvenient, uncomfortable, or inefficient; and these negative consequences are immediate and certain. As a result, we often need to add both activators and consequences to the situation in order to move people from conscious incompetence to conscious competence.

This is when an incentive/reward program is useful. Such a program attempts to motivate a certain target behavior by promising people a positive consequence if they perform it. The promise is the incentive and the consequence is the reward. In safety, this kind of motivational intervention is much less common than a disincentive/penalty program. This is when a rule, policy, or law threatens to give people a negative consequence (a penalty) if they fail to comply or take a calculated risk.

Often a disincentive/penalty intervention is ineffective, because like an injury, the negative consequence or penalty seems remote and improbable. The behavioral impact of these enforcement programs are enhanced by increasing the severity of the penalty and catching more people taking the calculated risk. But the large-scale implementation of this kind of intervention can seem inconsistent and unfair. And because threats of punishment appear to challenge individual freedom and choice (Skinner, 1971), this approach to behavior change can backfire and activate more calculated risk taking, even sabotage, theft, or interpersonal aggression.

Motivational intervention is clearly the most challenging, requiring enough external influence to get the target behavior started without triggering a desire to assert personal freedom. Remember the objective is to motivate a transition from conscious incompetence to a self-directed state of conscious competence. Powerful external consequences might improve behavior only temporarily, as long as the behavioral intervention is in place. Hence the individual is consciously competent, but the excessive outside control makes the behavior entirely other-directed. Excessive control on the outside of people can limit the amount of control or self-direction they develop on the inside.

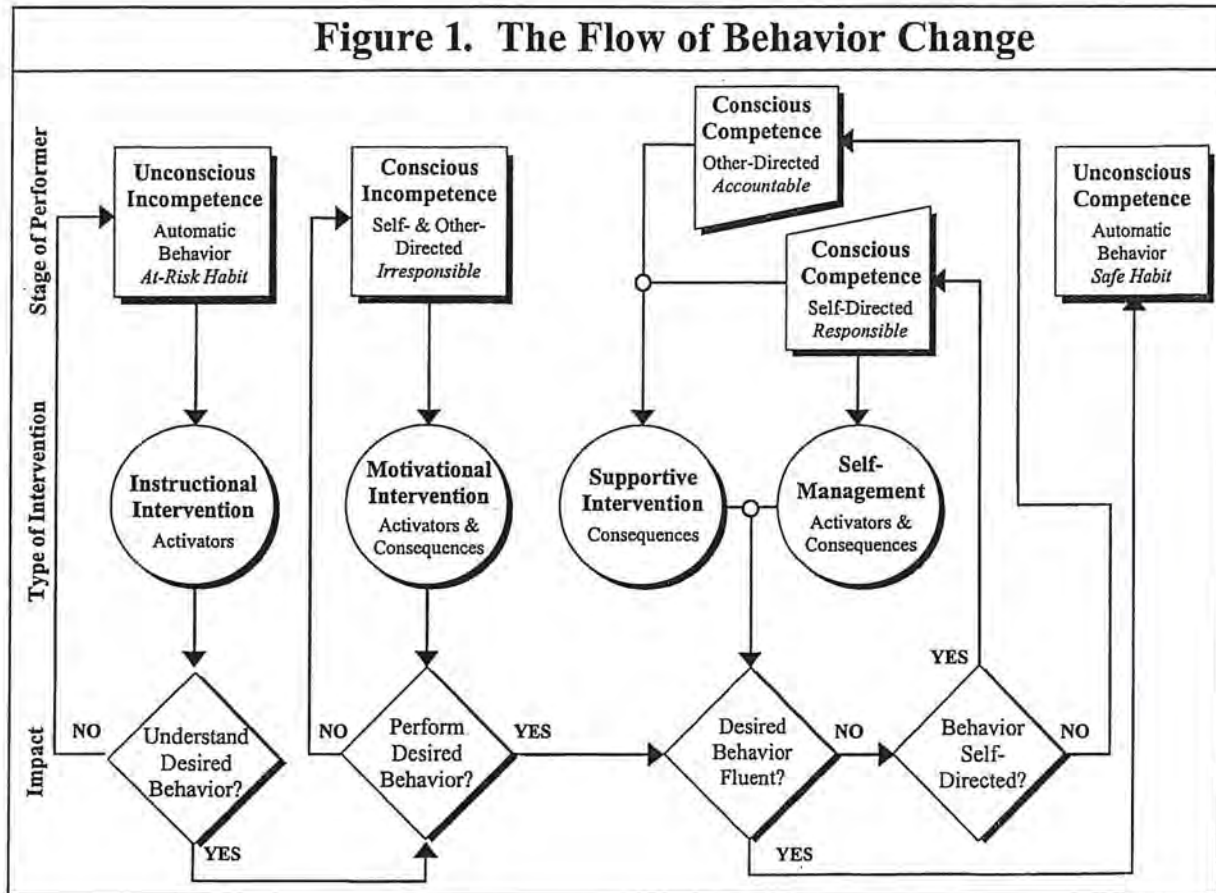
A long-term implementation of a motivational intervention, coupled with consistent supportive intervention, can lead to a good habit. In other words, with substantial motivation and support, other-directed safe behavior can transition to unconscious competence without first becoming self-directed.

