Overcoming Occupational Safety and Health Inequity:
A Case Study of Exemplary Performance in Medium Business

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DISSERTATION

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF FIGURES

LIST OF ABBREVIATIONS

BLS	Bureau of Labor Statistics
NIOSH	National Institute for Occupational Safety and Health
OD	Organization Development
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
SHARP	Safety and Health Achievement Recognition Program
SME	Small and Medium Enterprise
SMS	Safety Management System
SOII	Survey of Occupational Injury and Illnesses
TRC	Total Recordable Case

LIST OF TERMS

Establishment | "A single physical location where business is conducted or where services or industrial operations are performed" (Caruso, 2015). In this study, establishment is synonymous with firm.

Exemplary | An occupational safety and health program "that results in the immediate and long-term prevention of job related injuries and illnesses" (USDOL, 2000).

Intervention | Purposeful actions, such as new programs or initiatives, taken by an outside entity (i.e., OSHA) that intend to change safety and health attitudes and behaviors in a recipient organization, and to ultimately improve health and safety outcomes of interest (NIOSH, 2001).

Medium Business | Defined for this study as an establishment that employs 50-249 workers. Medium business is synonymous with medium-sized or mid-sized business.

System | A set of interconnected parts in context, where the focus is on the whole rather than the individual parts.

Occupational Illness | "An abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to factors associated with employment. It includes acute and chronic illnesses or disease which may be caused by inhalation, absorption, ingestion, or direct contact" (BLS, 2012).

Occupational Injury | "Any injury such as a cut, fracture, sprain, or amputation that results from a work-related event or a single, instantaneous exposure in the work environment" (BLS, 2012).

Performance | "The attainment of organizational goals by using resources in an efficient and effective manner" (Daft, 2016).

Under-recording | "The term used to describe work-related injuries and illnesses meeting OSHA recordkeeping criteria that should have been recorded on the employer's recordkeeping log but were not. Under-recording also includes injuries and illnesses on the log that are incorrectly categorized as less severe than they actually are" (Fagan and Hodgson, 2017).

Under-reporting | "Refers to two separate kinds of actions: employers that report inaccurate numbers and severity of workplace injury and illnesses to BLS and employees that do not report their work-related injury or illness to their employer" (Fagan and Hodgson, 2017).

SUMMARY

The Occupational Safety and Health Act of 1970 intended to create safe and healthy workplaces that curbed the incidence of work-related injury and illness. Nearly fifty years later, medium-sized firms experience higher total recordable case rates of injury and illness than firms of any other size. Because traditional regulatory and voluntary interventions have not lessened disparity, more knowledge was needed about the network or system of extra- and intra-organizational factors that promote safety and health in smaller businesses.

This exemplar case study used appreciative, retrospective inquiry and a systems model – an adapted Burke-Litwin model – to explain how a medium-sized custom plastics manufacturing firm successfully lowered its rate of occupational injury and illness. To conduct this qualitative-dominant mixed methods investigation, data were collected from Critical Incident Reports, interviews, a survey, private and public documents, and field notes. Event and injury timelines were created.

The study yielded data about thirteen a priori constructs – external environment, leadership, mission and strategy, culture, structure, management practices, core processes, work unit climate, individual tasks and skills, performance, organizational change readiness, individual change readiness, and time and one emergent construct – hazards. Of the fifty-two data themes that were uncovered, twenty-seven were most influential to the company's achievement of performance excellence. The case achieved safety and health performance excellence by experiencing recurrent external pressure from regulators and markets and by engaging external entities to improve safety conditions. At the organization level, leaders internalized that pressure, prioritized safety, and empowered safety leaders and managers to create a safety strategy. Through leadership commitment and consistent conduct of core safety processes, a safety culture developed. At the group level, the

SUMMARY (continued)

case defined safety roles, responsibilities, a reporting hierarchy, and a functional arrangement of corporate tasks; planned safety activities; mitigated hazards; monitored program implementation; incentivized safe behavior; and supported safety camaraderie and free expression of concerns. The case activated factors at the individual level, too. They set safety expectations for workers; leveraged personal knowledge, skill, traits, and styles; and monitored safety actions and outcomes. The organization exhibited change readiness by persistently looking for safety improvement opportunities, devoting resources to correcting deficiencies, cyclically refining safety actions, and creating an enticing worker engagement context. From a processual standpoint, as indicated by key events and cyclic safety activity, a dynamic set of serially- and simultaneously-acting factors propelled low rates of occupational injury and illness.

In summary, the case organization achieved low rates of occupational injury and illness by activating a system of extra- and intra-organizational factors .

CHAPTER I

<u>Introduction</u>

This study empirically explores the attainment of low rates of occupational injury and illness in medium-sized businesses. A systems model and an appreciative, retrospective case study design will be used to explain how one medium-sized firm with an exemplary occupational safety and health program achieved desirable performance. To fulfill this purpose, both qualitative and quantitative primary and secondary data will be collected. Knowledge gained from this study will inform the theory and practice of workplace safety and health in businesses employing 50 – 249 workers.

This chapter summarizes the study's relevant context and presents the research problem and questions. To set the stage, medium businesses will be defined and described. Then, to frame the research problem and to expose the knowledge gap, three related issues will be discussed – injury and illness rates, safety activity, and occupational safety and health interventions. The chapter concludes with a summary of the study's leadership and practical implications.

<u>Background and Context</u>

The Occupational Safety and Health Act of 1970 (OSH Act) set the U.S. trajectory for workplace safety and health (Henshaw et al, 2007). Congress justified passage of the OSH Act by acknowledging the economic burden of job-related injury and illness. "The Congress finds that personal injuries and illnesses arising out of work situations impose a substantial burden upon, and are a hindrance to interstate commerce in terms of lost production, wage loss, medical expenses, and disability compensation payments" (USDOL, n.d.).

The purposes of the OSH Act were many. Relevant to this research, the Act encouraged safe work, guaranteed employee protection from recognized hazards, and authorized the creation of regulatory standards (USDOL, n.d.). The Act also established

two agencies – the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH). Both work together to enforce and guide interventions at the federal and state level. With few exceptions, all employers, including medium-sized businesses, are covered by the OSH Act.

A.   Medium Business

In the realm of business, size matters. Nearly all enterprises begin as one-person or few-person entrepreneurial organizations. Some grow larger and others do not, either by intention to preserve intimacy and control or by inability to grow. Medium businesses have grown to their current size.

1.   Definition

In the U.S., medium-sized businesses are an undefined subset of the small business category. Globally, the medium category is defined and commonly refers to employers with 50-249 workers (Kushnir, et al., 2010). This simplified definition excludes key parameters that often characterize differently-sized enterprises, such as revenue, age, and even industrial classification. In research and practice, to facilitate data collection and comparison, it is common to use a definition based on employee number (Massey, 2005). In this study, the term medium or mid-sized will refer to establishments employing 50-249 workers.

2.   Economic Importance

Medium establishments are economically important. Even though companies of this size comprise about 5% of U.S. establishment – roughly 370,000 establishments, these independently-owned, for-profit corporations, partnerships, or sole proprietorships employ nearly thirty percent of the working population – more than 36 million workers – and generate one-third of the private sector Gross Domestic Product (US Census Bureau, 2018.; National Center for the Middle Market,

n.d.). Between 2007 and 2010, during the Great Recession, medium establishments were the only size category that netted jobs (Merritt, n.d.).

3.   Characteristics

Business size and behavior are known to be related. In other words, smaller businesses neither look like nor act like larger businesses (Dandridge, 1979). Compared to larger firms, medium firms tend to be privately, rather than publicly, owned, and they operated with a flatter, less-complex management structure (d'Amboise and Muldowney, 1988; Das and He, 2006). While the medium business owner typically holds central authority, which is common among smaller enterprises, mid-sized firms often hire professionals to manage core business functions, including production, bookkeeping, human resources, and marketing (Legg et al, 2015; Midsize Business Institute, n.d.). Even so, specialized business knowledge remains limited, and as these self-reliant organizations grow, they tend to seek external input from trusted friends, professionals (e.g., accountant), and intermediary organizations (e.g., trade associations, small business development centers) (Midsize Business Institute, n.d.; Hoffmann and Schlosser, 2001; Das and He, 2006; Street and Cameron, 2007).

Despite the benefits of market and organizational growth, medium businesses struggle with staffing shifts, person-job fit, alienation of veteran staff, and fluctuating internal values. Decision-making and communication breakdowns are types of problems that occur when new ideas and changes are proposed (Hrebiniak, 1978; Dandridge, 1979). Serious administrative challenges can arise in medium businesses when these phenomena are combined with slim financial capital (Wiklund and Shepherd, 2009; Harris, 2004).

Developmental challenges like these may impact occupational safety and health (OSH). Smaller firms lack time, money and OSH expertise (Hasle and Limborg, 2006). Owners and managers, who are generally unaware of safety and health requirements, tend to underestimate safety

and health risks, and they tend to overestimate their own hazard and control knowledge (Olsen et al., 2010; Hasle et al, 2012). Business leaders tend to blame accidents on employee failure or bad luck, rather than consider incidents preventable (Hasle et al., 2009; Kvorning et al, 2015). To compound matters, smaller firms, who typically seek only trusted sources of extra-organizational support, are reluctant to contact regulatory (i.e., OSHA) and non-regulatory agencies for assistance. These factors are thought to perpetuate occupational safety and health challenges in the average smaller business (Legg et al., 2014).

B.   Rates of Injury and Illness

Across the globe, smaller organizations experience higher rates of occupational injury, illness, and disability than their larger counterparts (Fabiano et al., 2004; Morse et al., 2004; Sorenson et al., 2007; Page, 2009). Specific injury and illness statistics, such as the Total Recordable Case (TRC) incidence rate; Days Away, Restricted, or Transferred (DART) rate; and fatality rate, are classic indicators of workplace health and safety performance.

In the U.S., the OSH Act instructs most employers, including medium businesses, to document certain types of job-related incidents. Each year, through the Survey of Occupational Injuries and Illnesses (SOII), the Bureau of Labor Statistics (BLS) solicits and publishes accident data from a sample of roughly 175,000 businesses (BLS, n.d.). For at least two decades, private medium-sized workplaces have consistently reported higher TRC rates of non-fatal injury and illness than workplaces of any other size (BLS, 2017). And, despite the declining trend of TRC rates among all business size classes, a unique rate differential persists for mid-sized firms (Figure 1). Two explanations have generally been offered for workplace health disparity – data reporting problems and insufficient safety activity. Because both explanations are central to this research argument, both will be discussed. Reporting problems are disclosed in the next paragraph, and in the next section, safety activity is examined.

4

Figure 1: National Total Recordable Nonfatal Occupational Injury and Illnesses Incidence Rates by Employment Size, Private Industry. Adapted from Bureau of Labor Statistics, Industry and Illness Data.
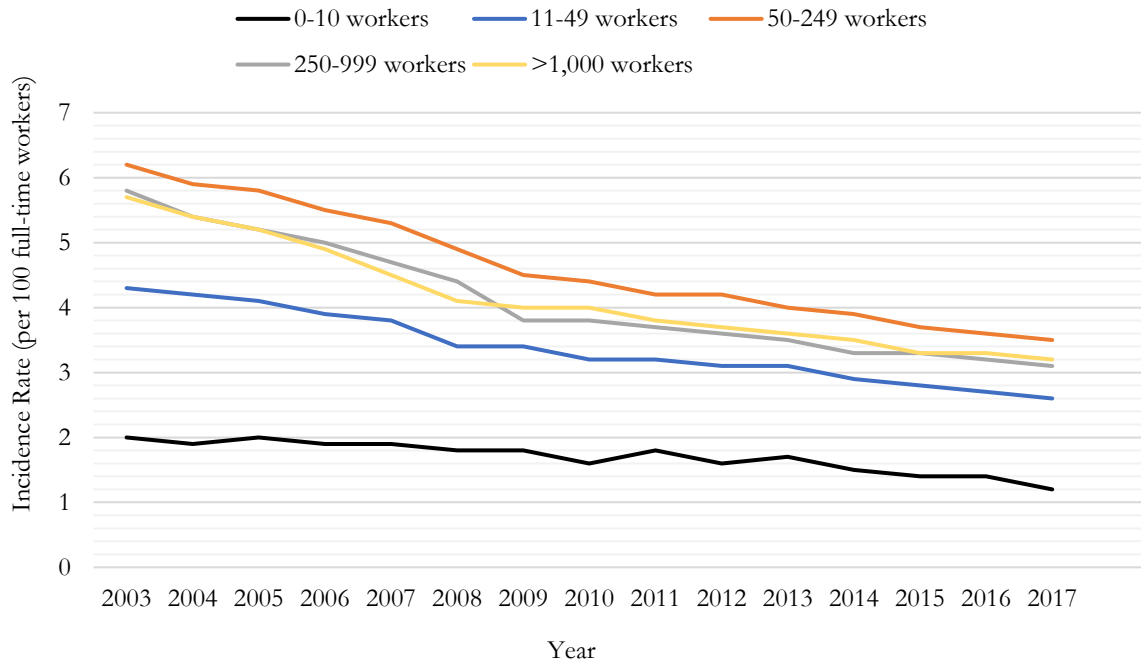
1. Under-Recording and Under-Reporting

Regarding data quality, safety and health professionals have vigorously debated the accuracy of occupational injury and illness counts in firms of all sizes. While the smallest firms are least likely to document OSHA-recordable incidents, erroneous recordkeeping is evident among all small and mid-sized firms (Ruser, 2008; Boyer and Zaidman, 2014; Cummings, 2014; Wiatrowski, 2014). SOII guidelines, too, which may confuse smaller employers, may prompt either inadvertent or intentional omission of information or submittal of worker's compensation data instead of OSHA-recordable

data (Rappin et al., 2016). Studies conclude that TRC rates may be under-recorded and under-reported by as much as 70% (Ruser, 2008), although estimates from 3% to 50% are more commonly cited (Oleinick et al., 1995; Rosenman et al., 2006; Wiatrowski, 2014). This suggests that medium firms may also experience different or even higher rates of occupational injury and illness. Fagan and Hodgson (2017), though, found that most undercounting occurred in a small fraction – less than 7% – of high-hazard industries, including meat and poultry processing, nursing homes, iron foundries, iron forging, battery manufacturing, and dairy farming. Unfortunately, in their study, error data was not stratified by business size.

Because Bureau of Labor Statistics data are heavily relied upon by insurers, researchers, policy-makers, and employers, "the consequences of inaccurate occupational injury and illness data are far-reaching" (Fagan and Hodgson, 2017). Even though data inaccuracies significantly challenge the integrity of SOII-derived injury and illness rates, the errors are likely systematic and constant over time. The data on which this research argument rests are drawn from BLS. Therefore, in the absence of strong evidence to the contrary, this study presumes that BLS data accurately reflect actual TRC rates in firms of all sizes.

C.   Safety Activity

Safety inactivity may also underlie the disproportionate rate of injury in medium firms (Boyer and Zaidman, 2014). Safety activity refers to employers' daily, purposeful use of policies, procedures, and equipment to lessen workplace hazards and risks (Stave et al., 2007; Sims, 2008). Almost all employers are required to follow minimum safety activities specified in OSHA standards; however, not all employers do.

Research shows that some safety activities more effectively reduce adverse incidents. These include the use of personal protective equipment, installation of machine guards, formation of safety committees, implementation of prevention campaigns and safety training, investigation of accidents,

analysis of worksite hazards, and involvement of employees and top management in safety initiatives (Chew, 1988; Saari, 1990; Shannon et al., 1997; Sims, 2008; Sinclair and Cunningham, 2014). To optimize the effectiveness of any safety activity, employers must adapt activities to their work environments (Chew, 1988).

Even though safety-active businesses experience fewer job-related injuries and fatalities (Shannon et al., 1997; Mearns et al, 2003; Sims, 2008), smaller firms are known to perform fewer and lower-quality safety actions than larger firms (Dennis, 2002; Champoux and Brun, 2003; de Kok, 2005; Gray and Mendeloff, 2005; Lentz and Wenzl, 2006; Sorenson et al, 2007; Sims, 2008). In fact, firm size is one of the strongest predictors of safety activity (Sims 2008; Sinclair and Cunningham, 2014).

At least twenty-seven barriers to safety activity have been cited in published literature (Masi and Cagno, 2015). These barriers, which span the internal organization and extend beyond organizational boundaries, include uniformly-applied safety laws that do not consider differences in firm size (Champoux and Brun, 2015); insufficient regulatory inspection (Silverstein, 2008); lack of external technical and regulatory support (Masi and Cagno, 2015); low revenue margin and lack of resources, which preempt safety investment (Orser et al., 2000; Targoutzidis et al. 2014); limited awareness of hazards and controls (MacEachen, 2010; Olsen and Hasle, 2015); language barriers and low literacy (Barbeau et al., 2004); prioritization of production over safety (Barbeau et al, 2004; Ozmec et al, 2014; Ipsen et al. 2015); lack of market benefit for safety (MacEachen et al., 2010); and use of older, less-safe production equipment (Leviton and Sheehy, 1996). Because these barriers tend to align with the characteristics of smaller businesses, insufficient safety activity is thought to be a function of smaller size (Legg et al., 2015).

The problems with safety activity in small and medium firms, prompts questions about the effectiveness of occupational safety and health interventions. This is discussed next.

D.   Occupational Safety and Health Interventions

Broadly defined, interventions are policies, programs, or other actions that specifically intend to change behavior and improve outcomes (Rychetnik et al., 2002). In that vein, OSH interventions are customarily issued by external entities (e.g., OSHA, professional associations), and they intend to prompt employer safety activity and reduce accidents and injuries (NIOSH, 2001). To appreciate the role of OSH interventions in this research problem, one must understand the tradition of intervention and its effectiveness in smaller businesses.

1.   Approaches to Intervention

In the U.S., two approaches to safety and health intervention predominate – the regulatory approach and the voluntary approach. The former control-oriented approach uses rules to enforce desired behaviors and punishment to increase compliance (Barling and Hutchinson, 2000). The latter approach, which few enterprises willingly undertake, extends beyond regulation to best practice.

Regarding the former, since the passage of the OSH Act in 1970, regulation has primarily driven safety effort for employers of all sizes (Barling and Hutchinson, 2000; Henshaw et al., 2007; Legg et al., 2015). Legislative standards set the low bar for health and safety. Nearly all OSHA standards are technical and hazard-specific; they detail the actions that employers must take to identify and to control specified risks (Bartel and Thomas, 1985). In the mid-1990s, NIOSH reinforced the value of technical interventions by noting that disease and injury were prevented "… through a combination of control technologies, exposure guidelines and regulations, worker participation programs, and training" (NIOSH, 1996). Even though businesses are solely responsible for compliance, a non-enforcement arm of OSHA offers nation-wide, no-cost informational and consultative assistance.

Voluntary interventions are intended to supplement regulation. Issued by professional associations (e.g., Compressed Gas Association, National Fire Protection Association) and other non-governmental agencies (e.g., American National Standards Institute), voluntary guidelines either address unregulated risks or address regulated risks in a more comprehensive fashion. The content of best-practice standards, like that of legislative standards, is typically hazard-specific and technically-oriented. While adoption of voluntary interventions is optional, employers who transcend regulation may reap benefits, including a more robust safety program, improved work processes, social recognition, and for certain cooperative interventions, temporary exemption from programmed OSHA inspection (OSHA, 2012; Targoutzidis et al., 2014; Tompa et al., 2016).

Safety management systems (SMS) are a newer, unique type of voluntary intervention that are neither technical nor hazard-specific. Rather, SMS prescribe systematic ways to manage and conduct safety programs, such as securing organizational commitment to safety, involving employees, performing hazard assessment, and auditing the safety program. Of the few national and international SMS, most are proprietary products that are sold to employers and monitored by non-regulatory auditors. Even though there are slight differences in the content of each safety management systems, all are similarly grounded in principles of management and continuous quality improvement. As such, they use perpetual goal-setting, implementing, controlling, and evaluating to lessen safety and health risks (Redinger, 2007). However, despite the term *systems*, safety management systems are more systematic than systems-like. In other words, SMS promote cyclical functioning, rather than a true orientation toward the larger, even undiscovered, network of factors that might drive or inhibit safety processes and outcomes. Though useful for short-term, incremental change, systematic activity requires significant periods of time to yield big change (Bititci, 2015). During this time, organizations may revert back to former habits (Bititci, 2015).

Systematic improvement, then, is not a tool for significant organizational change (Burke, 1993, 1995).

One SMS-based intervention, OSHA's Safety and Health Achievement Recognition Program (SHARP), targets businesses with fewer than 250 workers. OSHA's On-Site Consultation Program, which is not an enforcement arm of OSHA, can bestow the SHARP designation upon smaller firms from any industrial sector, who 1) request voluntary consultation, 2) correct recognized hazards, 3) implement an SMS, such as OSHA's Safety and Health Program Management Guidelines, 4) maintain injury and illness rates below industry-specific national averages, and 5) inform OSHA of new or changed hazards and working conditions (OSHA, n.d. c). Each business, though, meets these criteria in an independent manner. Employers, who maintain SHARP eligibility and submit interim self-evaluations, may be certified up to three years. SHARP organizations are considered exemplary, because their safety and health program "results in the immediate and long-term prevention of job related injuries and illnesses" (USDOL, 2000). Currently, about 1,500 sites nation-wide are among this elite group of small businesses (OSHA, n.d.(b)). While little is known about businesses' motivations for pursuing SHARP, even less is known about the thousands of smaller businesses that do not participate. Some authors conclude that safety management systems, on which the SHARP program is based, are too complex for smaller firms, who have limited financial and knowledge resources (Walker and Tait, 2004).

2.   Effectiveness of Interventions

Even though regulatory and most voluntary interventions have existed for decades, their effectiveness is controversial. For small and medium businesses, there is consensus that traditional approaches are ineffective (Legg et al., 2015). To be effective, an intervention must prevent or lessen adverse outcomes, like injuries, illnesses and fatalities, under real workplace conditions (Goldenhar, LaMontagne, Katz et al, 2001). Ironically, most regulatory and voluntary interventions

are not underpinned by effectiveness data. Rather, as good practices, they are believed to work.

Consequently, even excellent adherence to customary OSH interventions may induce only partial

worker protection (Bartel and Thomas, 1985).