In Summary

Figure 1 (on the next page) reviews this intervention information by depicting relationships between four competency states (unconscious incompetence, conscious incompetence, conscious competence, and unconscious competence) and four intervention

approaches (instructional intervention, motivational intervention, supportive intervention, and self-management). When people are unaware of the safe work practice (i.e., they are unconsciously incompetent), they need repeated instructional intervention until they understand what to do. Then, as depicted at the far left of Figure 1, the critical question is whether they perform the desired behavior. If they do, the question of behavioral fluency is relevant. A fluent response becomes a habit or part of a regular routine, and thus the individual is unconsciously competent.

When workers know how to perform a task safely but don't, they are considered consciously incompetent or irresponsible. This is when an external motivational intervention can be useful, as discussed earlier. Then when the desired behavior occurs at least once, supportive intervention is needed to get the behavior to a fluent state.



Most employees need supportive intervention for their safe behavior. In other words, most experienced workers know what to do in order to prevent injury on their jobs, and they have performed their jobs safely one or more times. But the safe way might not be habitual. The individual is consciously competent but needs supportive recognition or feedback for response maintenance and increased fluency.

Figure 1 illustrates a distinction between conscious competence/other-directed and conscious competence/self-directed. If a safe work practice is self-directed, the employee is considered responsible and self-management intervention is relevant. As detailed elsewhere (Watson and Tharp, 1997), the methods and tools of effective self-management are derived from behavioral science research and are perfectly consistent with the principles of behavior-based safety.

In essence, self-management involves the application of the DO IT process described above to one's own behavior. An individual defines one or more target behaviors to improve, monitors these behaviors, manipulates relevant activators and consequences to increase desired behavior and decrease undesired behavior, and tracks continual change in the target behaviors in order to determine the impact of the self-management process. See Geller (1998a) and Geller and Clarke (1999) for details regarding the application of self-management techniques for injury prevention.

ACCOUNTABILITY VERSUS RESPONSIBILITY

From the perspective of large-scale safety and health promotion, the differentiation in Figure 1 between accountable and responsible is critical. People often use the words accountability and responsibility interchangeably. Whether you hold someone accountable or responsible for getting something done, you mean the same thing. You want that person to accomplish a certain task, and you intend on making sure it happens. However, let's consider the receiving end of this situation. How does a person feel about an assignment -- does he or she feel accountable or responsible? Here's where a distinction is evident.

When you are held accountable, you are asked to reach a certain objective or goal, often within a designated time period. But you might not feel responsible to meet the deadline. Or, you might feel responsible enough to complete the assignment, but that's all. You do only what's required and no more. In this case, accountability is the same as responsibility.

There are times, however, when you extend your responsibility beyond accountability. You do more than what's required. You go beyond the call of duty as defined by a particular accountability system. This is often essential when it comes to industrial safety and health. To improve safety beyond the current performance plateau experienced by many companies,

workers need to extend their responsibility for safety beyond that for which they are held accountable. They need to transition from an other-directed state to a self-directed state.

Many mining tasks are accomplished by a lone worker. There's no supervisor or coworker around to hold the employee accountable for performing the job safely. So the challenge for safety professionals and corporate leaders is to build the kind of work culture that enables or facilitates responsibility or personal accountability for safety. An accountability system is needed that encourages personal involvement and commitment for safety. Then you'll start a spiral of accountability feeding responsibility, feeding more involvement and more responsibility, resulting in people becoming totally committed to achieving an injury-free workplace. Psychological research on relationships between environmental conditions or contingencies (as in an accountability system) and people's feeling states (like personal accountability or responsibility) suggests five general ways to make this happen. (More details are given in Geller, 1998a.)

Decrease Top-Down Controls for Safety

Mine safety is often a confrontation between a rule enforcer and a rule breaker. As such, safety is viewed as compliance with certain safety policies and mandates. One person holds another accountable for at-risk behavior, as in: "I saw what you did." Safety becomes a 'gotcha' game, one dictated by MSHA standards and unwittingly supported by corporate rules and regulations. Then the primary job of safety personnel is to check for worker compliance with safety procedures and to correct incidences of noncompliance. Making safety a priority means increasing the enforcement of safety policies. This climate leads to fault finding and punishment contingencies, both which prevent the development of personal accountability.

Promote fact finding. If you want to increase people's responsibility for safety, you need to focus on fact finding, not fault finding. An injury or "near hit" results from several causes, some having nothing to do with the person directly involved. Improving safety depends upon discovering all the factors contributing to injury potential. We can't do this if the work context makes people unwilling or frightened to discuss an incident openly because they're afraid of being blamed or punished. Removing fear of failure is critical to developing internal feelings of personal accountability (cf. Geller, 1999c).

Decrease punishment. In many work cultures, holding people accountable means punishing them for the mistakes they make. This can impede responsibility for reporting errors, calculated risks and near hits, and for looking for ways to reduce them. Geller (1996a, 1998a,d) has outlined various situations in which punishment is not desirable, and discussed why mistakes and human error never warrant punishment. Here we want to make the point that punishment procedures typically stifle the openness and interpersonal trust needed to conduct a responsible incident analysis and derive an effective corrective action plan.

Increase Feelings of Empowerment

From a psychological perspective, empowerment is not holding people accountable to do more. It is feeling empowered or responsible to do more. Employees need to be asked, "What will it take to make you feel more empowered or personally responsible for safety around here?" Seeking frank answers to this question and then struggling to make the changes requested will probably do more to increase employee involvement, commitment, and responsibility for safety than anything else.

The type of accountability system in place to evaluate the safety performance of individuals, work teams, and the entire work force influences whether people feel empowered and

responsible to improve safety. Research indicates that for an accountability system to promote personal responsibility it needs to:

- be proactive,
- promote the reporting of all injuries, near hits, and property damage incidents,
- distinguish between the journey (process goals) and the destination (outcome goals or vision),
- hold people accountable for results they can control,
- use recognition, rewards, and celebrations to shape process behaviors,
- consider environment, behavior, and person factors in all incident investigations,
- include daily audits of work practices and environmental conditions, as well as periodic assessments of perceptions and person states (through interviews, focus group meetings, and plant-wide surveys).

Help People Feel Important

When people's feelings of importance related to safety increase, their personal responsibility for safety also increases. So a rationale for decreasing top-down control over safety is that enforcement or punishment procedures decrease the recipient's sense of importance. And the strategies reviewed above for increasing feelings of empowerment also enhance personal perceptions of importance.