While regulatory intervention may improve safety knowledge and behavior, it has not been

shown to consistently lessen accident and injury rates (Haviland et al., 2010). Cox et al. (2008), in

their study of "what works," concluded that legislative activity and education heightened employers'

awareness of hazards. Inspection and penalty, too, appeared to motivate hazard detection and

correction (Gray and Scholz, 1993; Weil, 2001; Baggs et al, 2003; Gray and Mendeloff, 2005;

Mischke et al., 2013). However, compliance-related action was short-lived among all except the

most willing employers (Cox et al, 2008). In the long-term, command-and-control interventions

have neither sustained safe behavior nor reduced injuries (Gray and Mendeloff, 2005; Cox et al.,

2008; Mischke et al., 2013). In fact, the declining trend in TRC rates (Figure 1) has been more often

attributed to recordkeeping changes (Friedman and Forst, 2007) and accident undercounting

(Oleinick and Zaidman, 2010; Wuellner, et al., 2016) than successful regulatory intervention.

The tenuous relationship between regulation and incidence rates has led critics to question

legislative value. Safety and health standards have been declared inflexible, technically-biased,

limited in scope, punitively threatening, and even "unreasonable" when employers, for example, are

"cited because water at an eyewash station was too cold, an extension cord was kept in the wrong

place and no yellow line existed 10 feet from the edge of a flat roof" (Cordaro, 2015). OSHA's one-

size-fits-all standards place the same compliance burden on smaller businesses as on multinational

businesses, despite their vastly different resources. Beyond this, regulation does not cover some

well-documented risks, such as ergonomics and workplace violence (Silverstein, 2008).

Enforcement, too, has been declared a "game of regulatory cat and mouse" (Ayres and Braithwaite,

1992). In the U.S., OSHA inspection is rare -- only 1% of workplaces are inspected each year

(Silverstein, 2008). For the average business, this equates to one audit every 140 years (Cordaro, 2015). Knowing these shortcomings, "firms will elect to violate OSHA standards whenever such non-compliance is profit-maximizing" (Bartel and Thomas, 1985).

Effectiveness is equivocal for voluntary interventions, too, especially safety management systems, which have been increasingly promoted over the past two decades. Even though positive safety and health changes have occurred in some businesses that implement SMS, the small quantity and low quality of published studies preempts a recommendation for their use (Robson et al., 2007). A recent study of mostly mid-sized Spanish firms, which examined the relationship between the Occupational Health and Safety Assessment Series (OHSAS) 18001 SMS and rates of fatal and non-fatal accidents, showed a dubious relationship between SMS implementation and accident rates. Authors concluded that the results suggest a "lack of internalization of OHSAS 18001" and that SMS use may be "mostly symbolic rather than substantial" (Heras-Saizarbitoria et al., 2019).

In smaller firms, SMS are rarely implemented, and when implemented, their quality is low (Sorenson et al, 2007; Arocena and Nunez, 2010). Beyond that, as discussed earlier, systematic safety and health activity does not necessarily improve outcomes (Arocena and Nunez, 2010; Jensen et al., 2001). OSHA's Safety and Health Achievement Recognition Program, which centers on the implementation of a SMS, has been said to lack "national impact" (OSHA's, 2003; US GAO, 2004). This criticism from the General Accounting Office and the Labor Department's Office of Inspector General stems from low employer participation, inconsistent implementation and accountability, and insufficient evidence of injury and illness reduction.

E.   Narrow Perspective of Performance

In the U.S., according to BLS injury and illness statistics, the average medium business experiences persistent workplace health inequity. The lion's share of literature attributes disparity to the constraining characteristics of smaller businesses and to ineffective interventions. Very little

attention, though, has been paid to the broader network of factors that might influence injury and illness performance.

Historically, workplace safety and health has been considered a "technical and medical phenomenon which can be improved by better engineering and …monitoring of worksites" (Shannon et al., 1997). However, "most accidents are in fact caused by complex epidemiological interactions of labor, equipment, and the workplace environment," and because technical standards "address only part of the problem, these standards can have at best minimal effect" (Bartel and Thomas, 1985). There is a need, then, to look beyond technical strategies to other factors. Whysall et al. (2006), for example, who studied the implementation of ergonomic interventions in mostly medium-sized firms, discovered that "softer" aspects, such as changing worker behavior, gaining managerial support, and promoting a proactive health and safety attitude, were valuable, but often neglected. A more recent study showed the performance relevance of 27 intra- and extra-organizational factors ranging from regulatory support and intermediary partnerships to safety prioritization, communication and staff skill (Masi and Cagno, 2015). These studies of safety and health performance have spanned a period of thirty years. Collectively, they highlight the multifactorial or "wicked" nature of injury and illness performance (Rittel and Weber, 1973). Wicked problems, like the problem of workplace safety and health disparity, are difficult to describe and ambiguous to solve.

The intractable nature of injury and illness inequity in mid-sized firms reveals the need for systems thinking (Rittel and Weber, 1973). Systems thinking is "fundamentally different from that of traditional forms of analysis" (Aronson, 1998). Instead of deductively dissecting the issue, controlling the environment, and examining individual pieces, which is a common problem-solving technique in the field of occupational safety and health, systems thinking focuses on the whole – the system, the parts of the system, and the interactions that create the behavior or outcome of interest

(Aronson, 1998). A systems view is important, because parts of a system may appear different when examined individually than when examined together. In addition, because different system components may serve as short, medium and long-term drivers of performance, the temporal arrangement of components may be invisible in the absence of a systems perspective (Bititci, 2015).

Regarding smaller enterprises, "practitioners do not really have a complete and systematic view of the relevant factors that characterize safety." Needed is "a comprehensive picture embracing all the factors related to the safety performance" (Cagno et al, 2014). The historically narrow perspective of injury and illness causation, and the traditionally piecemeal examination of performance reflect the lack of systems thinking. This is the fundamental problem underlying this research.

Statement of Problem

Nearly one-third of U.S. workers are employed by medium-sized businesses. These establishments, on average, perform less and lower-quality safety activity than larger firms, and they experience the highest total recordable case rates of job-related injury and illness. For more than a decade, neither regulatory nor voluntary interventions have lessened workplace health disparity in firms with 50-249 employees. Traditional approaches to intervention have failed to consider the network of extra- and intra-organizational factors that may collectively shape safety and health performance. To lessen disparity in medium firms, more must be known, from a systems perspective, about the factors that promote and sustain low rates of job-related injury and illness.

Purpose of the Study and Research Questions

Despite long-standing workplace safety and health inequity in the average medium business, some businesses perform well. The purpose of this single exemplar case study is to explain, using a systems model, how one medium-sized firm created an exemplary occupational safety and health

program that lowered their total recordable case rate of occupational injury and illness. The

following primary and secondary research questions were addressed:

- Primary 1: How do medium-sized businesses with exemplary occupational safety and

  health performance achieve low rates of occupational injury and illness?

  - Secondary 2: What extra-organizational factors are perceived to play a role?

  - Secondary 3: What organization-level factors are perceived to play a role?

  - Secondary 4: What group-level factors are perceived to play a role?

  - Secondary 5: What individual-level factors are perceived to play a role?

  - Secondary 6: What is the role of change readiness?

  - Secondary 7: What is the processual relationship among these factors?

Leadership Implications and Practice Relevance

A.   Leadership Implications

The leadership issues central to this investigation are problem diagnosis and systems

thinking. In smaller businesses, even though the problems of health disparity and ineffective

intervention are well-recognized (Legg et al., 2015), the root causes of these problems are not. Well-

intentioned safety and health professionals continue to promote best safety practices and search for

new, impactful solutions, like SMS, rather than study the problem more deeply. Their current

interest, for example, regards the transformative potential of intermediary organizations (Olsen and

Hasle, 2015; Cunningham and Sinclair, 2015). However, the tendency to intervene often precludes a

thorough understanding of the underlying problem. Heifetz et al. (2009) advise "resist[ing] the

pressure to do something," and instead "…spend[ing] more time diagnosing the problem." Without

a deeper understanding of the factors associated with the problem(s), interventions are likely to be

exercises in luck, rather than effective solutions. In other words, if the non-technical or adaptive

aspects of safety and health disparity and intervention ineffectiveness remain elusive, even new policies and programs will fail, and the cycle of failure will persist (Heifetz et al., 2009).

To diagnose root causes in a real-world setting, systems thinking is useful. Up to 70% of major interventions fail, in part, because systems thinking is not employed (Kotter, 1995). In contrast with reductionism, which simplifies complexity, the systems view preserves interdependence through wholeness and relationships (e.g., national, local, organizational, interpersonal, personal) and by looking for distant, small, and less obvious drivers of problems (Aronson, 1998). In fact, the systems perspective excels in the face of messy situations or "wicked problems" (Williams and Hummelbrunner, 2009), which are common in the field of public health (Rittel and Webber, 1973; Trochim et al., 2006).

For decades, OSH researchers have tried to uncover the correlates of safety performance, which is a systems task, by either employing no theory or by employing closed theories and models, such as the Diffusion of Innovations model and Social Exchange Theory (Cunningham and Sinclair, 2015), Motivation Theory (Kvorning et al., 2015), Programme Theory (Olsen and Hasle, 2015), Realist Evaluation Theory (Olsen and Hasle, 2015; Limborg et al, 2014), Stages of Change model (Haslam, 2002; Barrett et al., 2005), Stakeholder Theory (Gadenne et al., 2009), Social Capital Theory (Limborg et al., 2014), Theory of Planned Behavior (Brosseau and Li, 2005; Ramalho et al., 2015), and safety management theories (Nielsen et al., 2015). While much has been learned through previous studies, leaders must continually look for novel ways to see and solve old problems. The application of open systems thinking to workplace health disparity in medium businesses is indeed novel.

B.   Practice Relevance

The findings from this investigation will serve theoretical and practical purposes. Small business researchers have called for the study of "a greater range of variables" that are "grounded in

a theory of organizational OSH behavior" (Sinclair and Cunningham, 2014). This study's conceptual framework, which integrates theories of open systems and organizational performance and change, fulfills that need. Specifically, the framework proposes relationships between rarely-studied intra- and extra-organizational factors and injury and illness outcomes. Even though this research will not determine causality, the combined use of retrospective inquiry and event and outcome timelines permits a degree of processual understanding. Future research can build on this conceptual perspective.

Practically, this research will meet several occupational and public health needs. First and foremost, the study will explore an applied or real-world safety and health problem. In medium businesses, there is, perhaps, no better example of a practical problem than decades-long injury and illness inequity. This applied study will complement the volume of technical research that dominates the field of occupational health and safety. Despite the great value of basic science, deductive experimentation cannot unravel complex social phenomena and cannot induce systemic change (Heifetz et al., 2009). The conceptual framework and data collection methods in this study were selected for their ability to tease out the adaptive factors that may influence workplace health in medium firms.

This study will also demonstrate the application of systems thinking to the field of occupational safety and health – a field in which reductionism is common. By defining the business system and examining the role of OSH throughout the system, practitioners might appreciate the theory-informing potential of this research perspective. Further, this study will distinguish systems thinking from systematic safety management, which is a distinction that may not be recognized in the field of occupational safety and health.

Evidence from this study will inform safety and health policy, too. NIOSH acknowledges that size-related workplace health disparity is an "emerging concern" (NIOSH, 2013). In their

National Occupational Research Agenda, NIOSH set a strategic goal to "reduce injuries and illnesses in smaller businesses by better-understanding…the work environment" (NIOSH, 2015a). The results of this research may uncover new avenues for intervention and extend the international conversation about disparity in smaller business – a conversation involving few U.S. contributors.

Finally, this study aligns with the federal public health mission to explore the conditions under which working people can be healthy (IOM, 1988). Even though "OSHA is not commonly considered a public health entity," (McDiarmid, 2000), OSHA's regulatory and voluntary programs are the predominant means for implementing the core public health functions of assessment, policy development, and assurance to the working population. Workers are indeed members of the public health community. Further, because work-related health and personal health are linked, this study indirectly enhances the health of families and communities (NIOSH, 2016).

CHAPTER II

<u>Introduction</u>

The purpose of this case study is to explain, from a systems perspective, how medium-sized U.S. businesses with exemplary safety and health programs achieved low rates of occupational injury and illness. To that end, chapter 2 will present literature related to the problem under investigation. Thereafter, following the description of three foundational theories of change, the research conceptual framework, constructs, and construct-related literature will be detailed.

<u>Review of Related Literature</u>

A.   Introduction

Much of what is known about occupational safety and health is based on larger organizations, who have resource-rich ability to implement safety and health standards and influence public policy (Targoutzidis et al., 2014; Legg et al, 2015). Over the past two decades, concerns about size-related health disparity have spurred the study of smaller firms, especially those with fewer than 50 workers. While medium establishments are frequently co-examined, medium entities rarely receive independent attention. Consequently, this review will draw from studies of mid-sized firms and from studies of small and medium enterprises (SMEs). In this discussion, the term *smaller* will refer to the SME category.

B.   Factors Associated with Health Disparity

As discussed in chapter 1, this research is grounded in the long-standing problem of workplace health disparity or inequity in medium-sized businesses. Health disparity, as defined by public health professionals, is "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage… [which] adversely affect[s] groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability;

sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion" (USDHHS, 2010). Although this definition does not state that place of employment is a disparity factor, the definition jibes with one description of workplace health disparity, which is "incomplete penetration of occupational health and safety interventions to certain worker populations due to barriers created by social, cultural and economic issues" (Stanbury and Rosenman, 2013).

In this study, a relevant theory of change emerges by considering two opposing correlates of injury and illness performance in smaller firms – the barriers and the facilitators of performance.

1.   Barriers to Performance

Numerous barriers to safety activity and occupational injury prevention are described in literature. Recall that safety activities are deliberate actions, methods, or equipment used by employers and employees to lessen job-related hazards and risks (Stave et al., 2007; Sims, 2008). Recall, too, that safety-active businesses experience fewer job-related injuries and fatalities (Shannon et al., 1997; Mearns et al, 2003). Unfortunately, the average smaller firm engages in fewer and lower-quality safety activities than larger firms (Barbeau et al., 2004; Champoux and Brun, 2003; Dennis, 2002; Sims, 2008). Barriers, which reside both outside and inside organizations, make it difficult for firms to create and maintain a safe and healthy workplace (Cagno et al., 2011; Hasle et al., 2012; Micheli and Cagno, 2010; Legg et al, 2015).

a.   Extra-organizational Barriers

To date, few external barriers have been named in literature. Two commonly cited barriers are regulation and lack of technical assistance. In the U.S., OSHA's one-size-fits-all approach to regulation is considered too rigid for smaller firms, who lack the resources to meet detailed requirements (Champoux and Brun, 2015). Insufficient inspection is also blamed for ineffective safety activity (Sinclair and Cunningham, 2014). The average U.S. business is inspected only once

every 140 years, given OSHA's low manpower and the vast number of enterprises to regulate (Palisano, 1987; Lewis, 2015). In smaller firms, oversight is further complicated by life-cycle fluctuations. Within any given year, many smaller businesses start and fail; these shifts are difficult for OSHA to track (Cunningham and Burnett, 2014). Consequently, "OSHA has become essentially irrelevant to most employers … infrequent OSHA inspections and small OSHA penalties provide little incentive for employers to pay attention to and comply with the agency's rules" (Silverstein, 2008).

Lack of external technical support and resources are also defined barriers (Masi and Cagno, 2015). By nature, smaller firms tend to be self-reliant and prefer to interact with trusted personal contacts (Mayhew, 1997; Hasle et al, 2012; Olsen et al, 2010). Even though OSH information and guidance are freely available – through OSHA in the U.S. - smaller businesses fail to access or use the information (Caple, Hodgson, and Grieg, 1997; Limborg and Hasle, 1997). Smaller firms are reportedly suspicious of regulatory agencies, like OSHA, which they associate with inspection and citation a (Mayhew, 1997; Legg et al, 2015).

In smaller organizations, market and customer factors often drive business behavior (Nerone, 1997; McAuley et al, 2007). However, for workplace safety, there is virtually no published mention of the commercial benefit to a safe workplace (Pratt, 2004; MacEachen et al., 2010).

b.   Intra-organizational Barriers

A host of intra-organizational barriers to occupational safety and health performance have been identified. Most examined are resource challenges, including insufficient safety knowledge, money, and modern technology (Micheli and Cagno, 2010; Beaver, 2003). Regarding the former, safety and health knowledge are reportedly lacking on numerous fronts. The average smaller business owner-operator is neither aware of safety regulations nor hazards (Hasle and Limborg, 2006; Champoux and Brun, 2003; Olsen and Hasle, 2015; MacEachen et al., 2010). Their poor

understanding of good safety practices and their difficulty planning OSH activities impedes safety activity (Masi and Cagno, 2015; Legg et al, 2015). Beyond this, the average smaller owner fails to understand the financial and non-financial costs of omitting a safety program; these consequences include worker's compensation expenses, lost productivity, poor morale, and damage to equipment (Mayhew, 1997). In addition to limited knowledge, the average smaller firm has limited financial capital, and because they are concerned about expenses, including the cost of achieving compliance, firms find it difficult to comply with safety regulations (Taylor, 1992; Sorenson et al. 2007). Even though medium firms generally have more slush capital than their smaller counterparts, their low revenue margin preempts the hire of safety and health consultants and global investment in safety programs (Pratt, 2004; Brosseau, Fredrickson, and Casey, 2007; Champoux and Brun, 2015; Legg et al, 2015). Also, due to financial barriers, smaller firms tend to use older, less-safe production equipment (Leviton et al., 1996, Ipsen et al., 2015). Modern technology typically incorporates safety controls like machine guards, ventilation systems, and noise dampening devices.

The attitudes and personalities of smaller business owners-managers have also been cited as barriers (Hasle et al., 2012; Champoux and Brun, 2015). By nature, entrepreneurs accept higher levels of business risk, and therefore may accept higher levels of safety risk (Nerone, 1997). In addition, given the high risk of failure in smaller firms, owners' managers primarily focus on business operations, such as products, customers, profits and sustainability (Longnecker et al., 1994; MacEachen et al., 2010). Mayhew (1997) found that "core business and economic pressures so dominate behavior that little attention is paid to an area which is seen as marginal. It is very difficult to convince small firm managers of the longer-term investment arguments for expenditure on health and safety (in part because the arguments are not as compelling as for larger companies) and therefore they are reluctant to pay for services in the area." As such, prioritization of daily business operations and lack of time inhibit safety (Ipsen et al, 2015; Ozmec et al., 2014).

Even the types of employees in medium firms are barriers to OSH. Smaller businesses tend to employ family members, friends, and neighbors (Eakin and MacEachen, 1998; García Pérez de Lema and Duréndez, 2006). Employees' desire to maintain positive relationships may influence their acceptance of riskier conditions (Lansdown et al, 2007). In general, employees in smaller firms tend to receive the lowest salaries and the fewest benefits, and they tolerate some of the worst working conditions (Dorman, 2000; Graham et al., 1990; and Kallegerg et al., 2000). The lack of unionization, too, which is common in smaller firms, curtails the ability of workers to join in defending their safety and health rights (Walters and Haines, 1988; Lamm and Walters, 2004).

To date, Masi and Cagno (2015) have compiled the most comprehensive list of OSH barriers in SMEs. Through their analysis of multi-sector literature spanning two decades, they described twenty-seven barriers. Many of these barriers have been discussed in this chapter. To categorize these barriers from most to least impactful, Masi and Cagno (2015) fit the barriers into published model of safety control, which contained six levels –government, regulators and associations, company, management, staff, and work and technological levels. Using this model, Masi and Cagno (2015) hypothesized that external barriers were more critical than internal barriers, and for example, that management barriers were more important than work (i.e., organization) barriers. Importantly, authors recognized that barriers to safety activity might neither be independent nor equally-impactful. This review is one of the first to take a holistic view of the barriers to safety performance in smaller organizations.

2.   Facilitators of Safety Performance

Workplace health disparity can also be understood by examining the facilitators of performance. Indeed, some smaller organizations, such as OSHA SHARP companies, have lessened disparity by doing something right. For decades, researchers have sought to identify these correlates of successful safety and health performance. According to Aksorn and Hadikusumo

(2008), "a successful safety program can be measured in terms of no injury to people, no damage to equipment, machines and tools, no damage to environment, no loss of market competition, no damage to company image or brand-name, and increased productivities." Nearly all published studies about facilitators of performance have been conducted in large organizations. Only a handful, five of which are discussed next, have examined the independent correlates of performance in smaller firms.

In their literature review, Shannon, Mayr, and Haines (1997) examined the relationship between intra-organizational factors and injury rates. Their comparative, rather than statistical, examination linked lower injury rates to employee empowerment, delegation of safety activity, and top management involvement.

Italian researchers Cagno Micheli, and Perotti (2011) set out to identify a broad set of safety and health factors associated with safe behavior and injury in small and medium enterprises. They brainstormed and culled independent variables from international literature. Injury frequency was associated with many single variables, including clear task definition, protective equipment usage, training, and company-wide risk analysis; and with several combinations of variables related to audits, management commitment, communication, training, PPE use; work procedures; firm size; firm resources.

Aksorn and Hadikusumo (2008) defined the critical success factors (CSFs) that differentiated injury rates among Thai construction organizations. After cultivating a list of 16 CSFs from interviews, authors ranked the 16 according to their perceived degree of influence (TABLE I). They concluded, non-statistically, that management support was the most crucial factor and that higher performance was associated with the holistic set of CSFs, rather than a few.

TABLE I: PERCEIVED RANKING OF CRITICAL SUCCESS FACTORS FOR LOWER INJURY/ILLNESS IN THAI CONSTRUCTION PROJECTS (ADAPTED FROM AKSORN AND HADIKUSUMO, 2008)

1. Management support	2. Safety education and training
3. Teamwork	4. Clear and realistic goals
5. Enforcement scheme	6. Personal attitude
7. Program evaluation	8. Personal motivation
9. Delegation of authority/responsibility	10. Supervision
11. Safety equipment	12. Positive group norms
13. Sufficient resource allocation	14. Employee participation
15. Good communication	16. Personal competency

Another study examined the association of safety management systems (SMS) and accidents in small (<50 workers) and medium (50-250 workers) Spanish businesses (Arocena and Nunez, 2010). To carry out the study, authors categorized common SMS features into 12 dimensions – preventive planning, monitoring and control, documenting, emergency preparedness, training, information for workers, worker participation, ergonomics/psychosocial risks, health surveillance, team work, and inter-firm cooperation (i.e., outsourcing, subcontracting). Noteworthy, the latter variable is extra-organizational. Arocena and Nunez (2010) found the safest firms to be those that attended to both technical (i.e., hazard control, safety planning, documenting) and people-oriented factors (i.e., training, information, communication). Among mid-sized manufacturing participants, the drivers of SMS implementation were interpersonal climate, rate of unionization, market competition, utilization of public financial and training support, high technology intensity, and the high degree of manual work tasks.