When people have choices in a situation they feel more important. And when their sense of importance is increased, they want to get more involved and make more choices. That's why it's important to first teach everyone the theory and principles behind a new process, and then help teams customize specific procedures for their work areas. The choice process will be

motivating in itself, and promote a sense of ownership for the methods and tools. This leads naturally to both personal and interpersonal accountability to make the process work.

Cultivate Belonging and Interpersonal Trust

According to a recent study of 20 companies in the midst of implementing some form of behavior-based safety, trust in management's ability to support the process was a critical determinant of employee involvement (DePasquale and Geller, in press; Geller et al., 1998). Furthermore, building a spirit of community or belonging among coworkers will increase their sense of personal responsibility for industrial safety and health. The improvement of work practices requires interpersonal observation and feedback. But for this to happen, people need to adopt a collective win/win perspective instead of the individualistic win/lose orientation common in many work settings. People who feel a sense of belonging, trust, and win/win interdependency with their coworkers will also feel responsible for their coworkers' safety.

Ways to measure and increase interpersonal trust in a work setting are detailed elsewhere (Geller, 1998b, 1999b). Here we review key points from these sources. Remember that a "we-they" mentality inhibits trust-building. People need to appreciate and respect each other's differences. People's safety in the system is interdependent, and their participation is critical for the organization's synergistic success. But building the kind of belonging and trust needed to break down independent perspectives and we-they barriers is an ongoing and never-ending process. You can help make this happen by promoting the following "C" words in yourself and others.

Communication. How we interact with others is obviously a key determinant of interpersonal trust. What people say and how they say it influences our trust in both their capabilities and their intentions. An individual's expertise is displayed by the person's spoken or

written words, and by the confidence and credibility linked to the words. You've probably experienced many times that the way something is said, including intonation, pace, facial expressions, hand gestures, and overall posture, has greater impact than what was actually said. And, you've certainly experienced personal feelings of trust toward another person change as the result of how that individual communicated information.

We can get others to trust our knowledge, skill, or ability by our actions. Presenting our case with clarity, confidence, and charisma certainly helps. But what about trust in intentions? Do you know people who have impressive credentials and communicate elegantly, but something makes you suspicious about their intentions? You believe they know what to do, but you're not convinced they will do what they say. They have the right talk, but give the impression they don't walk it.

One of the most powerful communication strategies for increasing trust in intention is active listening. When you listen to others first before communicating your own perspective, you not only increase the chance they will reciprocate and listen to you, you also learn how to present your message for optimal understanding, appreciation, and buy-in.

Caring. When you take the time to listen to other people's perspectives, you send a most important message that you care about them. And when people believe you care about them, they will care about what you tell them. They trust you will look out for them when applying your knowledge, skills, or abilities. They trust your intentions because they believe you care.

You also communicate caring and build interpersonal trust when you ask questions. We're not talking about the typical general questions we often ask people we haven't seen for awhile. We ask, "How are you doing?" and we get the standard reply "I'm doing fine, how about you?" No, we're referring to informed inquiry about a particular task or set of circumstances.

Questions targeting a specific aspect of a person's job send the signal you care about him or her. This communication is more than a general greeting. It's a statement of genuine interest in a person's behavior and feelings. It's especially powerful when it reflects active caring about health and safety.

In order to show caring with specific behavior-based questions, you need to take the time to learn what others are doing. This comes from active listening and behavior-based observation. You've heard the phrase "walk the talk." Well, here we're talking about "hearing to the talk, and watching the walk." This shows you care, and gives you an opportunity to "talk the walk" so people will trust your intentions.

Candor. We trust people who are frank and open with us. They don't beat around the bush. They get right to the point, whether asking for a favor or giving us behavioral feedback. And when these individuals don't know an answer to a question, they don't ignore us or hem and haw about possibilities. They tell us outright when they don't know something, and they tell us they'll get back to us later. And when they get back to us soon with an answer, our trust in both their intention and ability increases.