Chew (1988) uniquely studied medium-sized firms. His examination of paired Asian manufacturers in three countries with high and low injury rates involved 12 independent variables. These variables or "components of safety programmes" were hypothesized to differentiate high and low accident firms. Of the 12 intra-organizational variables, Chew (1988) found that line management supervision, top management involvement, safety training, and housekeeping, were either highly-significantly or significantly associated with accident rates. In addition, in all three countries, there was significant concordance between outcome performance and seven variables - line management supervision, top management involvement, safety rules, promotional work, machine guarding, person protective equipment, and housekeeping (Kendall coefficient of concordance=0.843, $p<0.05$).

3.   Summary of Factors Associated with Health Disparity

Studies of barriers and facilitators in small and medium firms have illuminated a host of performance correlates. These correlates were derived in piecemeal fashion through tens of separate inquires. While some studies were driven by explicit theory, including those by Arocena and Nunez (2010) and Chew (1988), other studies were not (i.e., Masi and Cagno, 2015; Cagno et al., 2011; Aksorn and Hadikusumo, 2008). By considering the collective findings from these studies, two messages become apparent. First, occupational safety and health performance in smaller firms has been linked to a list of factors from inside and outside of the organization. Second, many factors, such as regulation, unionization, market competition, and resource allocation, relate to the business function, rather than the safety function. Both messages suggest that effective theories of OSH performance improvement should consider multiple variables, including the external environment and business factors, as well as safety factors. This realization spurred a search for holistic, business-related theories of performance improvement.

Theory of Change

The field of organization development (OD) offered such theories. Organization development is "an area of academic study and professional practice that focuses on making organizations better – that is, more effective and productive..." (Anderson, 2016).

Three related OD theories undergirded this study's conceptual framework – open systems theory, organization performance theory, and change readiness theory. Related to this investigation, each was selected and for specific reasons. First, as discussed in Chapter 1, the "wicked" nature of occupational injury and illness disparity in medium businesses warranted systems thinking (Rittel and Webber, 1973). Open Systems Theory embodies the modern view of systems in organizations. Second, given the multitude of extra- and intra-organizational barriers and facilitators of OSH in smaller firms, researchers have sought theories that addressed the organizational context (Sinclair and Cunningham, 2014; Masi and Cagno, 2015). The elements of some organization performance theories align with identified safety and health barriers and facilitators. Last, because OSH researchers are interested in causal or change-provoking theories of injury and illness outcomes in smaller business (Cunningham et al., 2014), this study proposed the application of change readiness theories. Each theory and its relevance to the conceptual framework will be discussed next.

A.   Open Systems Theory

Open systems theory is the foundation of the study's conceptual framework. To understand Open Systems Theory, one must first understand systems and systems theory. Recall that a system, as discussed in Chapter 1, is a set of interconnected parts that work together to form a complex whole. Systems theory, then, is the study of systems – the study of the whole, the parts, and their interrelationships. Systems theory seeks to understand synergy and interdependence. Practically speaking, a systems perspective widens the lens through which we examine and understand things.

In the field of organization development (OD), organizations are considered to be systems. They are complex assemblies of people and parts working together to achieve a common purpose, specifically the production and sale of goods or services through division of labor (McAuley et al, 2007). Historically, organizations were thought to be *closed* systems, because decision-making was driven by internal goals and events; external interaction was viewed as minimal and select (McAuley et al, 2007). In 1966, however, *open* systems theory was applied to organizations (Katz and Khan, 1966). This theory, coined by biologist Van Bertalanffy in 1950, postulates that organizations, like organisms, are composed of individual parts with specific and inter-related functions and are open to influence by the external environment. Modern OD theorists believe that "most [organization] systems are 'open' in the sense that they exist within an external environment to which they adapt and change" (McAuley et al, 2007). Adaptation to external and internal perturbations preserves the integrity and equilibrium of the system or organization (McAuley et al, 2007). As open systems, businesses interact with the external environment to perpetually transform labor and material input into goods and services output (Figure 2).

Figure 2: Traditional Business System Model
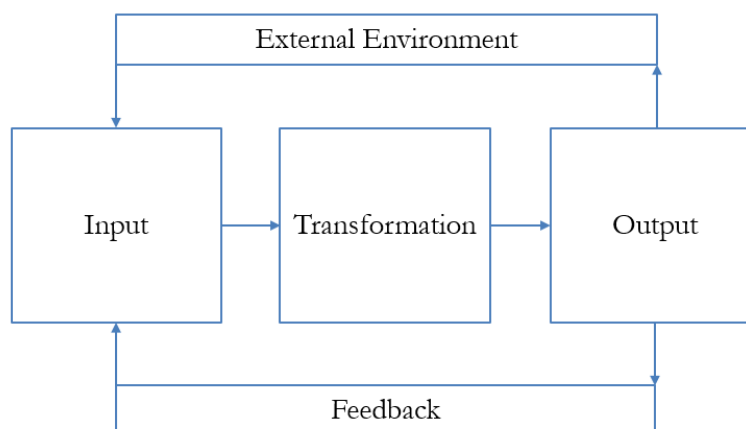
B.   Organization Performance Theories

Theories of organization performance and change flesh out open systems theory. Regardless of size, all organizations are believed to share basic operating principles and functions, such as structured decision-making, division of labor, policies, and rules. Organization theorists believe that these principles and functions are linked in ways that perpetuate the cycle of input, transformation, and output. This process literally involves the achievement of performance through change. Performance refers to the organization's output, which occurs as a consequence of planned input. Change in an organization is "defined as a difference in form, quality, or state over time in an organizational entity" (Van de Ven and Poole, 1995). Change has been viewed as either an incremental growth-like process – the result of regulatory, conflictive or competitive forces – or a leap or shift (Van de Ven and Sun, 2011) that turns "the organization in another direction, to fundamentally modify the "way we do things" (Burke, 2008). Shifts in change often stem from a new vision, organization restructuring, and new decision-making and accountability (Burke, 2008). Incremental change is said to influence incremental performance, and shifts in change lead to shifts in performance.

OD practitioners use models of organization performance to diagnose performance problems and to guide change efforts. Open systems models are particularly useful for this purpose (McAuley et al, 2007; Martins and Coetzee, 2009). Among the open systems models of performance and change is the regarded Burke-Litwin model, which defines and causally links 12 "critical" elements (Burke and Litwin, 1992). Even though these elements are common to organizations of all sizes, Burke and Litwin (1992) theorize that all 12 are not equally influential; they are divided among three hierarchical levels – total system, group, and individual levels. Most influential is the

organization level, where the fundamental principles and paradigms of the organization are defined (Burke and Litwin, 1992; Sullivan et al., 2013; Scherer et al., 2009). Four elements, specifically the external environment, mission and strategy, leadership, and organizational culture, drive the entire organization and foster major, sustainable change. At the group or work unit level are operational functions, which ensure the ongoing nature of business. Residing at this level are the elements of structure, management practices, core processes, and work unit climate. The third or individual level regards the people in the organization, specifically individuals' work tasks, skills, motivations, values and needs. Burke and Litwin (1992) theorize that change shifts are triggered by actions at the total systems or organization. Change at the group and individual levels can fine-tune, but not shift, the organization. The last element, individual and organizational performance, results from the synchronous function and collective convergence of all other elements (Burke and Litwin, 1992). Because elemental deficiencies are the source of performance problems, correcting deficiencies "promote[s] change within that component and subsequently create[s] positive linkages to other components within the organization" (Boone, 2012). Figure 3 illustrates the elements and relationships in the Burke-Litwin model.

Practitioners and researchers have affirmed the integrity of the Burke-Litwin causal model of performance and change (Roodt et al., 2003; Martins and Coetzee, 2009; Spangenberg and Theron, 2013). The model's "contribution to the outcomes of the organizational diagnostic process in cross-cultural research settings is considered significant" (Spangenberg and Theron, 2013).

Figure 3: Burke-Litwin Model of Organization Performance and Change. Adapted from Burke and Litwin, 1992.
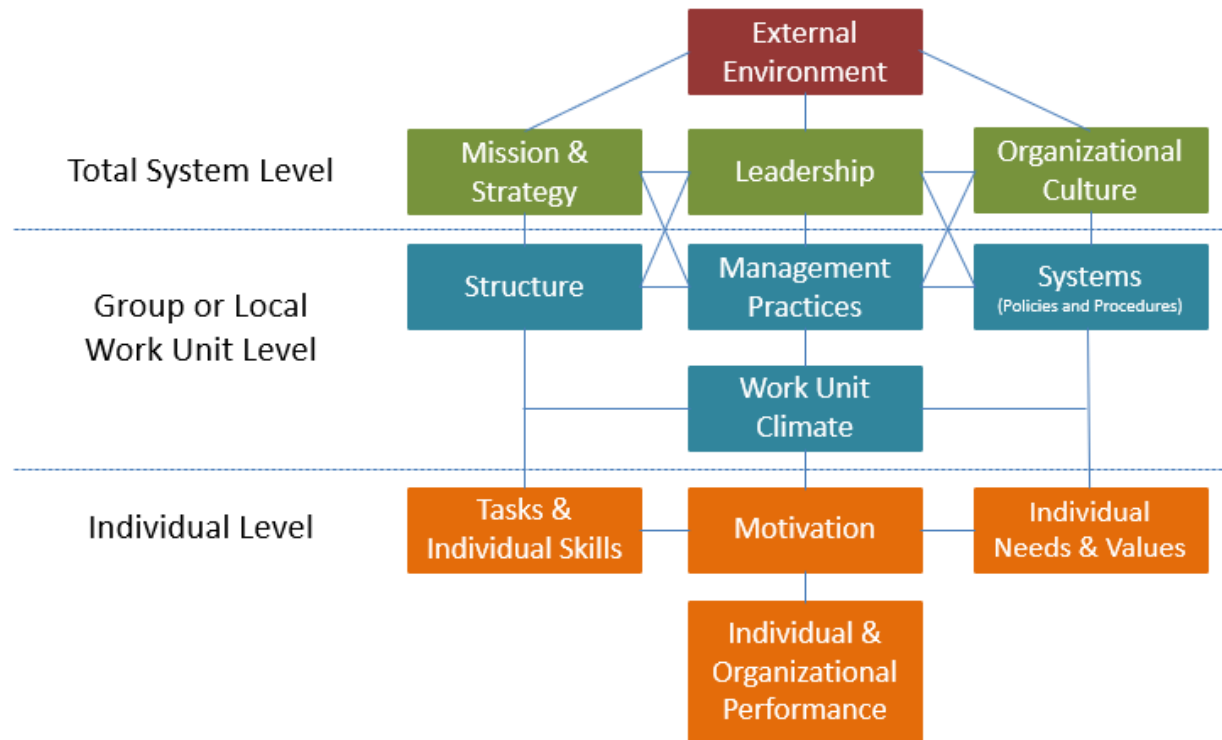
C.   Change Readiness Theory

Theories of change are well-researched in the fields of organization behavior and management (Bennis, 1966). Their genesis dates to 1947 when Kurt Lewin proposed that change was preceded by unfreezing – getting organizational members to physically and emotionally let go of the status quo (Self and Schraeder, 2008).

Simply speaking, change readiness refers to organizational and individual preparedness for change and receptivity to change, *after* the decision to adopt specific change has been made (Holt et al., 2007; Weiner et al., 2008). In addition, readiness "focuses on *intentional* [emphasis added]

organizational change, or deliberate efforts (often initiated by management) to move an organization from its present state to some desired future state to increase organizational effectiveness" (Weiner et al., 2008). Most likely, this future state involves improved individual development and organizational effectiveness (Cummings and Worley, 2005; Porras and Roberson, 1992).

Though seemingly intuitive, readiness has proven to be an abstract, multi-faceted concept, and "there is a good deal of confusion in the literature regarding how "readiness" ought to be appropriately conceptualized" (Stevens, 2013). To illustrate this, Attieh et al. (2013), who examined published literature about readiness in healthcare, uncovered ten theories, models and frameworks; five distinct concepts; and 17 and 59 dimensions and sub-dimensions, respectively. Among the conceptualizations are readiness as a stage-related progression (i.e., Stages of Change), a cognition formed by the change message, intention or commitment to change, and a psychological and physical capacity.

Most recently, readiness has been theorized as a multi-dimensional, multi-level state (Weiner et al., 2008; Holt et al., 2007) composed of both psychological factors and structural or contextual factors (Holt et al., 2010).   Even within an organization, individuals, work groups, and top managers may hold differing degrees of readiness (Holt et al., 2007). And, despite the historic characterization of change as a linear, pre-intervention phenomenon, readiness is likely a non-linear "continuous and dynamic process" that ebbs and flows throughout the duration of intervention (Van de Ven and Poole, 1995; Stevens, 2013).

Organization theorists agree that readiness is critical to the success of an intervention and to successful organization performance (e.g., Drzensky et al., 2012; Holt and Vardaman, 2013; Weiner et al., 2008; Weiner, 2009). "Readiness is considered a necessary precursor to successful organizational change and is often embedded within larger program planning and implementation frameworks" (Scaccia et al, 2015).   Because ready individuals are more likely to support and

participate in change, the success of a change intervention is primarily related to the degree of readiness of among the recipient population (Armenakis and Harris, 2009; Self and Schraeder, 2008; Stevens, 2013). Those who are not ready are likely to resist change (Lewin, 1951; Prochaska et al., 1994; Prochaska et al., 1997). As such, fewer than 60 percent of change interventions succeed (Porras and Robertson, 1992). The remainder of planned interventions fail for a variety of other reasons, including lack of readiness awareness, erroneous change-related decision-making, and failure of leadership to create readiness (Kotter, 1995; Burke et al., 2009; Nutt and Wilson, 2010).

In this study, even though the concept of change is embedded in the Burke-Litwin model, the concept of change readiness is not (Armenakis and Bedeian, 1999). Recall that the Burke-Litwin model is an organization development tool. Organizations who intentionally seek improvement, either through OD consulting or personal means, are apparently ready to change, both psychologically-ready and resource-ready. However, not all organizations can be presumed ready for shifts in change. "Most attempts to implement organizational change are not successful because principles and knowledge about the psychology of change are violated or ignored" (Prochaska et al., 2001). Therefore, in this study, to fully examine organization performance, readiness will be addressed.

<u>Conceptual Framework</u>

A conceptual framework is a set of beliefs, assumptions, and expectations that inform a research study (Miles and Huberman, 1994; Robson, 2011). Developed from theory, the conceptual framework or model explicitly defines the concepts or constructs under investigation and guides the line of inquiry, study design, and data methods (Lesham and Trafford, 2007).

A.   Conceptual Model

This study's conceptual model represented the occupational safety and health system in a medium-sized business with exemplary OSH performance. Even though it was impossible to

conceptualize or diagram an entire system, because a system is complex, dynamic, and even wholly unknown, (Diaz, 2007), for research purposes, system elements and boundaries must be defined (Williams and Hummelbrunner, 2009).

The conceptual model in Appendix A depicted the type and arrangement of intra- and extra-organizational elements or constructs that hypothetically produced low rates of injury and illness in a medium business. In the model, an industrial building represented the business organization. Inside the business were eleven theoretical constructs within three hierarchical levels – the organization level, group level and individual level. The external environment, the twelfth construct, surrounded the organization and influenced all internal levels. Perpetual exchange was shown by dotted lines and two-way arrows. Over time, in cyclical fashion, performance proceeded from left to right.

B. Constructs

Each construct was defined and theoretically and operationally described by referencing published and unpublished literature from the fields of business, social science, physical science, and government. Because the conceptual framework was largely derived from a theory of organization development, each construct was theoretically described using the body of business literature. Thereafter, the operational aspects of each construct were explored through the safety and health literature.   For both discussions, articles about mid-sized businesses or small and mid-sized enterprises (SMEs) were preferred. Also preferred was literature that linked constructs to performance. To preserve theoretical integrity, construct definitions were quoted from theories of origin. For example, because the external environment construct stemmed from Burke-Litwin's model of organization performance, the theoretical definition of external environment was quoted from Burke and Litwin. Operational definitions were adapted from theoretical definitions. TABLE II lists constructs and corresponding definitions.

TABLE II: THEORETICAL AND OPERATIONAL CONSTRUCT DEFINITIONS

Construct	Theoretical Definition	[d]Operational Definition
[a]External Environment	"Any outside condition or situation that influences the performance of the organization (e.g., marketplaces, world financial conditions, political/governmental circumstances)."	Any outside condition or situation that influences the occupational safety and health performance of an organization.
[a]Leadership	"Executives providing overall organizational direction and serving as behavioral role models for all employees."	Executives providing overall direction for occupational safety and health and serving as behavioral role models for all employees.
[a]Mission and Strategy	"What the organization's (a) top management believes is and has declared is the organization's mission and strategy and (b) what employees believe is the central purpose of an organization. Strategy is how the organization intends to achieve that purpose over an extended time scale."	Top managements believed and declared organizational safety and health mission and strategy; employees believed purpose of the organization; and how both are achieved over time.
[a]Culture	"The collection of overt and covert rules, values, and principles that are enduring and guide organizational behavior."	The collection of organization-wide overt and covert rules, values and principles about occupational safety and health that endure and guide organizational OSH behavior.
[a]Structure	"The arrangement of functions and people into specific areas and levels of responsibility, decision-making authority, communication, and relationships to assure effective implementation of the organization's mission and strategy."	The arrangement of functions and people into areas and levels of responsibility, decision-making authority, communication, and relationships for effective implementation of the OSH mission and strategy.
[a]Management Practices	"What managers do in the normal course of events to use the human and material resources at their disposal to carry out the organization's strategy."	What managers do in the normal course of events to use human and material resources to carry out the occupational safety and health strategy.
[a]Core Processes	"Standardized policies and mechanisms that facilitate work, primarily manifested in the organization's reward systems, management information systems (MIS), and in such control systems as performance	The standardized policies and processes applied across the organization that facilitate occupational safety and health work.

	appraisal, goal and budget development, and human resource allocation."	
[a]Work Unit Climate	"The collective current impressions, expectations, and feelings that members of local work units have that, in turn, affect their relations with their boss, with one another, and with other units."	The collective current impressions, feelings and expectations that members of local work units have about occupational safety and health that, in turn, affect their relations with their boss, coworkers and work units.
[a]Individual Tasks and Skills	"The required behavior for task effectiveness, including specific skills and knowledge required of people to accomplish the work for which they have been assigned and for which they feel directly responsible."	The employer's required behavior for safety and health task effectiveness, and the employee's skills, knowledge, and ability to safely and compliantly accomplishing assigned work.
[a]Performance	"The outcome or result … of effort and achievement (e.g., productivity, customer satisfaction, profit, and quality)."	Performance is defined as the outcome or result of occupational safety and health effort and achievement.
[b]Organizational Change Readiness	"Organizational members' shared resolve to implement a change …shared belief in their collective capability to do so" (Weiner 2009), and "the extent to which an organization is deemed to have the necessary financial or human capital resources, appropriate policies and procedures, and other intra- and extra-organizational characteristics to facilitate or hinder change (e.g., hierarchical structure, use of teams, market position, industry regulations)."	The collective organization-level psychological state and physical capacity needed to achieve occupational safety and health change.
[c]Individual Change Readiness	"The extent to which an individual …. is cognitively and emotionally inclined to accept, embrace, and adopt a particular plan to purposefully alter the status quo."	The extent of an individual's cognitive and emotional inclination to accept, embrace, and adopt a specific occupational safety and health plan that intends to alter the status quo.

[a]Burke and Litwin, 1992.
[b]Weiner et al., 2008
[c]Holt et al., 2007
[d]Adapted from Burke and Litwin, 1992

1.   External Environment Construct

Organizations do not operate in isolation from their environment; they must be aware of internal and *external* [emphasis added] influences (Emery and Trist, 1965). Beyond awareness, if an organization is to survive and thrive, "every organization must respond to the needs of its customers or clients, to legal and political constraints, and to economic and technological changes" (Gibson et al., 2011).

a.   Theoretical Discussion

The external environment refers to factors beyond the walls of an organization and beyond an organization's control (Pettigrew, 1987). Theoretically defined, the environment is "any outside condition or situation that influences the performance of the organization" (Burke and Litwin, 1992). While the list of potentially-impactful external conditions or situations is diverse (Sharfman and Dean, 1991), environmental factors can be broadly categorized as social, political, economic, technological and competitive (Pettigrew, 1987). Specific examples include funding changes, political shifts, new technologies and regulations, fluctuating human and natural resources, market competition, and natural disasters (Burke and Litwin, 1992).

Historically, the external environment has been deemed the apical driver of organizational action and outcomes (Pettigrew, 1987; Burke and Litwin, 1992). Theoretically, as external threats and opportunities directly impact an organization, leaders are compelled to react and make decisions. In recent years, though, as strategic leadership has gained prominence, the external environment is believed to exert a less directive, more circumferential, influence (Spangenberg and Theron, 2013).

There is a vast amount of literature about the extra-organizational environment, and a segment regards small and medium businesses. Recent publications even explore the relationship between external factors and occupational safety and health. Collectively, the literature shows that

external factors significantly influence organizational goals and performance outcomes (Emery and Trist, 1965; Pettigrew, 1987; O'Regan et al, 2008; Gibson et al., 2011).

A handful of studies about small and mid-sized businesses have examined specific aspects of the external environment, namely customers, economics, technology, and partnerships, and their relationship to outcomes. One longitudinal survey of fast-growing SMEs in Croatia showed that customer type (i.e., individual consumers, business customers) significantly influenced the outcomes of goal achievement and sales growth (Dragnic, 2014). This study also found that the state of the economy, as measured by multiple variables (i.e., gross domestic product, investment, employment, interest rates, organizational debt, financial liquidity) significantly predicted goal achievement and market growth (Dragnic et al., 2014).

In their review of published literature, Street and Cameron (2007) affirmed that smaller businesses networked with external organizations for a variety of reasons, including risk reduction and the need for complementary commercial, technical and social capital. Both threats and opportunities induced external alliances (Street, Cameron, 2007). These authors concluded that partnerships led to beneficial outcomes, such as product development, competitive advantage, and financial gain (i.e., sales, lower costs).

Lasagni (2012) went a step further and studied the types of impactful partnerships. He examined market relationships with customers and suppliers and industry collaborations with academia, government, research institutions, consultants, and technology entities. By surveying SME managers from various sectors in 6 European countries and controlling for intra-organizational contributors to innovation, Lasagni (2012) found that performance was enhanced through relationships with customers, suppliers and scientific collaborators.

b.   Operational Discussion

The literary intersection of occupational safety and health and the external environment yielded less and less-diverse information. More than one article, though, discussed the association of economic, political, and relationship factors with safety and health in smaller businesses.

Most OSH literature about the external environment centers on policy. While some published research supports the link between OSH regulation and improved injury performance, other research does not. Mischke et al., (2013) conducted a systematic review and meta-analysis to evaluate whether regulatory enforcement tools prevent injuries and illnesses. After searching multiple databases, Mischke et al. (2013) identified 23 relevant, quantitative and qualitative study designs. In seven intervention studies, injury rates, in the short term, either decreased by less than 10% or remained static compared with non-intervention groups. Two long-term studies showed meaningful 23% decreases in injury and accident rates. In smaller firms, inspection with citation led to better compliance and fewer injuries in the short term. Authors concluded that while inspection lessened injuries in the near-term, the magnitude of improvement was unclear. Fines or penalties had an unknown impact on injury rates.

Davies et al. (2009) and de la Fuente (2014) studied the link between economics and rates of occupational injury. Davies et al. (2009) hypothesized that UK rates of work-related injuries and illnesses from 1986 to 2005 correlated positively with the state of the economy. In other words, injury and illness rates rise in times of economic expansion and fall during contraction. Using statistical regression, Davies et al. (2009) compared historical workplace injury data with Gross Domestic Product and labor market conditions, as represented by employment fluctuations (e.g., hours of overtime). Rates of non-fatal minor and major injuries were positively and significantly associated with new hiring and overtime, especially in high-hazard sectors of manufacturing and construction. Minor injury rates were significantly associated with business cycles. Authors

concluded that the external economic environment created variable employment conditions that altered workforce composition and injury reporting.

In their retrospective study, de la Fuente et al. (2014) essentially affirmed these findings. By examining the impact of the mid-2000s global recession on Spanish occupational injury rates, authors concluded that the economic crisis resulted in lower rates of injury, including serious injury, especially in the industrial and construction sectors.

Finally, the Maine 200 program exemplified external partnerships. In 1993, OSHA initiated the Maine 200 program in response to historically high rates of job-related injury and illness in Maine (USDOL, 2009). By studying state worker's compensation data, OSHA discovered that enforcement had not been directed toward high-injury firms. To turn this trend, OSHA developed a cooperative partnership program for the 200 highest-injury workplaces in Maine. These employers were given the choice to either work with OSHA to develop effective, comprehensive safety programs or to face immediate inspection and enforcement. All but two firms chose partnership. Through collaboration, cooperating companies identified 5 times more hazards than would have been found by inspection alone (Ash Center for Democratic Governance and Innovation, 2019). Consequently, more than 70% of employers experienced reductions in injury and illness, and three out of five employers experienced a reduction in lost work days (USDOL, 2009). Important to this study, "the biggest percentage drop in injuries occurred amongst the 27 firms with less than 200 employees" (Pare, 2013). Maine 200 demonstrated that external cooperative relationships could improve performance in smaller enterprises.

These studies show that many factors in the external environment influence outcomes, such as injuries and illnesses, in organizations, including small and medium-sized businesses. For this appreciative case study, the external environment was defined as "any outside condition or situation

that influences the performance of the organization (e.g., marketplaces, world financial conditions, political/governmental circumstances)" (Burke and Litwin, 1992).

2.   Leadership Construct

Leadership is one of the most heavily studied topics in literature. Thousands of published papers have explored every angle of the leadership from personal traits and styles to theories and context (Cleland, 1995). Of the more than 130 definitions of leadership, most can be reduced to two basic concepts – the power to stimulate goal achievement, and the exertion of influence. (Wren 1995; Cleland 1995; Yukl, 2012). This discussion centers on the functions of leadership rather than behaviors, traits, styles and experience, which are part of the individual tasks and skills construct.

a.   Theoretical Discussion

"Leadership is the primary dynamic force that propels organizations to accomplish objectives (Bass, 1990)." Leaders, who are responsible for their entire organization, have two primary functions - direction-setting (i.e., visioning, strategic planning, strategic management) and team-building (i.e., assigning staff, allocating resources).

To set the direction of an organization, leaders must define a vision, strategically plan a path toward that vision, and adaptively manage the plan and the changes encountered along the way (Bass 1990; Spangenberg and Theron, 2013).

Visioning is the conceptualization of a future state (Spangenberg and Theron, 2013). Visions often link corporate values with product or service objectives. To operationalize their vision, executives must define a business strategy. In top performing medium-sized firms, Mirocha et al. (2013) discovered that leaders-in-training emphasized strategic thinking and adaptive problem solving. Because strategic plans are long-term, and because change is likely, "leaders acknowledge change and then create strategies that can turn the changes into opportunities" (Sellers, 2017). Both visioning and managing change involve environmental scanning, which is the process of monitoring

41

the external and internal environment for opportunities and threats. Vigilance requires decision-making about what does and doesn't matter and sense-making of all the information (Zaccaro, 2001).

In smaller businesses, leadership tends to be less formal. In the smallest firms, whose management structure is flat, the owner-operator is often the central authority and may be the only leader (Goffee and Scase, 1985; Poza, Alfred and Maheshwari, 1997). Studies indicate that small firm owners-operators are more oriented toward autonomy than financial gain or even business growth (Beaver, 2003). As such, they often employ emergent or tactical direction-setting; if direction-setting is strategic, the timeline is often short (Beaver, 2003). Hasty and non-collaborative direction-setting, which may not be based on market facts, may not serve the business well (Wang and Poutziouris, 2010).

To implement their strategic plan, leaders must assign staff, especially qualified staff, and use corporate resources to conduct strategic tasks (Spangenberg and Theron, 2013; Yukl, Gordon and Taber, 2002). Because tasks are shared across work units, another aspect of team-building is organization wide coordination—"making certain that units within the organization communicate with one another, determining what decisions need to be made and who should make them, and monitoring overall performance" (Burke, 2011).

The ultimate purpose of leadership is organizational effectiveness, and several publications link the two (Iscan, 2014). Few studies, though, explore the relationship between performance and leadership in smaller enterprises (Cope et al., 2011).

Ghosh et al. (2001) studied the key success factors in 50 top-performing Singaporean SMEs, most of which were mid-sized. Performance was defined by profit, return on assets, and percent of international business, to name a few. Two of six "universal" success factors were "strong, visionary, and capable leadership" and "adopting the correct strategic approach" (Ghosh et al, 2001).

Kumar et al., (2015) studied successful, small and medium Indian companies to identify critical success factors for effective supply chain management. By querying their business habits and performance parameters (e.g., customer service and satisfaction, growth, innovation, finances), authors identified five critical factors, including leadership commitment, strategic visioning, and the use of an effective implementation strategy. For multiple companies, top management commitment was perceived to be the most impactful.

Similarly, Kumar et al. (2014), in their investigation of quality management practices (i.e., ISO 9000, Lean, Six Sigma) among Australian and UK SMEs, concluded that leadership skill and commitment were the most important critical success factors for businesses of all sizes.

b.   Operational Discussion

The concept of leadership is often referenced in workplace safety and health literature (Jebb, 2015); however, most studies speak of leadership as a management behavior, and few studies are devoted to the topic (O'Dea and Flin, 2003). Unfortunately, studies persistently comingle the terms leadership or leader and management or manager. Though seemingly unimportant, this interchange inhibits a clear understanding of either term. In OSH literature, the terms *top management* or *management commitment* are frequently encountered, and presumably imply leadership.

The functions of leaders are also confounded in OSH literature. The business concept of leadership – visioning, strategic planning and managing, team-building, and role-modeling – are not customary in occupational safety and health. In the safety and health field, the terms *support* and *commitment* imply direction-setting. Dunlap (2009) suggested that top managers demonstrate support for safety and health by verbally expressing the importance of safety and by taking related safety action. Flin (2003) and Zohar (2014) considered management commitment to represent the allocation of time, money and staffing resources to identify and control risks and hazards. Ideally, these actions should be proactive (O'Dea and Flin, 2001). Resource allocation signals the priority of

safety over profit in the organization (Bowers et al., 2017). Another important sign of leadership support is staffing safety to carry out goals and objectives (Flin, 2003; Bowers et al., 2017).

From a team-building standpoint, leaders must foster trust and credibility. Bowers et al. (2017) raised the notion of decisional transparency; even when personnel and resources cannot be allocated, transparent decision-making preserves executives' safety credibility. A complementary notion regards the correlation between actions and words. Safety supportive words need to be followed by safety supportive actions. "Industry leaders may say that safety is an organizational value, but they will not be perceived as credible if these words are not supported by allocating money for safety supplies and initiatives, discussing safety performance in primary organizational meetings and behaving safely in an operational environment." (Dunlap, 2009). Further, to demonstrate commitment, OSH leaders should build relationships with the workforce and involve them in safety planning and decision-making (O'Dea and Flin, 2001). To do this, leaders should, for example, periodically walk through work areas, behave safely, and convey knowledge of the policies (Flin, 2003). According to several authors, leaders induce safety culture and climate by demonstrating commitment (Zohar & Luria, 2005; Barling et al., 2002; Clarke & Ward, 2006; Zohar, 2002; Zohar and Tenne-Gazit, 2008).

"Management commitment is probably the single most important factor in creating organizational change and improving safety" (Nielsen et al, 2015). Long ago, Havens (1974) linked OSHA compliance with top management commitment. A handful of studies in small and medium businesses demonstrated the relationship between leadership and performance.

Ipsen et al. (2015) studied the factors that facilitated and inhibited the implementation of a worksite stress management program in small and medium enterprises. Top management support, both in terms of enthusiasm and involvement, was a factor in successful implementation.

Nelson et al. (2015) also studied ways to integrate worksite health promotion activities with occupational health and safety programs. Leadership support for integration was one identified facilitator. "All participants cited the importance of leadership support in successful worker health programs. When asked how this was demonstrated, participants generally indicated that provision of work time for participation in programs was a visible sign of support…" (Nelson et al., 2015)

A third empirical investigation associated leadership role-modeling behaviors and working conditions in small and medium enterprises. Working conditions are a risk factor for occupational injuries and illnesses. In their study, Fernandez-Muniz et al. (2017) concluded that verbal safety encouragement and management participation in safety (i.e., safety activities, communication, training, audits) lowered work pressure (e.g., workload, work pace, time pressure) and improved safety conditions (i.e., noise, dust, lighting) and safety incentives (i.e., rewards, recognition).

To stay true to the origin of the conceptual framework, this study will employ the leadership definition offered by Burke and Litwin (1992) – "leadership is executives providing overall direction and serving as behavioral role models for all employees."

3.   Mission and Strategy Construct

Mission and strategy enable an organization to focus; performance depends on the ability to focus (Bititci, 2015). Mission represents the philosophical foundation of a business's activity and may be formalized in a written statement. A mission serves three purposes: 1) to bound the organization's operations, 2) to unify employees by serving as "a flag around which the organization can rally", and 3) to mark organizational achievement (Oster 1995,). Defining the mission is the "first strategic decision a small business needs to take" (Toftoy and Chatterjee, 2004). Strategy, then, broadly spells out how the mission will be achieved, including specific actions, responsibilities, resources, and timeframes that answer, "who will do what, when, where, and why in an organization" (Wegner and Jarvi, 1999).

a.   Theoretical Discussion

For this study, mission and strategy are theoretically defined by Burke and Litwin (1992) – mission is "what the organization's (a) top management believes is and has declared is the organization's mission and strategy and (b) what employees believe is the central purpose of an organization. Strategy is how the organization intends to achieve that purpose over an extended time scale." Three studies from business literature link both topics and performance.

Alavi and Karami (2009) examined the relationship between mission statements and self-reported performance in a sample of small and medium-sized United Kingdom firms. Their survey concluded that high performing organizations were significantly likely to have written mission statements ($p < 0.01$). High performance was also statistically related to mission development, specifically the participation of non-managers as well as managers ($p < 0.01$). Alavi and Karami (2009) not only demonstrated the organizational value of mission, they demonstrated the value of employees' perspectives of mission.

Nerone (1997) hypothesized that strategic planning was positively correlated with financial success in small enterprises. Recognizing that firms may be unaware of their use of strategic techniques, he conducted unstructured interviews and observations to collect primary and secondary data from 47 Small Business Administration SCORE clients in Florida. To probe the presence of strategic habits, Nerone inquired about the existence of a defined mission; the use of specific techniques (i.e., SWOT), external scanning, and contingency planning; and approaches to strategy implementation and evaluation. Nearly ninety-five percent of profitable businesses used strategic methods ($r=0.643$), whereas 75% of non-profitable business did not plan strategically.

In another article, Lyles et al. (1994) examined the impact of strategic formality and content on outcome performance, specifically return on assets, return on equity, and sales growth. Formal planning was defined as having a written plan with objectives, strategies, and resource requirements;

non-formal planning was the absence of a written long-range plan. By interviewing 188 Midwestern U.S. firms with fewer than 500 employees, Lyles et al. (1994) concluded that "formal planners placed significantly greater emphasis on formulating goals, selecting distinctive competencies, determining authority relationships, deploying resources, and monitoring implementation than did non-formal planners." In addition, formal strategic planners were significantly more likely to address a "wider variety" of strategic content than non-formal planners. From a performance standpoint, even though formal and non-formal strategic planners had no differential financial outcome, formal planning was statistically associated with higher growth.

b.   Operational Discussion

Safety and health literature is almost devoid of reference to both organizational or safety-related mission and strategy. Even rarer are peer-reviewed studies about the role of OSH mission and strategy.

In an anecdotal article, strategic planning improved safety for Indianapolis-based Reilly Industries. This seven-plant, 900-employee chemical manufacturer integrated the American Chemical Society's Responsible Care program into their organizational mission and business plan. Over a 5-year period, top management invested 20% capital, budgeted annually, evaluated performance each quarter, developed detailed communication plans, and "weave[d] Responsible Care into the fabric of normal operations." OSHA requirements, accident investigation, contractor and employee training, and documentation were also incorporated in Responsible Care. Reilly claimed its strategic approach improved accident analysis, enhanced corrective action, and reduced injury risks (Kiesche, 1992). This non-peer-reviewed story demonstrated that a defined safety and health mission and strategy may be associated with improved outcomes in small businesses.

For this study, Burke and Litwin's (1992) mission and strategy definition was adapted to occupational safety and health. Restated, mission and strategy referred to top management's

declared safety and health mission and strategy, employees' perceived mission and strategy, and the organization's plan to achieve those purposes over an extended period.

4.   Culture Construct

Throughout the 1970s, culture, an anthropological concept, increasingly appeared in the field of organizational studies (Pettigrew, 1979; Smircich, 1983). Since then, management literature has been filled with culture-related theoretical discourse and empirical examination. Culture is now considered a normative organizational phenomenon, which "can be used to build organizational commitment, convey a philosophy of management, rationalize and legitimate activity, motivate personnel, and facilitate socialization" (Smircich, 1983). Corporate culture has also been linked to successful change management (Peters and Waterman, 1982; Kotter and Heskett, 1992; Michela and Burke, 2000) and desired performance (Denison and Mishra, 1995; Ogbonna and Harris, 2000).

a.   Theoretical Discussion

Culture is often conceptualized as a singular condition that permeates an organization. Theorists, however, believe that an organization's culture develops adaptively over time and varies with life cycle (Schein, 1985, 1992). In new organizations, owners and managers often dictate or emulate the reigning culture. In growing organizations, though, culture is constantly influenced by external factors and the social interactions of new employees (Gordon, 1991; Peterson, 2002). Even though sub-cultures are common within an organization, a convergent culture typically predominates and defines the organizational identity (Martin, 1992). This reigning culture is relatively stable (Parker et al., 2006).

While the history of organization-level culture is well understood, the definitions and conceptual dimensions are less clear. At least two dozen definitions have been offered in published literature. Broadly speaking, culture is "the way we do things around here" (Uttal, 1983). More specifically, Smircich (1983) divided studies of organizational culture into two camps – those viewing

48

culture as a symbolic metaphor of organizational being and those treating culture as a measurable, outcome-associated variable. Seeing the value of both perspectives, Martin (2002) conceptualized organizational culture as having subjective and objective elements. According to his dualistic view, subjective culture referred to the overt and covert values, beliefs, and assumptions that are shared by members of an organization. Objective elements are the physical manifestations of, or clues to, the subjective values, beliefs and assumptions. Schein (1985, 1992), who is often cited in culture-based literature, is known for explaining the relationship between subjective and objective culture. According to him, culture can be divided into three understandable, traceable components or layers— superficial, espoused, and underlying (Schein, 1991). The superficial level, which is tangible to insiders and outsiders, includes "the physical environment, language, organizational structures, practices and processes, behaviors, stories, rituals, and dress" (Schein, 1992). Because superficial indicators can be misleading and misinterpreted, equal consideration should be given to the less-sensible espoused and underlying layers of culture. The second layer, espoused culture, refers to the rules and norms that the organization claims to have. These are the ethically and morally proper statements about mission, values, and attitudes. Assumptions, which are the third layer of underlying beliefs, perceptions, thoughts, and feelings of the organization, embody the essence of an organization's culture (Schein, 1992). Similar to Schein, Burke and Litwin (1992), whose model of organization performance and change undergirds this study's conceptual framework, consider culture to be "the collection of overt and covert rules, values, and principles that are enduring and guide organizational behavior" (Burke and Litwin, 1992).

Some published articles link culture and performance. Nahm et al. (2004) studied culture in medium and large businesses. They examined the relationship between culture, as conceptualized by Schein (1992), and performance in 224 manufacturing firms employing more than 100 workers. Authors hypothesized that underlying assumptions about customer orientation would be reflected in

an organization's espoused customer beliefs and organizational artifacts, such as their technology and preventive maintenance. In addition, they surmised that these cultural layers would be associated with sales, return on investment, market share, and competitive position. After pilot testing their 5-point scale survey instrument, Nahm et al., (2004) administered their questionnaire to metal fabrication, industrial machinery and equipment, electronic and other electric equipment, and transportation equipment manufacturers. Authors concluded that culture and performance were linked. Specifically, "high levels of customer orientation" led to customer-oriented managerial beliefs, stated customer value, strict time-based manufacturing practices, and ultimately, to "high performance" (Nahm et al., 2004).

b.   Operational Discussion

Since the mid-1980s, the safety culture of industrial organizations has been extensively explored in literature. The number of publications rapidly expanded after the chemical and nuclear disasters in Bhopal, India and Chernobyl, Russia. Safety culture is commonly considered to be a facet of organizational culture (Guldenmund, 2010; Cooper, 2016).

Like organizational culture, safety culture is associated with multiple interdisciplinary conceptualizations and definitions. Vu and De Cieri (2013) noted the existence of 51 original definitions. To confound matters, in occupational safety literature, the terms culture and climate are frequently co-mingled or interchanged. According to one author, "the concepts of safety culture and safety climate are still ill-defined and not worked out well; the relationship between safety culture and safety climate is unclear; there is considerable confusion about the cause, the content and the consequence of safety culture and climate; there is no satisfying model of safety culture nor safety climate; and the issue of the level of aggregation has not received the attention it warrants" (Guldenmund, 2000).

Even as insufficient conceptual coalescence has caused "critical" confusion among researchers and practitioners (Cooper, 2016), a theme or pattern can be found among several definitions -- safety culture is the set of organization-level shared beliefs, attitudes and perceptions about safety and their manifestation through policy and practice (Jebb, 2015). This theme aligns with Schein's (1992) and Martin's (1992) views of organizational culture.

Guldenmund (2000) intended to disentangle the dimensions of safety culture and climate by examining sixteen studies from safety literature. After parsing definitions, evaluating basal theoretical models, and studying methods of data collection and analysis, Guldenmund (2000) found that "most authors aim at the same concept… [they] differ on what this concept might encompass… [and] their operationalisations of the concept differ." Nonetheless, safety culture was similarly conceptualized as having shared attitudes toward safety in the work environment. Methodologically, Guldenmund criticized the use of widely differing questionnaires to probe multiple dimensions, and he found it futile to meaningfully interpret disjointed data. Regarding models of culture, Guldenmund (2000), who regarded Schein's (1992) three-level model as an intuitive, convenient way to conceptualize and measure culture, adapted the model to safety (TABLE III).

TABLE III: LAYERS OF SAFETY CULTURE FRAMEWORK (ADAPTED FROM GULDENMUND, 2000)

Layers of Culture	Visibility	Examples
Artifacts (Outer Layer)	Visible	Slogans, logos, buildings, dress, personal protective equipment, posters, reports, celebrations, rituals
Espoused Values (Middle Layer)	Relatively Explicit	Spoken/written statements, espoused ambitions
Basic Assumptions	Implicit (implicit to outsiders, and some insiders)	Underlying thoughts, feelings, relationships

Other authors have defined the indicators of safety culture. According to Flin et al, (2000), a range of two to nineteen indicators have been identified in prior studies.   Unfortunately, inconsistent naming, framing, and measuring of indicators has precluded the ability to compare studies. Five indicators of safety culture commonly appear in literature – "organizational commitment, management involvement, employee empowerment, reward systems, and reporting system" (Wiegmann et al., 2002).

Like organizational culture, safety culture is associated with performance. The presences of a strong safety culture – one that is relatively homogenous and proactive toward safety – has been linked to fewer and less severe accidents (Zohar, 1980; Hayes et al. 1998; Gillen et al., 2002; O'Toole, 2002). Conversely, large-scale incidents (i.e., Chernobyl accident, Piper Alpha offshore oil disaster, Deepwater Horizon explosion, Upper Big Branch mine coal dust explosion) have been linked to poor safety culture (IAEA, 1986; Jebb, 2015).