The second definition of "candor" in my American Heritage (1991) dictionary reflects another important aspect of trust-building -- "freedom from prejudice" (p.233). When people's interactions with you reflect prejudice or the tendency to evaluate or judge another person on the basis of a stereotype or preconceived notion about group characteristics, you have reason to mistrust these individuals, both in their ability to evaluate others and in their intentions to treat people fairly. And, your trust in these persons decreases even when the prejudice is not directed toward you.

When a person gives an opinion about another person because of race, religion, gender, age, sexual orientation, or birthplace, you should doubt this individual's ability to make people-related decisions. You should wonder whether their intentions to perform on behalf of another individual will be biased or tainted by a tendency to pre-judge people on the basis of overly simple and usually inaccurate stereotypes.

Consistency. Perhaps the quickest way to destroy interpersonal trust is not to follow through on an agreement. How often do we make a promise we don't keep? Most promises are behavior-consequence contingencies. We specify that a certain consequence will follow a certain behavior. Whether the consequence is positive or negative, trust decreases when the behavior is not rewarded or punished as promised.

One of the problems with punishment contingencies is that they are difficult to implement fairly and consistently. It's easy to state a policy that anyone not using appropriate personal protective equipment will be "written up," but it's quite difficult or impossible to carry out this contingency consistently for a large workforce. What about safety incentive programs that offer everyone rewards when no injuries occur over a designated time period and participants observe coworkers getting hurt but not turning in an injury report? And, how about a "safe employee of the month" program that selects winners according to nonobjective criteria or doesn't consider everyone consistently as a potential award recipient? You risk the possibility of trust reduction every time you implement a contingency (such as a punishment policy or incentive program) that is not administered fairly and consistently.

Commitment. People who are dependable and reliable are not only showing consistency, they are demonstrating commitment. When you follow through on a promise or pledge to do something, you tell others they can count on you. You can be trusted to do what

you say you will do. Making a commitment and honoring it, builds trust in both intention and ability.

Telling a personal anecdote to illustrate a point is often a good way to demonstrate commitment for something. And when this commitment is consistent with the theme of your speech or written presentation, your credibility increases. The audience has reason to trust your intentions to give accurate and useful information.

Consensus. Demonstrating personal commitment to a mission, purpose, or goal helps to build group consensus. And when a group of people reach consensus about something, all group members agree on a decision or course of action and are willing to support it. Leaders or group facilitators who develop consensus among people are trusted. This is the opposite of top-down decision making, and is not the same as negotiating, calling for a vote and letting the majority win, or working out a compromise between two differing sets of opinions.

Whenever the results of a group decision-making process comes across as "win-lose," some mistrust is going to develop. A majority of the group might be pleased, but others will be discontent and might actively or passively resist involvement. And even the "winners" could feel lowered interpersonal trust. "We won this decision, but what about next time?" And without solid back-up support of the decision, the outcome will be less than desired. "Without everyone's buy-in, commitment, and involvement, we can't trust the process to come off as expected."

So how can group consensus be developed? How can the outcome of a heated debate on ways to solve a problem be perceived as a win-win solution everyone supports? How can a win-lose compromise or negotiation perceived to depreciate interpersonal trust be avoided? Solutions are more easily spoken than accomplished. Consensus-building takes time and energy, and

requires candid, consistent, and caring communication among all members of a discussion or decision-making group (Geller, 1998b; Rees, 1997). In other words, when people demonstrate the C-words discussed here for building trust in interpersonal dialogue, they also develop consensus and more interpersonal trust regarding a particular decision or action plan.