Cooper (2016) examined the evidentiary link between safety outcomes and three influential safety culture models – Guldenmund's (2000) tri-level model based on Schein's (1992) three-layer model; Reason's (1998) interdependent sub-culture model; and Cooper's (2000) reciprocal safety

culture model based on social learning theory. Regarding the former, Cooper (2016) dismissed the tri-level concept, stating that the underlying assumptions were too vague, too difficult to measure, and overly simplistic. He stated that, to date, studies, had not correlated cultural assumptions and attitudes with positive behavior and accident prevention. Reason's (1998) model presumed that organizational safety culture was a product of other intra-organizational sub-cultures. Cooper (2016) dismissed that model, too, without citing any relevant studies of safety performance. Finally, Cooper linked his own reciprocal safety culture model with accident reduction. His model considered safety culture to be a product of psychological (i.e., perceptions, values, attitudes, norms), behavioral (i.e., safe behavior) and situational (i.e., management involvement, risk management, safety rules) action. While Cooper (2016) concluded that individual safety behavior and organization-level action were "strongly and consistently" correlated with outcomes, he notes that "no published studies have assessed the relationships between values or norms and actual safety outcomes," and "psychological factors such as attitudes, values, and norms are rarely assessed correctly" (Cooper, 2016).

In this study, both subjective and objective aspects of safety culture will be examined. Both are important, because while organizations may publicly state one set of values, tacit rules, lack of trust, and fear may hide a very different situation. Consequently, the operational definition of culture is the collection of overt and covert rules, values, and principles pertaining to occupational safety and health that endure and guide organizational occupational safety and health behavior.

5.   Structure Construct

Organizational structure is "the arrangement of functions and people into specific areas and levels of responsibility, decision-making authority, communication, and relationships to assure effective implementation of the organization's mission and strategy" (Burke and Litwin, 1992). As

such, structure is a multidimensional concept, which includes configuration, centralization, and specialization.

a.   Theoretical Discussion

Structure is classically equated with configuration – the "anatomy of the organization" (Dalton et al., 1980). In this sense, structure is a physical concept that includes organizational size, operating sites, span of control, hierarchical shape and administrative intensity or ratio of managers to non-managers. Within the physical structure, centralization and specialization describe the division of work. In centralized organizations, the locus of control, both strategic and operational control, resides with a few, top-level decision-makers (Ford and Slocum, 1977). In less centralized organizations, individuals at various hierarchical levels have either authority or participatory privilege with a range of operational activities; those with granted authority, however, have more power (Meijaard et al., 2005). Beyond work control, work must be performed. Specialization regards task diversity, the distribution of duties among positions, and employee specialization, the degree to which specific duties are held by specific positions (Pugh, 1968; Meijaard et al., 2005). Both physical and functional arrangement are conveyed via organization chart.

To manage accountability and information, organizations are intentionally structured around power, relationships and lines of communication. Structure, though, is dynamic, and as organizations grow, they modify their structure to meet new and different goals (Pathfinder International, 2012). In addition, structural dimensions often change, either at the same time or at an adjacent time, after conditions stabilize (Miller and Friesen, 1980).

Dimensions like these describe organization complexity (Ford and Slocum, 1977). Even though smaller businesses are considered "informal, unstructured and centralized," a study of Dutch firms with fewer than 100 workers showed otherwise (Meijaard et al., 2005). This study also revealed relationships between structure and performance. By regressing structural characteristics

with performance outcomes (i.e., sales growth, profitability, innovativeness), authors concluded that larger of these firms demonstrated "more standardization, departmentalization, task specialization and decentralization." They also found that some structures, which varied by size and sector, were associated with better performance. Meijaard et al. (2005) conclude that though there is no single best structure, "organizational structure indeed matters" and must be considered "in models and future analysis of small firm performance."

b.   Operational Discussion

In occupational safety and health, the holistic concept of organizational structure is rarely, if at all, discussed. However, the dimensions of configuration, centralization and specialization have been examined. Configuration might refer to the physical presence of a safety department or to the reporting level for safety concerns. The presence of a safety and health committee, whether one carrying authority or participatory privilege, exemplifies centralization. Health and safety committees are present in 75% of companies with more 50 employees (Planek and Kolosh, 1993). Specialization, then, may be reflected by the functional presence of OSH-assigned staff, who are either trained individuals with specialized knowledge of safety and health (Hale, 1995) or individuals who are elected or appointed from among the working staff (Cameron, et al., 2013). Occupational safety and health specialists may be internal employees, such as safety manager, advisor, representative or technician, or external consultants.

For this study, structure refers to "the arrangement of functions and people into specific areas and levels of responsibility, decision-making authority, communication, and relationships to assure effective implementation of the organization's" occupational safety and health "mission and strategy" (Burke and Litwin, 1992). A few articles highlight the relationship between occupational safety and health structure and successful organization performance.

Smitha et al. (2001) published an article showing the extraordinary impact of safety committees on U.S. injury and illness rates in manufacturing. Their study concerned four types of state-level workplace safety laws; one of those laws mandated safety committees. Using secondary data from 42 states between the years 1992 and 1997 and Poisson Regression, they demonstrated that injury rates were significantly and inversely associated with the percentage of workforce affected by mandatory safety committees.

Morse et al. (2013) went on to describe the characteristics of health and safety committees, which they deemed "the most common worker-management structure." Their well-designed cross-sectional survey involved nearly 400 health and safety committee members from manufacturing industries in Connecticut. This state was one of the first to legally mandate health and safety committees for organizations with 25 or more workers. Primary data was crossed with secondary data about committee size, statutory conformance, and employer injury and illness rates. Fifty-one percent of surveyed industries employed 50-249 employees. The study explored many aspects of safety committees, including committee composition, training, activities, communication, meeting characteristics, and union involvement. Authors concluded that certain committee actions, specifically expeditious corrective action and attention to safety training, were associated with lower injury rates. In addition, lower injury rates were associated with larger committees.

Another article described the relationship between safety staffing and injury and illness performance among construction contractors (Cameron et al., 2013). Contractors who used external consultants were found to have an average accident injury rate nearly three times higher than contractors employing internal safety staff. Beyond this, firms employing at least one empowered safety professional had lower average rates of injury; however, the act of adding more safety staff did not further diminish injuries. Cameron et al., (2013) observed that the role and authority of a safety person was more important than the number of safety staff. "Employing at least

one full-time internal safety person is better than relying solely on a safety consultant." And, "if these safety advisers report to senior management…they have a greater chance of influencing others to act safely or commit resources to manage safety."

6.   Management Practices Construct

Despite the absence of a universal definition of management, scholars commonly consider management to be the process of doing work through people and with resources to achieve specific goals and objectives. (Johnson and Stinson, 1978; Terry and Rue, 1982; Daft, 2016). Within all but the smallest organizations, management resides at three levels. Strategic management is an executive or leader-level task that is concerned with the mission and direction of the organization (Smit et al., 2007). Tactical management refers to the actions and behaviors of middle and line managers, who are responsible for the function of business units and teams. Supervisors and foreman ensure the conduct of daily operational tasks (Smit et al., 2007). In this section, tactical and operational management practices were addressed. Executive management was described under the Leadership construct.

a.   Theoretical Discussion

Burke and Litwin (1992) define management practices as "what managers do in the normal course of events to use the human and material resources at their disposal to carry out the organization's strategy." Even though management practices are any number of behaviors that propel goal achievement (Burke, 2011), Henri Fayol, a turn-of-the-century engineer and theorist, was the first to describe five basic management functions – planning, organizing, commanding, coordinating, and controlling (Wren and Bedeian, 2009). Subsequently, a multitude of management theorists have either expanded upon or re-interpreted that list (TABLE IV). Now, four managerial functions are commonly recognized, specifically planning, organizing, leading and controlling (Griffin, 2012; Daft, 2016). Different business sectors, business establishments, and managers may

differently emphasize each function, though. Common to these four functions are the processes of decision-making and communicating (Lorenzana, 1993).

TABLE IV: EXAMPLE MANAGEMENT FUNCTIONS

Henri Fayol in Wren and Bedeian (2009)	Stoner, Freeman and Gilbert (1995)	Drucker (2008)	Griffin (2012)	Daft (2016)
Planning	Planning	Planning (Setting Objectives)	Planning, Decision-making	Planning
Organizing	Organizing	Organizing	Organizing	Organizing
Commanding	Leading	Integrating (Motivating and Communicating)	Leading	Leading
Coordinating	Controlling	Measuring Performance	Controlling	Controlling
Controlling		Developing People		

Planning is the management function that precedes and underlies all other functions. Planning is the process of selecting near term goals and drafting methods to implement and measure them (Daft, 2016). Depending on the management level, planning may have a wider or narrower scope. For example, middle managers plan for departments and low-level managers plan for teams and individuals. Regardless of level, plans should align with the organizational mission, vision, and strategy.

Organizing refers to the assembly and use of human, financial and other resources (i.e., buildings, tools, materials, public relationships) to implement plans (Wren and Bedeian, 2009). This function centers on defining and assigning tasks, delegating authority, coordinating actions, and

deploying resources. Because organizing is a physical phenomenon, it is often reflected in the organizational structure (Daft, 2016).

The third common management function, leading, regards the use of authority and behavioral action (i.e., motivating, modeling) to spur the conduct of work (Daft, 2016). Leading is synonymous with directing and commanding, which are less used terms. Leading, as a middle and low-level management function, should not be confused with leadership, which is an organization-level phenomenon.

Controlling is the fourth fundamental management function. "Controlling means monitoring employees' activities, determining whether the organization is moving toward its goals, and making corrections as necessary" (Daft, 2016). In other words, managers, who are ultimately responsible for achieving performance, exert control to determine how well employees and resources are being used. The intent of controlling extends beyond the detection of compliance or deviation to correction.

Luthans (1988) empirically examined the type and frequency of management activities among successful and effective managers. He defined successful managers as those who had earned quick promotion. Effective managers were those who achieved performance, both profits and satisfaction. Through blinded observation, he amassed ethnographic-like data from forty-four managers in large and small service organizations. The data was eventually reduced into twelve behavioral categories, and ultimately, into four functional activities – communicating, traditional management, networking, and human resources management. Luthans (1988) then studied an unrelated set of 248 managers to discern the frequency of these 4 activities. He found that all managers spent nearly one-third of their time communicating, one-third managing traditionally, one-fifth networking, and one -fifth managing human resources. In the third phase of his study, he distinguished the activities of successful and effective managers. Using regression, descriptive

comparison and correlation, Luthans (1988) found a significant relationship between success and networking. Successful managers, though, spent little time on traditional management functions. By contrast, effective managers, spent more time communicating and managing human resources; they spent the least amount of time networking. Luthans (1988) concluded that human-related activities, such as communicating and managing staff, were the key to effective performance in large and small companies.

Other authors noted that smaller businesses, which have flatter management structures, have unique management situations. In organizations with fewer than 50 workers, for example, no levels of management may exist between the owner and employees. However, mid-sized enterprises with 50-250 workers are likely to employ middle and operational managers to oversee core business functions (Legg et al., 2015; Midsize Business Institute, n.d.). While published literature is full of sector-specific, practice-specific studies of smaller businesses, very few studies broadly discuss the approach to managing a smaller business.

d'Amboise and Muldowney (1988) examined published theories of smaller business management. They categorized theories into ten areas, such as degree of interaction with the environment, organizational structure, entrepreneurial characteristics, and use of traditional management functions. Regarding the latter, the authors highlighted the tenuous application of management functions by smaller firm managers, specifically their tendency to set vague goals, fixate on economics, satisfice, and avoid formal and strategic planning. d'Amboise and Muldowney (1988) concluded that even though approaches to small business management were rooted in general management theory, "it is increasingly apparent that general management is not sufficiently specific when applied to small business."

Another article showed the importance of planning to smaller business success. Allred et al. (2007) surveyed the CEOs of fast-growing U.S. businesses to discern their time and attention to

formal and informal planning. Formal planning was characterized by a written strategic business plan, and the latter by a variety of techniques including list-making, staff meetings, personal research, discussions and thinking and luncheons. Allred et al. (2007) showed that CEOs spent a significantly greater amount of time on informal than formal planning. During informal planning, most attention was given to management functions. Authors also found that 68% of surveyed companies has a formal written plan. Among their conclusions, Allred et al. (2007) suggested that informal planning was perhaps more important to the success of smaller companies than formal planning.

b. Operational Discussion

In the field of occupational safety and health, management has been heavily studied. Safety climate surveys, for example, inquire about the topic of management more often than any other safety topic (Flin et al., 2000). Unfortunately, because the term management has been used ambiguously and consistently interchanged with the term leadership, the literary understanding of safety management is distorted.

Not surprisingly, then, there is no standard definition of safety management. Kirwan (1998) defined safety management as the practices, roles and functions associated with safety. Another definition considered health and safety management to be the "organized efforts and procedures for identifying workplace hazards and reducing accidents and exposure to harmful situations and substances" (Business Dictionary, 2019). The former definition is sweeping and comingles roles, actions, and procedures. The latter definition centers on hazards and outcomes. A more fitting definition of safety management practices would be aligned with business management practices, such as, *the process of doing safety and health work through people and with resources to achieve specific safety and health goals and objectives*.

Of interest to most safety and health researchers are those practices that reduce accidents. Historic studies showed that better outcomes were associated with assigning a safety officer,

communicating hazards and risks, holding regular training, involving managers in safety activities, prioritizing safety in meetings, including safety in decision-making, and investigating accidents (Shafai-Sahrai, 1971; Smith et al, 1975; Cohen, 1977; Shannon et al., 1996). To identify the most impactful organizational practices, Shannon et al. (1997) conducted a systematic review. They examined ten large-scale studies with statistically significant findings. By qualitatively comparing these studies, Shannon et al. (1997) concluded that the following management practices lessened injuries: training, empowering workers, maintaining high-quality interpersonal relationships, delegating safety activities, conducting safety audits, evaluating hazards, screening workers' health, using technological safety controls, and the actively involving top management. Some practices, though, such as disciplining employees for safety violations, showed conflicting association with injury rates.

In an empirical study, management practices were significantly associated with safety outcomes in mid and large-sized Thai construction firms (Aksorn and Hadikusumo, 2008). Twelve of sixteen studied variables were management practices, and ten practices were significantly associated with safety outcomes: supporting safety, promoting teamwork, educating and training, evaluating programs, setting clear goals, supervising workers, enforcing safety, acquiring/maintaining safety equipment, allocating resources, and delegating safety responsibilities (TABLE V).

TABLE V: MANAGEMENT PRACTICES - CRITICAL SUCCESS FACTOR ASSOCIATED WITH LOWER INJURY/ILLNESS OUTCOMES (ADAPTED FROM AKSORN AND HADIKUSUMO, 2008)

• Management support	• Effective enforcement scheme
• Promoting Teamwork	• Safety Equipment Acquisition and Maintenance
• Appropriate Safety Education and Training	• Sufficient resource allocation
• Program Evaluation	• *Continuing participation of employees
• Clear and Realistic Goals	• Delegation of authority and responsibility
• Appropriate Supervision	• *Good Communication

*Not statistically significant.

According to Aksorn and Hadikusumo (2008), the single most influential practice, though, was management support. Authors stated that "management plays a very important role in an efficient and effective safety program. Management must fully and actively translate ideas into safety actions, including issuing a written comprehensive safety policy, allocating sufficient resources, promptly reacting to safety suggestions and complaints, attending regular safety meetings and training, regularly visiting the workplace, following the same safety rules as others, etc."

Operationally defined for this study, management practices were what managers do in the normal course of events to use the human and material resources at their disposal to carry out the organization's occupational safety and health strategy. This construct regarded the actions (e.g., planning, staffing, budgeting, training, communicating, rewarding) of middle and lower level managers.

7.   Core Processes Construct

All organizations have an internal operating scheme that facilitates daily business. This scheme or set of processes serves as "the cement that binds an organization together to make it

more than a collection of individuals with separate needs" (Weisbord, 1976). Processes aid the coordination, integration and evaluation of work, and thereby facilitate the roles and responsibilities of workers and enhance goal achievement and organizational survival.

a. Theoretical Discussion

Burke and Litwin (1992) define an organization's internal operating scheme as the "standardized policies and mechanisms that facilitate work, primarily manifested in the organization's reward systems, management information systems (MIS), and in such control systems as performance appraisal, goal and budget development, and human resource allocation." These internal systems or core processes include, for example, technology, communication, quality, and knowledge management (Weisbord, 1976; Porter and McLaughlin, 2006; Spannenberg and Theron, 2013; Edvardsson and Durst, 2013).

Within a business, core processes permeate at all levels – production, departmental, and leadership levels. Across organizations, though, the composition of core processes and their degree of standardization differ. The vital role of core processes has resulted in a solid literature base, much of which pertains to small and medium enterprises. Each core process could be discussed at length. Here, a few published studies will clarify the concept of core processes and to empirically highlight their relationship to performance.

Human resources management (HRM) is a frequently-examined, multidimensional process. The historic belief that smaller businesses either do not have or do not need personnel practices has been discarded. A firm's competitive advantage is predicated on its tangible and intangible internal resources, especially human resources (Pfeffer, 1998; Forth et al., 2006). Advantage not only depends on employees; it depends on the methods to gain and retain workers (Ferligoj et al., 1997). HRM may carry greater importance to smaller firms, who must achieve more with less. While many studies have positively linked formal HRM with performance (i.e., innovation, profitability,

productivity, turnover, social climate) (Sun et al., 2007; Messersmith and Wales, 2011), and at least two studies, which are discussed next, have causally associated the two (Razouk, 2011; Sheehan, 2014).

In his longitudinal examination of 275 small and mid-sized French firms, Razouk (2011) was the first to explore the causal link between 13 high performance work system (HPWS) variables and performance. A HPWS is "a group of separate but interconnected human resource practices that together recruit, select, develop, motivate, and retain employees" (Way, 2002; Wood and Wall, 2002). Razouk (2011) grouped independent variables into 5 categories – 1) appraisal, which regarded performance, training and promotion; 2) participation; 3) information sharing about HR strategy, economic status and employment changes; 4) compensation; and 5) communication with employees. By analyzing simultaneous associations and reverse causality, Razouk (2011) demonstrated that an index of these variables was "significantly and positively linked with profitability, innovation and social climate."

A similar UK study examined the causal link between performance and a different set of human resources practices. Sheehan (2014), who studied service and manufacturing sector SMEs, surveyed human resources directors or CEOs about common, formal HR practices, including, hiring; performance appraisal; compensation; education and training; employee involvement; sharing information; and personnel management. These variables, as an index, were significantly and positively associated with profitability and innovation and negatively related to staff turnover. Sheehan (2014) concluded that past human resources investments yielded positive future performance.

Other researchers have addressed organizational communication. Jayawarna et al. (2007) studied the impact of training incidence, intensity (i.e., number of training offerings), and formality on sales growth, employee growth, and SME survival. Their survey of owners/managers in United

Kingdom manufacturing firms found that SMEs that provided any kind of training experienced significant sales growth. Employee growth, too, was significantly and positively related to training incidence and intensity. Even though more respondents preferred informal information conveyance, such as coaching, networking, and attending seminars, Jayawarna et al. (2007) found that the best performing SMEs offered formal training (i.e., university courses, outside provides for in-house courses).

Small business researchers have also examined the core process of information management (IM). Even though smaller businesses rarely implement systematic information management methods, studies suggest that IM increases sales growth, productivity, process improvement, employee development, customer satisfaction, creativity and improves external relationships (Edvardsson and Durst, 2013). A variant of information management called knowledge management refers to an organization's systematic and specific process for acquiring, organizing, storing, retrieving, sharing and applying tacit and explicit knowledge. Wang and Yang (2016) empirically examined the impact of knowledge management (KM) on decision-making, work efficiency, and faster cycle time, for example, in Taiwanese SMEs. Authors measured system quality (i.e., technical infrastructure, ease of searching, ease of navigating, system speed, ease of communicating), knowledge quality (i.e., data accuracy, completeness, relevance, availability), service quality (i.e., resource adequacy and distribution, management support, use instruction), and actual KM use. Wang and Yang (2016) concluded that all KM measures predicted performance.

One appreciative study linked quality processes with improved business outcomes. Using a qualitative design, Murphy and Leonard (2016) interviewed ten winners of a home building quality award. Winners were small business owners who applied quality management principles. Subjects attributed their success to expert external quality guidance, employee involvement, and communication of quality ideas and quality vision. Performance impacts included fewer defects, less

variance between estimated and actual costs, and better cycle time, teamwork, customer satisfaction, business opportunities, and profitability.

b.   Operational Discussion

Some core processes have been discussed in safety and health literature. Even though most studies regarded larger firms, three peer-reviewed articles about human resources practices, reward processes, and policies and programs mentioned smaller firms.

Zacharatos et al. (2005) hypothesized that HPWS might lessen the lost-time injury rate in larger and smaller companies. Authors examined 10 independent variables, 7 of which were human resources practices related to hiring, training, decision-making, information-sharing, compensation, job security, and job status. Survey responses from one hundred thirty-eight human resource directors led Zacharatos et al. (2005) to conclude that their set of HPWS practices positively influenced workplace safety and accounted for 8% of the variance in lost-time injuries.

 In OSH, employers commonly penalize or reward safe and unsafe behaviors by withholding or offering cash, merchandise, recognition, or participation opportunities (Reason, 1998). Mattson et al. (2014) qualitatively evaluated the role of monetary bonuses on the safe behavior of nuclear power workers in three plants. Interviews addressed the bonus amount, dispensation to individuals versus teams, temporal relationship between good performance and pay, emphasis on bonus as an incentive, system fairness, and participation in bonus system development. Mattson et al. (2014) concluded that bonus systems neither engendered frustration and competition nor significantly propelled safe behavior; monetary rewards generally supported the existing safety attitude.

Authors have associated policies and procedures with safety climate and safety program effectiveness (Shannon et al., 1997; DeJoy et al., 2004). DeJoy et al. (2010) hypothesized and statistically confirmed that a firm's policies and programs not only reflected organizational safety and

health values, but shaped their safety climate, organizational commitment to safety, and number of reported accidents, to name a few.

For this study, the following adapted definition of core processes will be used – "the standardized policies and mechanisms that facilitate" occupational safety and health and manifest "in the organization's reward system, management information systems (MIS), and in such control systems such as performance appraisal, goal and budget development, and human resource allocation" and other systems including communication, quality, and technology (Burke and Litwin, 1992).