However, building consensus around a group process or action plan is not easy. There's no quick fix to doing this. It requires plenty of interpersonal communication, including straightforward opinion sharing, intense discussion, emotional debate, active listening, careful evaluation, methodical organization, and systematic prioritizing. But on important matters, the outcome is well worth the investment. When you develop a solution or process that every potential participant can get behind and champion, you have cultivated the degree of interpersonal trust needed for total involvement. Involvement in turn builds personal commitment, more interpersonal trust, and then more involvement.

Character. This final C-word for trust-building means different things to many people. But generally, a person with "character" is considered honest, ethical, or principled. People with character are credible or worthy of another person's trust because they display confidence and competence in following a consistent set of personal beliefs. They are believable and trusted because they know who they are; they know where they want to go; and they know how to get there.

All of the strategies discussed here for cultivating a trusting culture are practiced by a person with character. Therefore, this C-word epitomizes interpersonal trust from both an intention and capability perspective. We'd like to add a few additional trust-building methods, however, that especially fit this category, although they do overlap with other C-words discussed here.

First, individuals with character are willing to admit vulnerability. They realize they aren't perfect and need behavioral feedback from others. They know their strengths and weaknesses, and find exemplars to model. By actively listening to others and observing their behaviors, individuals with character learn how to improve their own performance. And if they're building a high performance team, they can readily find people with knowledge, skills, and abilities to complement their own competencies. They know how to make diversity work for them, their group, and the entire organization.

Having the courage to admit your weaknesses means you're willing to recognize when you've made a mistake, and to ask for forgiveness. There is probably no better way to build trust between individuals than to own up to an error that might have affected another person. Of course you should also indicate what you will do better next time or ask for specific advice on how to improve. This kind of vulnerability enables you to heed the powerful enrichment principle we learned from Frank Bird, "good better best, never let us rest, until our good is better and our better best" (Bird and Germain, 1987, p.111).

And what is your trust level for a group leader who not only admits failure but continually seeks ways to improve? This is the kind of person you want on your team. You can openly discuss with this person your own incompetencies or insecurities without fear of ridicule or reprisal. Indeed, you trust this person will appreciate your desire to improve and will offer the guidance you need to do better. You also trust this individual to maintain the confidentiality of any disclosure of personal failure or vulnerability.

Building interdependent trust and belonging should be part of the mission statement for every corporate endeavor that involves people. It should influence almost every conversation we have with coworkers. It is a continuous journey, essential to cultivating an organization of

individuals and teams whose personal and shared accountabilities for safety and health are sufficient to achieve a Total Safety Culture. The seven C-words reviewed here are easy to remember, and although their meanings overlap to some extent, each offers distinct directives for trust-building behavior.

SUMMARY AND CONCLUSIONS

This chapter began with a review of three basic principles defining a behavioral science approach to improving the human element of mining safety, including a rationale for using a behavior-based approach. Then a basic framework for implementing a behavior management system was introduced. It was referred to as DO IT for the four basic processes of behavior-based safety: 1) Define target behaviors to support or improve, 2) Observe critical behaviors in order to help people become more mindful of safe versus at-risk work practices and provide constructive behavioral feedback, 3) Intervene for instruction, support, motivation, or safety self-management, and 4) Test the impact of the intervention process to verify the beneficial influence of the behavior-based procedures and learn how to continuously improve the behavior management system.

Our subsequent discussion of a distinction between accountability and ways to develop personal responsibility went beyond the test phase of a DO IT process. For example, issues of empowerment, belonging and interpersonal trust implicate subjective feeling states which are difficult or impossible to measure. This might seem problematic for managers inspired by the popular management principle, "You can only manage what you can measure."

There are some things we should do, however, because they are right. Many of the recommendations given here for developing an accountability system that promotes personal responsibility cannot be readily monitored nor measured, but you need to have faith in the

research-supported theory that promoting feelings of empowerment, trust, and belonging are important for safety improvement (cf. Geller, 1996a, 1998a, 1999b). This is like taking vitamin pills regularly without noticing any measurable consequences.

We are motivated by consequences, however, so let's consider certain benefits you can expect to gain from a successful behavior-based safety management process as reviewed in this chapter. Since most injuries are caused in part by at-risk behavior, a reduction in at-risk behavior and an increase in safe behavior will lead to injury prevention. However, we'd like you to consider five other benefits that result from people contributing interdependently to an effective behavior-based safety process. These outcomes are critically important, and relate to much more than safety. In fact, they can benefit every important function of your organization. In explaining these we'll review most of the key psychological principles covered in this chapter.

Benefit 1: It Focuses Evaluation on the Right Numbers

How is safety performance measured at most mining facilities? It's measured by final outcomes -- injuries that occur during the year. Companies keep score by trying to improve their incident rate. Do workers walk around the job thinking about lowering the company's incident rate? Can they relate to that? Of course not. It's too abstract and remote. And it's not really under the workers' immediate control.

Top management needs to keep worrying about the outcome numbers, but not the people doing the jobs on the floor. They need to focus on the process -- the day-to-day operations. That's what they can control, and that's the focus of behavior-based safety. When workers concentrate on what they can actually **do** for safety, they'll reach the outcome everyone wants -- fewer injuries.

Benefit 2: It Builds Positive Attitudes

Have you ever noticed how safety-related conversations often resemble an adult-child confrontation? One person holds another accountable for at-risk behavior, as in "I saw what you did." Then safety becomes a 'gotcha' game, reinforced by MSHA regulations and corporate rules. This heavy-handed approach only diminishes a person's feelings of empowerment, importance, belonging, and interpersonal trust.

Behavior-based safety focuses on the use of rewards, positive feedback, and interpersonal recognition to motivate and support safe behavior. This encourages people to get involved in a safety improvement process because they want to, not because they feel threatened and think they have to. Thus, through behavior-based safety people act themselves into a positive attitude.

Benefit 3: It Increases Personal Responsibility for Safety

When people have tools they can use on a daily basis to prevent injuries, and they have support to use these tools, they have real control over safety. If they're held accountable for process numbers they can control, and they believe their efforts will prevent workplace injuries, they'll feel responsible and do more than what's required. They'll feel empowered and want to get involved in an improvement process.

Benefit 4: It Facilitates Interpersonal Coaching and Teamwork

Imagine a workplace where everyone coaches each other about the safest way to perform a job. When workers depend on others in this way to improve safety, they understand teamwork. They appreciate how everyone's safe and at-risk behavior influences the safety of everyone else. With this interdependent attitude, they're willing to use behavior-based coaching to actively care for their coworkers.

The five letters of COACH reflect the main ingredients of behavior-based coaching: "C" is for **care**. Know I care and you'll care what I know. "O" is for **observe**. I care so much I'm willing to watch you work, so I can give you behavior-based feedback. "A" is for **analyze**. I'll think about my observations to understand barriers to safe behavior. "C" is for **communicate**. I'll recognize and support the safe behavior I see, and I'll give corrective feedback for at-risk behaviors in a way that is accepted by the person I observe. "H" is for **help**. Behavior-based coaching helps increase safe behavior and decrease at-risk behavior, and this helps to prevent injuries. It also helps to build interpersonal trust and an interdependent mindset.

Benefit 5: It Teaches and Promotes Systems Thinking

It's easy to get bogged down with handling immediate short-term demands -- like production deadlines -- and lose sight of the bigger picture. Systems thinkers take a broad and long-term perspective. They look beyond immediate payoffs, like the ease, speed, or comfort they get by taking a risky shortcut. They consider the possibility of a bigger payoff in the distant future. They realize their safe behavior teaches others by example and protects them from injury.

Systems thinkers understand the link between behavior and attitude. A small change in behavior can result in a beneficial change in attitude, followed by more behavior change and then more attitude change -- eventually resulting in total commitment. So behavior-based safety sets the stage for systems thinking and interdependent teamwork, and this can lead ultimately to a Total Safety Culture.

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