8.   Work Unit Climate Construct

The concept of climate, like that of culture, is heavily debated in literature. Unlike culture, which originated in the fields of anthropology and sociology, climate is older and rooted in psychology, especially in studies of experimentally-created social environments (Denison, 1996). In the 1960s, climate entered the realm of organizational studies. By 1970, three concepts of climate had been proposed – psychological climate, organizational climate, and a combination of organization perceptions and objective conditions (Denison, 1996).

a.   Theoretical Discussion

Over the course of four decades, at least 30 definitions of climate have surfaced in published literature (Cooper, 2016). Nearly all definitions can be assigned to one of two camps – psychological climate or organizational climate. The former refers to an individual level phenomenon involving individual perceptions of the environment. The latter is a group level phenomenon – an aggregate of individuals' perceptions. In general, climate is more often considered a shared perception (Katz and Kahn, 1978; Glendon and Stanton, 2000; Brown and Holmes, 1986; Ostroff et al, 2013).

In their model of organization performance and change, Burke and Litwin (1992) highlight the climate of the work unit. A work unit is a team of people who share a common goal, interest or task. In Burke's (2002) view, the work unit is one of the most important organizational sub-groups. Beyond the job itself, an individual's immediate work environment serves as that person's primary means for interfacing with the organization, his locus of socialization and support, and his source of information about organizational reality. Work unit employees share perceptions about how well they are managed, how clear job expectations are, how performance is recognized, whether decision making is inclusive, whether they feel treated fairly, how much support they feel from immediate colleagues, how well they relate to other work units, and how effectively their work environment is arranged (Burke, 2011).

While climate can be conceptualized in the purely subjective sense, Schneider and co-authors proposed the existence of an objective focus (Schneider and Bowen, 1985; Schneider et al., 1998; Schneider et al., 2013). He theorized that climate had specific dimensions or facets related to an organization's focus or strategic functioning. For example, a single organization possessed climates for customer service, productivity, innovation, and safety and all can be subjectively and objectively measured. Subjective measurement is the topic of this discussion and refers to members' collective perceptions of events and experiences.

Climate carries value in organizations, and studies have positively correlated climate with performance (Ostroff et al, 2013). Because dimensions of climate are intellectually more tangible than climate as a whole, it is more meaningful to study climate facets. Across sectors and organizations, researchers have strongly associated outcomes with various climate facets (i.e., productivity, ethical conduct, safety) (Schneider, 1975; Martin and Cullen, 2006; Zohar, 1980, 2010). For example, Schneider et al. (1998) demonstrated an association between customer service climate and actual customer orientation. In another study, innovative behavior was linked to innovation

climate as influenced by leadership, organizational support for innovation, role expectations, career stage and problem-solving style (Scott and Bruce, 1994).

b.   Operational Discussion

Safety climate is one of the two most frequently examined climate dimensions (Ostroff et al., 2013). Zohar (1980) adopted the climate concept from management literature and considered safety climate to be a subset or dimension of general organizational climate. Between 1980 and 2008, 130 articles about safety climate were published in peer-reviewed journals (Huang et al., 2010). Definitions of safety climate now pervade the literature. Some definitions consider safety climate to be an individual-level phenomenon like psychological climate (Dedobbeleer and Beland, 1991; Neal et al., 2000, 2006), but the lion's share view climate as a group-level phenomenon similar to organization climate (Cheyne et al., 1998; Zohar 1980, 2000; Coyle et al, 1995; Cooper, 2016). Wiegmann et al. (2002) offered one of the most comprehensive descriptions of safety climate: *"Safety climate is the temporal state measure of safety culture, subject to commonalities among individual perceptions of the organization. It is therefore situationally based, refers to the perceived state of safety at a particular place at a particular time, is relatively unstable, and subject to change depending on the features of the current environment or prevailing conditions." (Wiegmann et al., 2002)*

Even though definitions add mass and boundary to this abstract concept, researchers are more interested in the predictors or indicators of safety climate (Griffin and Neal, 2000). Prior studies have examined the link between safety climate and indicators of climate, such as safety rules, job satisfaction, safety design, job stress, teamwork, training, violations, communication, work pressure, risk taking, and management involvement (Flin et al., 2000).   Unfortunately, inconsistent inter-study naming, framing, and measuring has precluded the quantitative discovery of a common set of safety climate indicators (Coyle et al., 1995).

To qualitatively address this gap, Flin et al., (2000) compared safety climate instruments from eighteen published industrial studies. They extracted one-hundred individual and group-level safety climate variables and categorized them into 35 themes. Five of these themes appeared often in the studied instruments – management (i.e., attitude toward safety, supervisory style, safety commitment), safety systems (i.e., safety officials, committees, policies, equipment), risk (i.e., risk taking behavior, worker involvement), competence (i.e., safety knowledge, skill) and work pressure (i.e., pace, work volume). The first three themes, which appeared in nearly three-fourths of instruments, were deemed core themes (Flin et al., 2000). In most studies, indicators were extracted from literature rather than drawn from theory; only four researchers employed qualitative methods (i.e., interviews, focus groups, brainstorming) to uncover climate indicators.

Several studies have examined the value of safety climate. Safety climate not only associates with safe behavior and compliance (Tholen et al, 2013; Christian, Bradley, Wallace, and Burke, 2009; Lingard, Cooke and Blismas, 2009; Neal and Griffin, 2006; Cooper and Phillips, 2004; Schneider and Subirats, 2002), it mediates the occurrence of accidents and injuries (Beus et al., 2010; Christian et al., 2009).

Zohar (1980) was the first to propose a relationship between climate indicators and incident rates, even though he did not measure accident data. In his ground-breaking empirical study of safety climate, he surveyed 400 Israeli production workers in large industrial plants. To measure the strength of association between safety climate, safe behavior, and compliance, Zohar (1980) crafted a seven-dimension questionnaire covering the following topics –management's safety attitudes, promotion, social status, safety officer, training, workplace risk, and enforcement. Zohar discovered that safety training and management indicators most influenced accident rates.

Only a handful of peer-reviewed studies address safety climate in small and mid-sized businesses. Hon et al. (2014) examined the relationship between safety climate and near misses and

injuries in Chinese private and governmental repair and maintenance businesses. Managers, supervisors and workers completed questionnaires with safety climate indicators for management commitment to OSH, employee involvement, safety rules, work practices, and safety responsibilities. Respondents self-reported near misses, injuries, safety participation and compliance. Hon et al. (2014) concluded that safety climate was positively associated with safety participation and compliance and significantly negatively correlated with injuries and near misses.

To round-out this discussion, a clear distinction must be made between climate and culture, which, on the surface, appear similar. Burke (2011) says that - "climate is defined in terms of perceptions that individuals have of how their local work unit is managed and how effectively they and their day-to-day colleagues work together on the job. Climate is much more in the foreground of organizational members' perceptions, whereas culture is more background and defined by beliefs and values. The level of analysis for culture is the organization. Climate is, of course, affected by culture, and people's perceptions define both, but at different levels. … Although there are similarities, understanding the differences between culture and climate is one of the keys to understanding organization change…".

The work unit climate construct for this study will align with Burke and Litwin's (1992) description. This approach preserves the integrity of the Burke-Litwin model of organizational performance and change. In addition, the emphasis on climate as a group-level, rather than an individual-level, phenomenon, avoids conflict with the individual change readiness construct, which is conceptually similar with psychological climate. Therefore, the operational definition of work unit climate will be "the collective current impressions, expectations and feelings that members of local work units have" about occupational safety and health "that, in turn, affect their relations with their boss, with one another, and with other units" (Burke and Litwin, 1992).

9.   Individual Tasks and Skills Construct

Human capital is a valuable resource that enables organizations to profit and compete (Youndt et al., 2004, Diaz-Fernandez et al., 2014). The better the stock of human capital, the greater the success (Mincer, 1997). For success, though, there must be congruence between the job tasks and the worker. Alignment influences productivity through satisfaction and motivation (Burke, 2011).

a.   Theoretical Discussion

The individual tasks and skills construct, as conceived by Burke and Litwin (1992), refers to "the required behavior for task effectiveness, including specific skills and knowledge required of people to accomplish the work for which they have been assigned and for which they feel directly responsible" (Burke and Litwin, 1992). Simply put, this construct regards person-job fit.

The broader concept of person-environment fit (P-E) asserts that human behavior can neither be fully attributed to the characteristics of the individual nor the situation; behavior results from a combination of the two (Muchinsky and Monahan, 1987). Person-job (P-J) fit, which is a type of P-E fit, concerns the compatibility between essential job tasks and the individuals performing those tasks.

Edwards (1991) identified two reciprocal forms of P-J fit – needs-supplies (N-S) fit and demands-abilities (D-A) fit. Regarding the former, employers supply monetary compensation, both wages and merit pay (Turban and Keon, 1993); non-monetary benefits; and physical work space, for example, to attract individuals and to meet workers' needs. Such needs include compensation, opportunities for growth and achievement (Turban and Keon, 1993), interpersonal support, and preservation of personal values (Chatman, 1991). Needs-supplies fit is achieved when job attributes match employees' needs and preferences. Regarding D-A fit, employers expect individuals to contribute knowledge, skills, abilities, time, and commitment to achieve task performance (Edwards, 1991). To identify human capital criteria, employers must define job tasks and work conditions.

Potential employees, in turn, possess abilities that meet those criteria. Marimuthu et al. (2009) described two complementary forms of learned capital - valuable capital and firm-specific capital. Valuable capital refers to an individual's generally marketable knowledge and skills, often acquired through education and experience. Firm-specific capital "emphasizes the unique routines and procedures that have limited value outside the firm in which the capital base has been developed" (Marimuthu et al., 2009). Beside learned abilities, individuals possess innate abilities, such as learning capacity (Weiner, 2009), risk tolerance (Weiner, 2009), self-esteem (Turban and Keon, 1993), motivational traits and skills (Kanfer and Heggestad, 1997) and personal aptitude and attitude (Paloniemi, 2006). In one recruiting study, Johnson et al. (2008) determined that personality characteristics, such as inclusion, control, and openness, significantly influenced job applicants' interest in business manager positions. Demands-abilities fit is achieved when an individual possesses the capacity to meet job demands.

The concept of competence further fleshes out the individual's role in P-J fit. Competence refers to the personal characteristics that produces effective or successful performance (Armstrong, 2006; Gilley, 2009). Experts have named five fundamental dimensions of competence - motives, traits, self-concept, knowledge and skills (Spencer and Spencer, 1993). Skills and knowledge are often referred to as hard competencies, because their application is outwardly visible. Examples of knowledge and skills include the possession of technical information, interpersonal ability, physical dexterity, and analytical and conceptual thinking (Spencer and Spencer, 1993). The soft competencies, specifically motives, traits, and self-concept, represent individuals' desires, values, personalities, attitudes, and physical characteristics. An article about small and medium enterprises by Paloniemi (2006) showed that employees' knowledge, both practical and theoretical; skills, both technical and tacit (e.g., interpersonal, social, communication); and abilities were enhanced by the accumulation of work experience; job familiarity and willingness to actively learn enhanced "the

feeling of doing your job well, being an independent worker, having faith in yourself and working with greater ease and speed" (Paloniemi, 2006).

Favorable P-J fit leads to positive outcomes, including low job stress and better attendance, organizational commitment, retention, job satisfaction, motivation, and task performance (Edwards, 1991; Kristof-Brown and Zimmerman, 2005; Vogel and Feldman, 2009). A study of Singaporean SMEs, who sought expansion into China, demonstrated this point. Among the significant predictors of successful business expansion were employees' interpersonal and institutional business skills and their professional and technical knowledge (i.e., product quality, research and development, information systems, support services, marketing skills) (Xia, et al., 2007). Li and Hung (2010) also demonstrated that needs-skills and demand-abilities fit predicted organizational citizenship behaviors and job performance among Taiwanese bank and insurance employees. Both dimensions, in combination, better predicted outcomes than either dimension alone (Li and Hung, 2010).

b.   Operational Discussion

Occupational safety and health literature recognizes the need to place the right people in the right jobs. Among the antecedents of safe behavior and safety performance are individuals' safety knowledge, skill, experience, and motivation (Neal et al., 2000). However, safety literature appears to highlight the demands-abilities aspect of P-J fit.

A study by Aksorn and Hadikusumo (2008) demonstrated the application of individual tasks and skills to occupational safety and health. In a two-phase study, authors examined the relationship between 16 literature-identified critical success factors (CSFs) and accident rates in medium and large Thai construction firms. Two of the sixteen CSFs – personal competency and personal attitude – pertained to individual-level tasks and skills. Personal competency was described as "placing the right person on the right job. The right person was "physically and mentally capable

for carrying out the assigned tasks with the right knowledge, experience and skills" (Aksorn and Hadikusumo, 2008). Similarly, personal attitude was the "tendency to respond positively and/or negatively to certain persons, objects or situations;" in this case, the situation was occupational safety (Aksorn and Hadikusumo, 2008). Following survey of 80 construction safety staff and project managers, CSFs were ranked. While personal attitude ranked among the top 7 CSFs, participants considered personal competency to be one of the least important CSFs. Aksorn and Hadikusumo (2008) next examined accident rates and qualitative presence of critical success factors using a mixed-methods multi-case study. The construction firm with the most favorable performance on all CSFs, including personal attitude and personal competency, experienced 50% fewer accidents. This study demonstrated that 1) personal competence and attitude were measurable, 2) personal competence and attitude were part of a broader performance framework – much like the role of individual tasks and skills in Burke and Litwin's (1992) model of organizational performance and change, and 3) individual capacity was associated with low injury rates.

In summary, in this study, the individual tasks and skills construct was synonymous with person-job fit. The demands-abilities and needs-supports dimensions, which were once viewed as separate concepts, are now considered to jointly embody the conceptualization of P-J fit (Cable and DeRue, 2002; Scroggins, 2008). Indicators of fit are diverse and include delineation of work tasks, job compensation, technical knowledge and skills, personality, and preservation of personal values. Studies in businesses of all sizes show that several outcomes of interest, including safe behavior and injury rates, are positively influenced by P-J fit.

10.   Performance Construct

The primary reason for studying organizational dynamics and processes is to optimize performance (Daft, 2016). Burke and Litwin (1992) define performance as "the outcome or result as well as the indicator of effort and achievement (e.g., productivity, customer satisfaction, profit,

and quality)." This definition encompasses both interim and final outcomes, and pertains to both individual and organization-level performance.

a.	Theoretical Discussion

Within this seemingly straightforward description is the dichotomy of performance as a process or behavior and performance as an outcome (Campbell, 1990; Roe, 1999).

As a behavior, "performance is what the organization hires one to do, and do well" (Campbell et al., 1993). Individual performance is synonymous with job performance - the extent to which an employee effectively and efficiently meets defined objectives, and thereby contributes to the achievement of organization goals (Ford and Tetrick, 2008). Individual performance depends on the job and, as discussed previously discussed in the individual tasks and skills and individual change readiness sections, on multiple individual and situational factors. To enlighten these factors, Borman and Motowidlo (1993) further divide individual performance into task and contextual performance. Task performance is prescribed by the job and refers to the technical actions that literally translate raw materials or inputs into goods and services or outputs. Not surprisingly, an individual's knowledge skills, abilities, and experience influence task performance. Contextual performance, by contrast, refers to organizational citizenships behaviors that support the psychosocial work environment – volunteering for extra tasks, working enthusiastically, cooperating with others, following intra-organizational rules, and supporting organizational objectives. Discretionary behavior is most influenced by situational factors (e.g., work unit climate) and individual factors (e.g., personality, values). Both task and contextual performance contribute independently to an individual's overall performance (Motowidlo and Van Scotter, 1994), and together, both influence organizational effectiveness.

As an outcome, performance stems from the collective, cohesive action of employees at all levels in an organizational (Potnuru et al., 2016). While larger organizations value non-financial and

financial outcomes, they prefer the latter, which indicate how well their assets have translated into revenue (Malina and Selto, 2004). There are numerous ways to assess financial performance, and most regard costs, revenue, or profit. In a longitudinal study of European manufacturers, Bititci et al. (2011) found that managers examined and tracked very similar indicators of performance. Examples of financial outcomes include net profit, return on investment, and earnings before interest and taxes. Certain non-financial outcomes, too, are commonly measured, such as percent market share, innovation, customer satisfaction, and employee morale. Other non-financial outcomes are industry or product-specific. For example, tourism accommodation businesses monitor room occupancy rate (Morrison and Teixeira, 2004). It is important for organizations to supplement customary financial outcomes with firm-specific indicators of performance (Pfeffer, 1998).

Much like larger businesses, smaller businesses value financial and non-financial outcomes of performance (Chadwick et al., 2013; Georgiadis and Pitelis, 2012; Messersmith and Guthrie, 2010). In a study of 5,000 randomly-selected Australian organizations, smaller establishments were significantly more performance-oriented than larger firms (Gray et al., 2003). Attention to performance may not be surprising, given the high failure rate of smaller firms. In one study, profit, product and customer satisfaction outcomes were the focus for small Finnish companies, whereas UK firms emphasized financial variables, including overall profitability and debt level (Laitinen and Chong, 2006). Even though a key financial outcome for smaller firms is the break-even point (Morrison and Teixeira, 2004), growth and profitability are two of the most frequently monitored economic dimensions (Covin and Slevin, 1991; Murphy et al., 1996).

In historic management literature, other terms, such as effectiveness and success, have been used in lieu of the term performance. Organizational effectiveness is "the extent to which an organization as a social system, given certain resources and means, fulfils its objectives without

incapacitating its means and resources and without placing undue strain upon its members"

(Georgopoulos and Tannenbaum, 1957). As defined, effectiveness emphasizes both the

achievement and the process of achievement – much like Burke and Litwin's definition of

performance. Over the years, the term performance has predominated (Shenhav et al., 1994).

Success, too, has been referenced. This term, though simple, is subjective and much debated

(Rogoff et al., 2004). Some describe success as an aspect of performance (i.e., growth, profitability)

(Perren, 2000; O'Gorman, 2001), and others consider success an organization-specific objective, or a

high degree of overall achievement (Brooksbank et al. 2003).

b.   Operational Discussion

The topic of performance pervades occupational safety and health. Similar to business

literature, OSH literature distinguishes between performance as a behavior and performance as an

outcome. The former is often termed individual, process, or leading performance, whereas the latter

is considered organizational or lagging performance (Christian et al., 2009). To understand the

current view of safety performance, it is useful to first discuss outcomes.

Safety outcomes are believed to reflect the overall effectiveness of safety processes and

individual and group safety behaviors (Shannon et al., 1997; OECD, 2003). The field of OSH, like

the field of business, has identified numerous financial and non-financial safety outcomes. Unlike

business, though, safety and health focus heavily on non-financial performance. Non-financial

outcomes of interest include the number or incidence rate of near-misses, which are injury-free

accidents that disrupt work or cause property damage (Goldenhar et al., 2003); lost time accidents;

injuries; and fatalities (Shea et al., 2016). The most common and readily accessible outcome, though,

is the injury rate (Shannon et al., 1997). In the U.S., worker's compensation insurers and OSHA

regulators, either collect or mandate the collection of injury and illness counts. Both organizations

use rate data, such as the worker's compensation case rate, lost-time case rate, and total recordable

case rate, to determine policyholder insurance premiums (Wurzelbacher and Jin, 2011) and to prioritize OSHA inspections. Other entities, including the Bureau of Labor Statistics, trend injury rates for organizational comparison and research. Shannon et al., (1997) believe that "work injury rates are probably the most appropriate measure to use for evaluating the effectiveness of safety measures."

Historically, the safety and health field has deemphasized financial or economic performance. In recent years, though, OSH professionals have increasingly demonstrated the business value of health and safety (AIHA, 2008). Financially meaningful safety outcomes include the direct cost of injury, indirect cost of injury (i.e., lost productivity, equipment damage, time to correct/investigate), percent costs due to specific injuries/illnesses, cost per 1 FTE per year, percent costs due to lost time, and claim compensation rate (Dorman, 2000; Wurzelbacher and Jin, 2011; Shea et al., 2016).

Some OSH researchers have criticized the profession's heavy attention to outcome performance (Hopkins, 2009; Sinelnikov et al, 2015). Safety outcomes, as stand-alone indicators, have been criticized as retrospective, "failure-focused" (Sinelnikov et al., 2015), and generally insufficient indicators of health and safety productivity (Wurzelbacher and Jin, 2011). These concerns are fueled by the under-reporting and erroneous reporting of incidents, and the fact that, in some industrial sectors and very small businesses, injuries and illnesses are rare, statistically-insignificant events (Zohar, 2000; Glendon and Litherland, 2001; Cooper and Phillips, 2004). As such, injury rate data may be an unstable performance outcome (DeJoy et al., 2004; Havold, 2005).

"To reduce the dependence on accident data," recent emphasis has been placed on leading indicators of performance or performance behaviors (Rigby and Lawler, 2001). These antecedent "actions, behaviors and processes, [are] the things people actually do for safety" (Blair and O'Toole, 2010). Safety activity, whether mandated or voluntary, can be quantitatively and qualitatively

described. Quantitative examples of leading indicators are the number of workers trained, percent of workers using protective gear, number of inspection findings, and time to correct audit deficiencies. In recent years, there has been interest in qualitative performance, such as safety culture (Fernandez-Muniz et al., 2009), communication (Grabowski et al., 2007), employee involvement (Wurzelbacher and Jin, 2011), management commitment to safety (Lingard et al., 2011, Zohar, 2010), prioritization of safety (Glendon and Clarke, 2017), adherence to policies and procedures (Frazier et al., 2013; Payne et al., 2009); and post risk-assessment action.

At least two studies linked leading and lagging safety performance. Wurzelbacher and Jin (2011) compared leading safety performance in U.S. companies with high and low worker's compensation lost-time case rates. They found a significant inverse relationship between case rates and the conduct of near-miss investigations, analysis of job hazards, use of safety tools and devices, management of specific hazards (i.e., dusts, welding fume, slip and trip risks, ergonomic risks), monitoring of hazard controls, and the use of health promotion and post-injury medical management programs. Sheehan et al. (2016) regressed perceptions of the conduct of safety activities, such as audits, value placed on OHS, resources, employee involvement, OHS authority, and reward and recognition, with safety outcomes (i.e., reported injuries, unreported injuries, near-miss incidents). The conduct of leading activities was negatively associated with both unreported injuries and near-miss incidents.

Performance is a complex concept with behavioral, or leading, and outcome dimensions. The concept of performance in business and safety and health literature is well-developed. In safety, behavioral or leading performance is synonymous with safety activity, and at least two studies show that safety activity is linked with favorable results. In this investigation, performance was defined as the outcome or result of occupational safety and health effort and achievement.

11.   Organizational Change Readiness Construct

Change readiness, commonly termed organizational change readiness, is a multifactorial, multi-level concept. In literature, the term has pertained to any type of change at any level in an organization; however, "greater conceptual clarity would result if authors used the term organizational readiness for change to refer to the organization-level construct and used the term individual readiness for organizational change to refer to the individual-level construct" (Weiner et al., 2008). This discussion is devoted to the organization-level change readiness.

a.   Theoretical Discussion

The body of organizational change readiness literature is largely conceptual, but the number of empirical studies is growing (Weiner et al., 2008). Given the abstract nature of readiness, concepts of culture and climate often cloud the discussion. Weiner et al. (2008) offer clarity and states that readiness pertains to a specific change intervention, whereas culture and climate reflect the general state-of-affairs. Others concur that readiness refers to a specific innovation and not a general state of preparedness (Drzensky et al., 2012; Rafferty et al., 2013).

So, what is organizational readiness? Most often, authors describe readiness as a mental state, mainly cognitive and attitudinal (Weiner, 2009; Holt and Vardaman, 2013; Rafferty et al., 2013; Armenakis et al., 1993; Stevens, 2013). Thoughts and attitudes are conscious, reasoned ways of thinking and feeling about something or someone. Unlike cognition, attitude, is reflected in behavior. Because thoughts and attitudes are shared socially, readiness can be considered a shared or collective mindset about a belief, a commitment to act, or the ability to act on a specific issue (Rafferty et al, 2013). Weiner (2009) defines shared change commitment as "organizational members' shared resolve to implement a change," and change efficacy as the "shared *belief* in their collective capability to do so." Managers and employees may share very different views of a planned change initiative. Shared readiness refers to the extent to which people at all levels – leaders, change

agents, and recipients – similarly understand and view the change process. Shared resolve or team

unity is necessary to implement large-scaled planned efforts.

Organizational learning is a specific way to cultivate shared psychology (Weiner, 2009). By

systematically working together to identify new knowledge, formulate goals, build consensus, and

integrate that knowledge with existing functioning and historic experience, organizations learn, and

thereby, adapt to changing circumstances. By enduring this process together, as a social team,

members define directions and create results that they collectively care about (Senge, 1991).

Learning organizations are those that intend to transform themselves through social learning (Senge,

1991).

Newer literature emphasizes the affective psychological element (Rafferty et al, 2013). Even

though emotion or affect is a recognized, relevant change precursor (Weiss, 2002; Holt et al, 2007),

it has been under-emphasized and less studied (Rafferty et al., 2013). Affect pertains to individuals

and groups of individuals. Presumably, a positive or hopeful affect, rather than a sad, apprehensive

or anxious affect, is more conducive to change readiness. Affect can be measured by assessing

discrete emotions (Rafferty et al., 2013). Collective affect is shaped by situational cues – a sort of

emotional learning. "Emotional comparison occurs when individuals in ambiguous and

physiologically arousing situations – such as during periods of large-scale organizational change –

seek out and use cues from similar others to label their aroused state" (Rafferty et al, 2013).

Despite literary emphasis on the psychological component of organizational readiness, some

authors consider the capacity component equally important (Weiner et al., 2008). An organization's

ability to change is a functions of their physical capability to undertake change (Weiner, 2009).

Readiness as capacity is "the extent to which an organization is deemed to have the necessary

financial or human capital resources, appropriate policies and procedures, and other intra- and extra-

organizational characteristics to facilitate or hinder change (e.g., hierarchical structure, use of teams,

market position, industry regulations)." (Weiner et al, 2008). Capacity is often defined in terms of money, staffing, materials, and information (Lehman et al., 2002; Stevens, 2013). Staffing refers not only to the numbers of workers, but workers in the right positions. Adequate office space and IT equipment are examples of material resources (Lehman et al., 2002). Beyond this, time is a valued resource; abundant work tasks and other-than-change priorities pressures can derail change efforts (Weiner, 2009). Lesser referenced forms of capacity, that literally support and sustain a specific planned change, regard clarity of the change mission, policies and procedures, structure, task demands, and regulatory oversight (Lehman et al., 2002; Stevens, 2013).

The greatest conceptual clarity about organizational change readiness emanates from the fields of management and health, and the concept largely centers around two factors – shared psychology and structural capacity to undertake change. Commitment to change and ability to change are functions of the social group's value of the proposed change and belief that physical change is possible (Weiner, 2009). In addition, Stevens (2013) argues that readiness is a process rather than a static state.

b.   Operational Discussion

The concept of organizational change readiness is virtually absent from occupational safety and health literature. Even though behavior-change and motivation are referenced, they are individual-level rather than organization-level constructs.

That said, one empirical research study demonstrated the relevance of organization-level change readiness to workplace health and measurability in mid-sized businesses. Hannon et al. (2012) probed organizational readiness to implement workplace health promotion in businesses of all sizes. In their cross-sectional, national survey of low-wage employers, Hannon et al. (2012) inquired about shared attitudinal readiness to change (i.e., leadership support, perceived benefit) and readiness capacity (i.e., financial resources, wellness staff or committee, time). Human resources

managers from five industrial sectors - accommodation and food services, education, health care and social assistance, manufacturing, and retail trade – were interviewed. Descriptive statistics revealed that larger firms offered more wellness policies and programs than smaller firms. Even though readiness attitude was stable across business sizes and sectors, capacity differed. Smaller companies and those in the accommodation/food service and retail trade sectors reported lower capacity to change. Hannon et al. (2012) concluded that aspects of attitudinal readiness, namely the perceived benefit and feasibility of wellness programs, was positively and significantly associated with capacity, and capacity, in turn, was positively correlated with implementation.

For this investigation, organizational change readiness was defined as the collective psychological state and structural capacity to achieve specific occupational safety and health change.

12.   Individual Change Readiness Construct

Recall that change readiness is related to planned change. From the point that a specific plan is adopted, change agents cannot assume that individuals either understand or embrace change decisions. Further, because change is implemented through people, who must alter their way of work, individual readiness is an important consideration (Oreg et al., 2011). "Individuals' *perceptions* [italics added] of the attributes of an innovation, not the attributes as classified *objectively* [italics added] by experts or change agents, affect its rate of adoption" (Rogers, 2003). In fact, studies indicate that fewer than 20 percent of employees are ready to make directed changes (Prochaska et al., 2001; Levesque et al., 2001). However, individuals, who are ready, are more likely to participate in and support change (Stevens, 2013).

a.   Theoretical Discussion

Three groups of authors have largely shaped the modern conceptual view of individual readiness. Though each defines individual readiness a bit differently, all consider readiness to reflect the psychological state of change recipients. The authors' perspectives, though, differ on the nature

of cognition and extent of change-related behavior. In the simplest definition, Armenakis et al. (1993) consider individual readiness to be a cognitive precursor to change. Specifically, in their definition of change, Holt et al. (2007) include affect about change and adoption of change. Stevens (2013) goes further and considers readiness to be the long-term thoughts and behaviors that enable change. TABLE VI summarizes these three perspectives.

TABLE VI: DEFINITIONS OF INDIVIDUAL CHANGE READINESS

Author	Definition	Focus
Armenakis et al., 1993	"Readiness is the cognitive precursor to the behaviors of either resistance to, or support for, a change effort."	Cognitive
Holt et al., 2007	"The extent to which an individual or a collection of individuals is cognitively and emotionally inclined to accept, embrace, and adopt a particular plan to purposefully alter the status quo."	Cognitive
Stevens, 2013	"A positive and proactive response to change over time as a function of contextualized affective and cognitive evaluations."	Behavior

Armenakis et al. (1993, 2007) further characterized the cognitions that led individuals to either resistant or support a change intervention. In their view, the state-of-mind of individuals affected by change was shaped by five beliefs – discrepancy, appropriateness, efficacy, personal valence and principle support. Discrepancy was a foundational dimension that begged the question, *is change necessary?* A significant amount of research supports the notion that individuals must first believe that a reason for change exists (Bandura, 1986; Pettigrew, 1987; Kotter, 1995; Nadler and Tushman, 1989; Rafferty and Griffin, 2006). Those who recognize a gap between the current and

desired state are more likely to see a legitimate need for change, and those who don't, may view change as arbitrary. Appropriateness probes the fitness or correctness of the proposed change – *is the proposed change the right change?* For optimal readiness, the change should be perceived as the correct solution, and perhaps one that emanated from careful study of the problem. A higher belief in appropriateness fosters belief in change. Efficacy is the perceived ability to successfully implement the solution. Those who believe in their own capacity to change are more likely to undertake change (Bandura, 1986). The fourth dimension of personal valence asks, *what is in it for me if we change?* Higher valence, and thus higher degree of readiness, refers to the view that change increases personal benefit. Finally, principle support is the belief that key organizational leaders are wholly committed to the change – they are "walking the talk" (Armenakis et al., 2007). In this study, the latter dimension will be addressed by the leadership construct.

In addition to cognitive and affective views of readiness, Holt et al, (2007), through a review of readiness instruments, concluded that individual readiness was also influenced by the content or topic of change (i.e., what is being changed), implementation process, and the context or circumstances surrounding the organization.

Stevens (2013) uniquely proposed that individual change readiness was an iterative behavioral process that was perpetually influenced by personal and extra-personal factors. By heavily emphasizing the conditions of individual change readiness (i.e., content, change process, context) and the intra-organizational environment (i.e., history of change in the organization, leadership and management support, culture), Stevens (2013) explained that individual readiness was neither a trait nor a state, but a process.

A slightly different perspective of individual change readiness preceded the work by Armenakis et al. (1993, 2007), Holt et al. (2007), and Stevens (2013). This perspective, rooted in the field of personal health, has recently been applied in public health settings (Edwards et al., 2000) and

organizations (Prochaska et al., 2001). Historically, change readiness centered on behavior. Prochaska (1979) studied psychotherapeutic behavior modification in those with substance addition. Later, during a retrospective study of smoking cessation, in which a common sequence of change-related behaviors was identified, Prochaska and DiClemente (1982) proposed the Stages of Change theory. According to their transtheoretical model, when presented with a change opportunity, individuals will exhibit behavior at one of five stages - precontemplation, contemplation, preparation, action, and maintenance (Prochaska and DiClemente, 1982). Readiness for change was most often associated with the preparation stage (Weiner et al., 2008). Historically, because an individual's receptiveness to intervention depended on their stage of readiness, it was beneficial to name that stage.

b.   Operational Discussion

Even though behavior-change and motivation are discussed in occupational safety and health literature, the more substantive topic of individual readiness is virtually absent. A Boolean search of the terms *change readiness* OR *individual readiness* AND *safety* in specific business, social science and physical science databases, yielded one relevant article. In their case study, Barrett, Haslam, Lee and Ellis (2005) described the application of Stage of Change theory in a manufacturing company with nearly 200 employees. Safety and health deficiencies were evident in this pre-fab building manufacturer, and authors assessed the health and safety attitudes and beliefs of individuals at three organizational levels – senior management, middle management and production workers. To collect data, authors posed stage-specific questions, and upon encountering difficulty with stage diagnosis, they augmented questioning with interviews and a climate assessment. Barrett et al. (2005) concluded that senior managers, production managers, and employees were at varying stages of change readiness. In addition, the readiness differential was greatest among production workers. Unfortunately, the authors used the Stage of Change model to assess the state of safety in the case

organization, rather than to inquire about a specific safety change. The use of change readiness in this manner – as a measure of culture or climate – confounds the reigning notion that individual readiness pertains to a planned, specific intervention (Weiner et al., 2008). Nonetheless, Barrett et al.'s (2005) study demonstrated that change readiness could be measured and that readiness concepts had utility in the occupational safety and health realm.

For this study, a modified version of the Holt et al. (2007) definition was adopted. Their definition encompassed cognitive, affective, and iterative change factors. Consequently, individual change readiness was defined as **"**the extent to which an individual or individuals are cognitively and emotionally inclined to accept, embrace, and adopt a particular **"** occupational safety and health "plan to purposefully alter the status quo" (Holt et al., 2007).

CHAPTER III

<u>**Introduction**</u>

Using a systems model, the purpose of this research is to explain the attainment of low rates of occupational injury and illness in safety-successful medium businesses. To fulfill that purpose, an exemplar case was selected from a population of OSHA SHARP certified firms and examined using multiple sources and mixed methods. This chapter specifies both theoretical and practical aspects of the research design, study population, case selection, methods of data collection and analysis, information management, and study quality.

<u>**Study Design**</u>

Yin (2014), a renowned qualitative research methodologist, says that every empirical study has a design, whether that design is implicit or explicit. Explicitness, though, allows others to examine the study's strengths and limitations. In complex, dynamic environments, like organizations, controlled, deductive designs are ineffective for disentangling the interconnected milieu (Barends, 2014). By contrast, applied research designs, facilitate probing and learning in real-world situations. For this applied investigation, case study research was combined with appreciative and retrospective inquiry.

A.   Case Study Research

Case study research is one type of applied research. "A case study is an empirical inquiry that investigates a contemporary phenomenon (the "case") in depth and within the real-world context" (Yin, 2014). Using systematic techniques, case investigation broadly and deeply describes or explains an event or set of events (Bromley, 1990). Case inquiry asks, "not whether [things] work, but how they work" (Rogers, 2000). Unlike basic research, case research compels the investigator to interact with the case, collect rich information, and ethically report findings and observations (Stake,

2005). Consequently, case study probes phenomenological context in ways that basic science methods cannot. The hallmark of case study research is the collection of detailed, multi-sourced data from single or multiple cases with or without embedded units of analysis.

Embedded designs permit more comprehensive inquiry of the phenomenon of interest (Patton, 2015). With this approach, multiple sub-units within a case are examined. For example, in the study of an organization, "the main unit [case] may be a company as a whole, and the smallest units may be departments or even groups of individuals, such as owners and employees" (Scholz and Tietje, 2002). In these information-rich investigations, embedding facilitates data organization and integration (Yin, 2006; Baxter and Jack, 2008; Creswell et al., 2011).

Doorewaard's (2012) description of the multi-case framework is equally relevant to single case designs. Underpinned by theory, research questions are first defined. The presumed answers to those questions inform the creation of a conceptual model, which visually depicts "the territory you want to study … a visual display of your current working theory … what you think is going on with the phenomenon" under investigation (Lesham and Trafford, 2007). For each case, or for a single case, constructs are intentionally probed. Case study research culminates with the comparative search for data similarities and differences across sources, and for multi-case designs, across cases. Importantly, case research fundamentally differs from the educational or technical concept of case study, where cases serve illustrative, rather than investigative, purposes (Yin, 2014).

For inductive designs, like case study, research questions are the core of the design; they replace hypotheses (Maxwell, 2009). Hypotheses are appropriate in deductive and comparative investigations (Maxwell, 2009). Because inductive studies, neither test theories nor test the strength of differences, hypothetical reasoning is customarily absent. Rather, case studies, which examine "the process by which phenomena take place," tend to generate, rather than test, hypotheses (Maxwell, 2009).

For several reasons, a single-case embedded design was chosen for this investigation. First, because medium businesses are complex, dynamic social systems, a context-embracing approach was warranted. Second, case methodology, which is particularly useful for answering *how* and *why* research questions (Yin, 2014), was best able to answer this study's primary question – how do medium-sized businesses with exemplary occupational safety and health performance achieve low rates of occupational injury and illness? Third, regarding the rationale for a single case, this study intended to deeply understand a rarely-examined phenomenon – the successful and sustainable achievement of low rates of occupational injury and illness. Therefore, a single significant or exemplar case is ideal for learning, in detail, about a specific phenomenon (Patton, 2015). Finally, embedded units of analysis added depth to this single case by enabling the study of performance from three intra-organizational perspectives - the organization level, group level, and individual level (Figure 4). The organization level referred to executive and top managers, who oversaw the business, set direction, and influenced corporate culture. The group level pertained to operations staff who managed vital business functions, including human resources, marketing, accounting, and safety. At the individual level, employees carried out daily service and production activities. These units of analysis corresponded to the levels in the conceptual model.

Figure 4: Single-Case Embedded Design
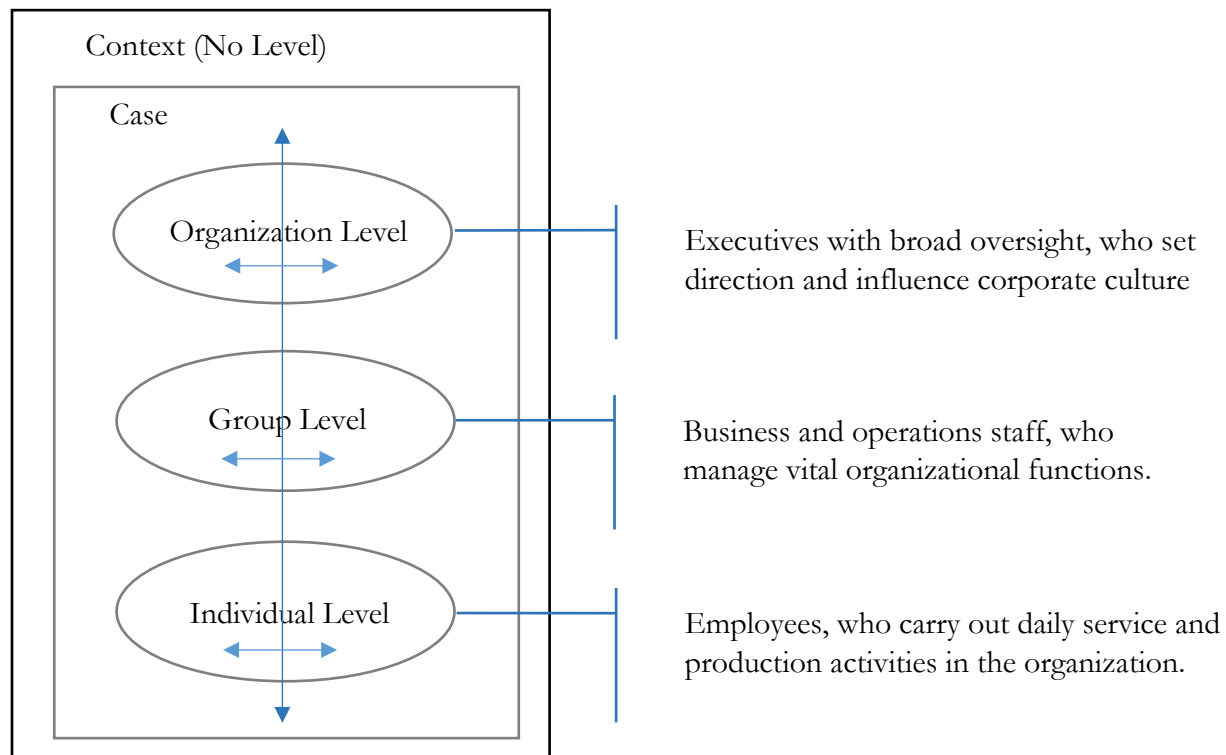
B.   Appreciative Inquiry

        The approach to inquiry for this study was appreciative, rather than deficit-oriented. Deficit-based research is common when something, an organization for example, is ineffective or under-performing (Reed, 2007). Appreciative inquiry (AI), though, is "a positive, strength-based, participatory methodology that seeks to discover the best in people and their organizations" (Stratton-Berkessel, 2010). Traditionally, AI has been used as an organization development tool in public and private sectors. In the past decade, AI has been adapted to research for the purposes of identifying strengths and understanding how to reproduce successful processes. AI asks, "what is working around here?" (Hammond, 2013).   This approach to inquiry is particularly useful in low-

trust situations, such as occupational safety and health where individual and organizational behaviors may carry ethical and legal consequences (Reed, 2007).

For the proposed study, AI was chosen for its ability to describe the successful transition of one medium business from injury-prone to exemplary. The appreciative perspective also complemented the abundance of problem-oriented literature about occupational safety and health in smaller organizations. In fact, positive orientation is a recognized gap in safety and health literature. In their review article, MacEachen et al. (2010) noted that small business studies "tended to be problem-focused rather than solution-oriented."

C.   Retrospective Inquiry

This research also inquired retrospectively. In retrospective designs, data is collected after the events of interest have occurred and the outcomes are known, and even though events and outcomes cannot be observed in real-time, relevant archival documents and subjects with first-hand experience can be accessed. "Retrospective case studies are most suitable when the research question focuses on longer term changes taking place in a process, variable, or general phenomenon. The longer the temporal period required to detect changes …, and the greater the availability of respondents who can provide first-person accounts …, the more appropriate a retrospective case design becomes" (Street and Ward, 2010).

In this study, retrospection enabled the discovery of historic decisions, events, actions, and processes that led to the case's low rates of occupational injury and illness. According to published accounts from SHARP certified medium-sized firms, the achievement of low TRC rates required long-term organizational change – roughly 2 to 10 years (OSHA, n.d. a). To optimize information recall and availability, the timeframe for this investigation was as current and narrow as feasible.

D.   Case Selection

Case selection is pivotal in case study research. In exemplar case studies, special or unique cases are chosen for their ability to display the phenomenon of interest; exemplars are not intended to be representative (Maxwell, 2009; Yin, 2014; Patton, 2015). Here, the phenomenon of interest is the successful achievement of low rates of occupational injury and illness by medium firms. Logically, then, the exemplar must be drawn from a population of businesses that have achieved marked improvement in safety and health outcomes.

1.   Study Population

OSHA SHARP businesses are, by definition, considered to operate exemplary safety and health programs, and they have achieved lower-than-industry-average rates of injury and illness (OSHA, n.d. b). Across 50 states and five U.S. territories, more than 1,300 smaller firm representing a wide variety of industries are SHARP certified. To earn the SHARP credential, businesses must 1) employ fewer than 250 workers, 2) request and participate in comprehensive consultation from an OSHA On-Site Consultation Program, 3) involve employees in the consultation process, 4) correct identified hazards, 5) implement an injury prevention program, such as OSHA's Safety and Health Program Management Guidelines, 6) notify the Consultation Program of changes in hazards and working conditions, and 7) maintain injury/illness rates below their industry-specific national average (OSHA, n.d. c).

In this investigation, the study population was further reduced to minimize the influence of factors that may be unique to twenty-eight OSHA State Plan states and territories. Consequently, the exemplar case was chosen from about 770 SHARP-certified firms in states or territories under federal OSHA jurisdiction; medium businesses comprised a fraction of this total. In their public list of certified firms, OSHA's On-Site Consultation Program does not publish firm size, but half are reasonably estimated to employ 50 – 249 workers. Therefore, the study population consisted of about 385 mid-sized, SHARP certified businesses in federal OSHA states.

For obvious reasons, the population was limited to firms that are required to keep OSHA records. Certain employers, because of size or North American Industry Classification System (NAICS) category, are exempt from injury and illness recordkeeping (OSHA, 2014).

Importantly, even though a set of SHARP organizations served as the study population, this research did not focus on SHARP achievement. Rather, the study used SHARP certification as a marker of safety excellence through which a broader array of factors could be examined. These factors were different from or beyond SHARP requirements.

2.   Exemplar Case Selection

An exemplar case was purposefully chosen from eligible cases in the study population. Purposeful selection is appropriate when a limited number of cases are available (Light et al, 1990). To ensure that the exemplar was research-relevant and data-rich, eligible cases met additional criteria. First, eligible businesses engaged in private, rather than public, business. Private and public firms have different motives, stakeholders, financial sources, and obligations. Beyond that, U.S. public firms are exempt from federal OSHA requirements, and in state-run OSHA states, public firms may be covered by unique state-specific requirements. Second, eligible cases achieved OSHA SHARP status within the past 5 years. This proximate timeframe increased the likelihood of encountering employees with first-hand knowledge of safety and health improvement and optimized participant recall and document retrieval. Third, eligible exemplars maintained SHARP status since initial certification. Uninterrupted SHARP designation served as evidence of organizational commitment to safety and health and ability to maintain programmatic excellence. Finally, eligible cases demonstrated improved safety and health outcomes, specifically TRC rate improvement, across the retrospective timeframe. TRC improvement reflected the positive impact of safety and health change.

Prior to recruiting the exemplar, a handful of eligible cases were identified in a state that was geographically proximate to the researcher. To identify those cases, which are listed in Appendix B, the researcher worked with On-Site Consultation staff. Once potential exemplars were named, companies were prioritized by their fulfillment of eligibility criteria. Higher priority was given to companies that recently attained initial SHARP certification; achieved marked TRC rate improvement; and were likely to possess the resources, interest, and ability to participate in this study. Regarding the latter, effective research depends upon positive relationships (Maxwell, 2013).

Thereafter, an On-Site Consultation Program Consultant contacted the leading exemplar and obtained permission to release their contact information. The researcher then telephoned the prospective business and outlined the research scope, benefits and risks. A script for this telephone conversation appears in Appendix C. A second telephone conversation was conducted with an authorized decision-maker to further explain the study's purpose, participant expectations, data confidentiality, and on-site requirements. As advised by Maxwell (2009), the case representative's questions were answered and mutual expectations negotiated. Once established, the research agreement was formalized in a Letter of Support from the exemplar. At the request of the case organization, the researcher completed a non-disclosure agreement.

3. Case Description

The case was a medium-sized, custom plastics manufacturing company in the continental United States. Formerly part of a large firm, the company was founded thirty-two years ago by a single entrepreneur. Since inception, the manufacturer had produced highly-engineered, custom plastic products for architectural, scientific, and medical purposes. Over the past two decades, the company's international market overtook their domestic market. To meet international demand, an independently-operated facility was opened in 2001 in Asia. The company's products have been installed in more than 50 countries, and by 2011, annual revenue was estimated to be $50 million. In

2013, the owner-operator sold the company to a private capital investment entity, who largely preserved management and operations.

For at least eleven years, the U.S. facility employed more than 50 workers. While employment fluctuated over the past decade, the employment trend, both numbers of workers and hours worked, was positive (Figure 5). Between 2009 and 2012, during the U.S. economic downturn, the company's production rallied and staffing almost doubled. One hundred or more workers, on average, have been on the payroll since 2011. The current 100-person workforce is male-dominant and racially Caucasian and Hispanic. Sixty percent of workers spoke primarily English, and forty percent spoke primarily Spanish. All but one Spanish-speaker worked at the individual- or production-level. At the time of study, all but one employee worked full-time.

Figure 5: Employment Trend in Case Organization, 2007-2017

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Hours Worked	109492	131820	134180	172589	175302	151793	162730	285004	237175	233663	251530
Number of Employees	88	65	83	93	116	108	115	130	118	105	106
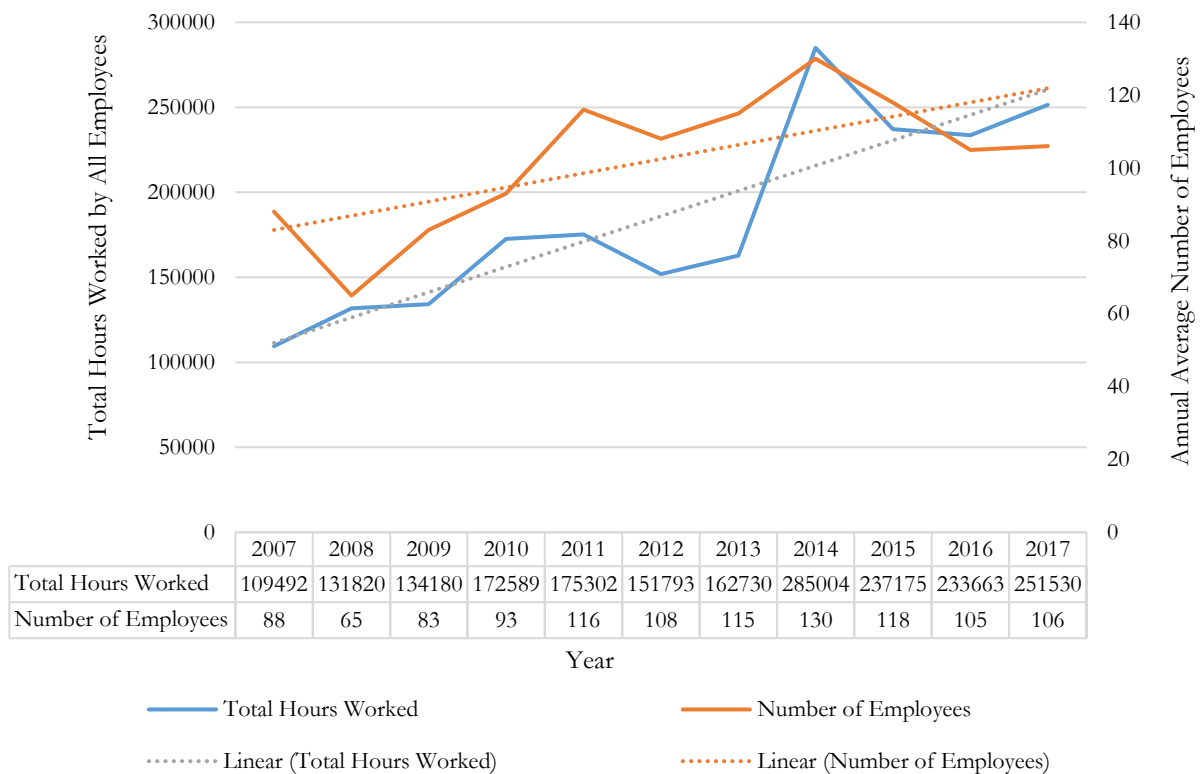
This case was exemplary for two reasons. First, in 2016, the company was awarded a 1-year OSHA SHARP certificate. That award was extended in 2017 to a 3-year SHARP credential. Second, the case experienced dramatic reductions in occupational injury and illness rates over the study timeframe. Since peaking in 2011, Total Recordable Case (TRC) and Days Away, Restricted, or Transferred (DART) rates have declined. Beyond 2015, the company's three-year average TRC and DART rates have been below the national industry average (Figure 6). Unpaired t-testing confirmed significant differences in the average TRC and DART rates before 2013 (Group 1) and after 2014 (Group 2) [TRC: $t(9)=2.6463$, $p=0.0266$; DART: $t(9)=6.0625$, $p=0.0025$].

Figure 6: Case Organization Occupational Injury and Illness Rates, 2007-2017
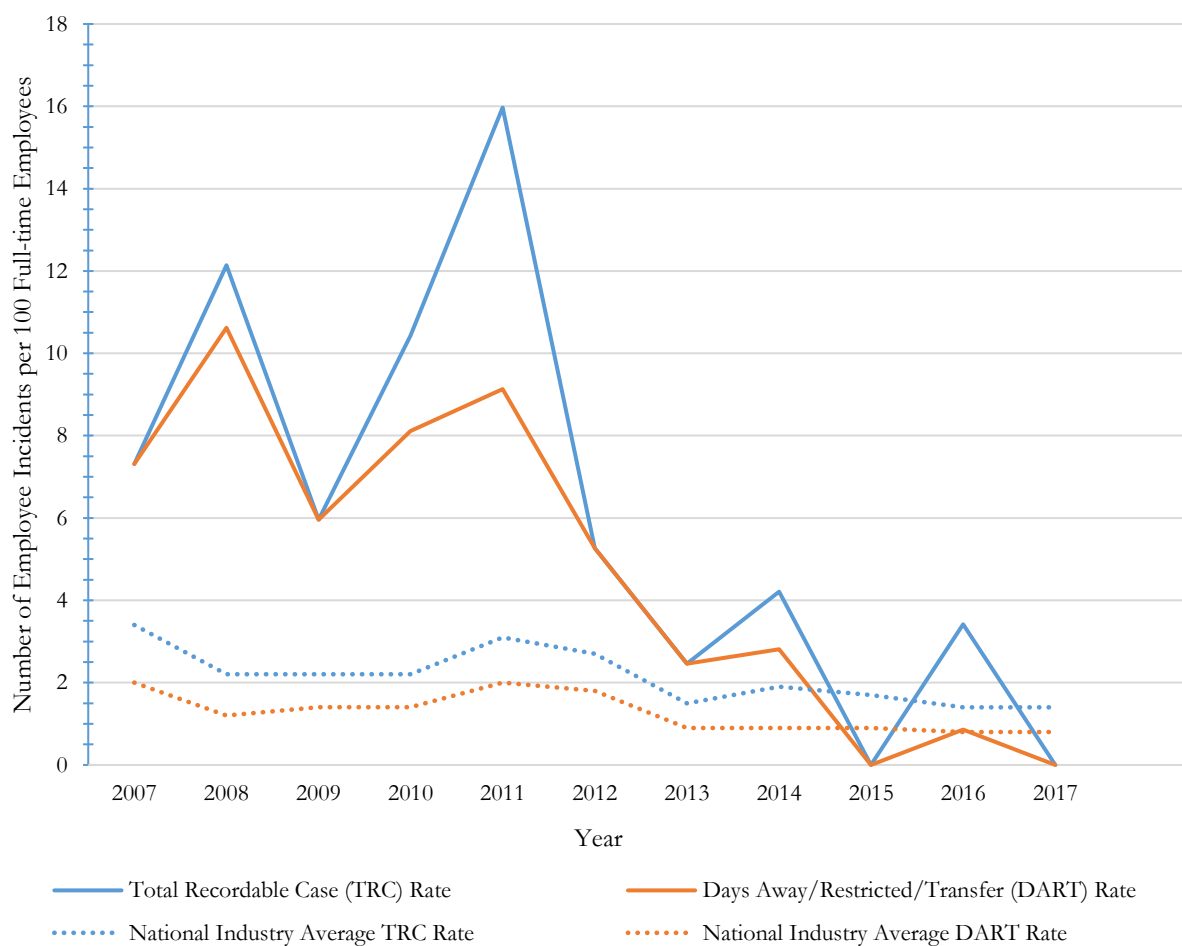
Data Sources and Analysis Plan

This section describes the systematic plan for conducting this investigation, including the retrospective timeframe, research subjects, data gathering and analysis procedures, management of information, ethical obligation, and study quality.

A.   Retrospective Timeframe

The retrospective timeframe refers to the temporal boundaries of a study. In this investigation, the timeframe broadly represented the period of organizational transition from a higher state of occupational injury and illness to a lower state. Specifically, this period centered on the exemplar's initial SHARP certification date – August 3, 2016 – and was bracketed by the present date and a historic date no longer than 5 years before SHARP designation. Consequently, the research timeframe extended from August 2011 through March 2018. While the vast majority of data regarded this timeframe, historic data was included or context purposes.

B.   Research Subjects

The employees of the exemplar case served as potential research subjects. Employees were informed about the research and their roles and rights via the distribution of English- and Spanish-version Research Information and Consent for Participation summaries (Appendices D and E). To participate, self-selecting subjects met four inclusion criteria at the time of data collection: 1) at least 18 years of age, 2) employed full-time, 3) employed for pay, and 4) either fluent in English or Spanish. Screening questions were used on paper instruments and during interview to verify eligibility. To the extent possible, voluntariness and privacy were protected.

C.   Mixed Methods

Numerous, even conflicting, definitions of mixed methods have been offered in literature. Most definitions point to the blended use of qualitative and quantitative data, either concurrently or sequentially in a single study, to deepen understanding and corroborate evidence (Johnson et al., 2007; Yin, 2006; Tashakkori and Teddlie, 2009). Qualitative approaches are flexible, descriptive, inductive, and valued for uncovering the processes that led to outcomes of interest – "processes that experimental and survey research are often poor at identifying" (Maxwell, 2013). In contrast, quantitative methods are objective and deductive; using statistical tools, these methods measure the

relational strength between independent and dependent variables (Morgan, 2014). A mixture of methods is best for research problems "in which the quantitative approach or the qualitative approach, by itself, is inadequate to develop multiple perspectives and a complete understanding" (Creswell et al., 2011).

Philosophically, mixed approaches are pragmatic and driven by research questions that seek to illuminate real-life situations and their contexts (Johnson et al., 2007; Creswell et al., 2011). Even so, there are different reasons for mixing methods, such as seeking converging or complementary evidence, using one method to develop another method, or uncovering information that leads to new theories (Greene et al., 1989). Practically, mixed research employs theoretical and conceptual underpinnings, multiple sources of data, intentional data integration, and holistic interpretation. According to Yin (2006), mixing should be evident throughout the study design – in research questions, units of analysis, data collection methods, and analytic strategies.

For many of these reasons, mixed methods were employed in this study. Here, for targeted aspects of the conceptual framework, qualitative-dominant approaches were combined in tandem to achieve data corroboration and complementarity. Qualitative data were collected via Critical Incident Reports (*aka* Short Story Worksheets); interviews; archival documents, both private and public; and field notes. For two of thirteen constructs – work unit climate and organizational performance – quantitative data was gathered from one survey and archival documents (i.e., OSHA Form 300). Even though statistical significance and generalizability are sought in quantitative approaches, this study did not seek significance. However, descriptive and inferential statistics were employed to compare data. The Measurement Table (TABLE LIII, Appendix F) links research questions, theoretical constructs and associated key words, data sources, data analyses, and outputs.

1.   Methods Overview

After the exemplar case was named, this data-rich study unfolded in four consecutive phases (Table VII). In phase 1, preliminary data were collected and analyzed to set the stage for further study. The case's exemplary status was verified, and to gain early insight about safety and health, Critical Incident Reports were solicited from organization-wide employees. In phase 2, data from all other sources (i.e., survey, interviews, archival documents, field notes) were gathered. In addition, two types of analyses occurred – individual-source analysis and within-source analysis. Next, in phase 3, data across sources was combined and examined for patterns and relationships. Finally, in phase 4, all data were synthesized and interpreted, and all research questions were answered.

TABLE VII: PHASES OF RESEARCH

Phase	Purpose	Data Collection	Data Analysis
1	Case Familiarization	Archival Documents, Critical Incident Reports	TRC Rate Verification, Analytic Memoing
2	Data Collection, Individual- and Within-Source Analysis	Work Unit Climate Survey, Interviews, Archival Documents, Field Notes	Content Analysis, Survey Analysis, Data Integration, Analytic Memoing
3	Cross-Source Analysis	None	Data Integration, Timeline Creation
4	Interpretation	None	Data Synthesis, Answer Research Questions

2.   Pilot Testing of Instruments

Before initiating the study, to gauge question clarity and construct coverage and to validate the study methods, all data collections instruments, including the interview guide, were pilot tested

with an ineligible, medium-sized OSHA SHARP business. Based on feedback, some explanatory text was shortened and two interview questions were reworded to clarify terms and intended meaning.

3.   Data Collection

In the first and second phases, information about thirteen constructs and three units of analysis was collected from six qualitative and quantitative sources. TABLE VIII displays the relationship between the constructs and data sources.

TABLE VIII: CONSTRUCTS, DATA SOURCES, AND DATA TYPES

Construct	Data Source	Data Type
External Environment, Organizational Readiness, Leadership, Mission and Strategy, Culture, Structure, Management Practices, Core Processes, Individual Readiness, Individual Tasks and Skills, Time	Critical Incident Reports, Interviews, Archival Documents, Field Notes	Qualitative
Work Unit Climate	Work Unit Survey, Critical Incident Reports, Interviews, Archival Documents, Field Notes	Qualitative, Quantitative
Organizational Performance	Critical Incident Reports, Interviews, Archival Documents, Field Notes	Qualitative, Quantitative

All data collection instruments and information materials were available in English and Spanish languages. After English instruments were finalized, a two-person, professional team – one native English speaker and a second native Spanish speaker – translated instruments into Spanish. Translation teams, rather than individual translators, are the preferred method for translating survey instruments (Harkness, 2010). English to Spanish translation was not word-for-word; rather, translation preserved semantics, question format, and response option measurement.

a.   Data Collection: Phase 1

1.   Verification of Exemplary Status

This study depended on the exemplary safety and health status of the selected case. Before significant research effort was invested, the case's OSHA SHARP certificates were examined.

2.   Critical Incident Reports

To learn broadly about the case, Critical Incident Reports were solicited. The Critical Incident Report (CIR) is a narrative-based, primary data collection tool (Bloomberg and Volpe, 2012). This tool prompts brief, question-driven, reflection-oriented narrative from individuals with knowledge of a specific phenomenon. Because CIRs are brief, data can easily be collected from a large group of participants. Brookfield (1991) cautions that CIRs, due to their brevity, should be used in conjunction with other qualitative data tools. "Critical incidents serve as a "validity check" on some aspects of the data uncovered in the interviews," (Bloomberg and Volpe, 2012).

For this study, the term *critical incident* was publicly avoided, because, in occupational safety and health, critical incidents imply adverse events, such as accidents, injuries, inspections, or violations. Instead, the appreciative term *short story* was used. The use of CIRs at the study's outset intended to spur broad worker involvement and generate diverse ideas. Consequently, all employees, regardless of job title or duration of employment, were invited to complete a Short Story Worksheet (Appendices G and H). English and Spanish language Worksheets contained research

items and screening and demographic questions. The latter questions were used to remove ineligible participants and to stratify responses by unit of analysis. To avoid access bias in the mid-sized case, whose production workers did not routinely use computers, paper forms were used. Anonymous completion and submission were interpreted as consent to participate. On two occasions at the case site, Short Story Worksheets were made available for a defined time-period.

In this investigation, CIRs served two purposes. In phase 1, short stories, which disclosed safety-related events, terms, job titles, relationships, and dates, oriented the researcher to the case and context. *En masse*, Short Story Worksheets enhanced the researcher's interview preparation and probing. The second purpose of CIRs occurred in phase 2. There, after screen failures and incomplete worksheets were excluded, all CIRs underwent content analysis.

b.   Data Collection: Phase 2

In phase 2, data were collected from all other sources – one Work Unit Survey, nine interviews, archival documents, and researcher-generated field notes.

1.   Work Unit Climate Survey

Surveys are common quantitative research tools that enable the collection of data from larger participant groups. They uncover normative data, extreme information, and data relationships that might be generalizable to a population of interest. Once designed, though, survey instruments only yield pre-defined information; consequently, they are "inflexible to discoveries" (Gable, 1994).

In phase 2 of this investigation, a short survey of attitudes and beliefs will be used to assess one construct – work unit climate. Because climate is a collective and subjective phenomenon, climate is best studied using quantitative methods (Schwartz and Davis, 1981) that aggregate individual responses to the unit-level (Baer and Frese, 2003). Aggregation aligns nicely with this study's embedded design. Even though the Work Unit Climate survey only measured cross-sectional safety climate, other data sources queried past climate and changes in work unit climate.

Cox and Flin (1998) assert the absence of a standardized tool for studying safety climate. Among the multitude of available instruments is Hahn and Murphy's (2008) 6-item global safety climate survey, which is well-tested, validated, and designed for cross-industry use (NIOSH, 2015b). Even so, Hahn and Murphy's (2008) survey employs an agree-disagree scale, which survey experts have shown to confuse respondents and increase the likelihood of acquiescence bias (Krosnick and Presser, 2010). As such, the response options in this study were converted to Likert-type options and ordered to minimize social desirability bias (Krosnick and Presser, 2010). Open-ended demographic questions were also added to stratify responses by unit of analysis. The modified Spanish- and English-version Work Unit Climate Questionnaires are shown in Appendices I and J.

The researcher administered the paper-based Work Unit Climate Survey on-site, along with copies of the Research Information and Consent for Participation narrative (Appendices D and E). All employees were offered questionnaires, and anonymous completion and submission was interpreted as consent.

2.   Interviews

Interviews are one of the most common sources of qualitative data (Fossey et al., 2002). Verbal exchange deepens the understanding of phenomena and is "optimal for collecting data on individuals' personal histories, perspectives, and experiences, particularly when sensitive topics are being explored" (FHI360, 2005). Given the ethical risks of workplace hazards and legal risks of regulatory compliance, occupational safety and health is a sensitive topic.

Selecting the right interview participants is crucial for collecting the right data. The best participants are those that have firsthand knowledge of the event or phenomenon of interest (Weiss, 1994). In this study, an Interview Screening Questionnaire was used to identify subjects, who were familiar with the transformation of the case organization into an exemplary safety and health performer (Appendices K and L). After subjects screened favorably, ideal participants were those

that had been employed the case site during the research timeframe, possessed direct knowledge of some safety and health improvements, and expressed willingness to reflect on past experiences with the researcher. Nine individuals – three from each unit of analysis, were purposefully selected from the group of qualified candidates. Their privacy was maintained throughout the interview process.

In qualitative research, interview questions should elicit story-telling in an open, non-leading manner (Patton, 2015). As such, there is no value in using validated or highly-specific interview questions. In this study, interview questions were crafted by the researcher and informed by OSHA's On-site Consultation Program Success Story Template (OSHA, n.d. d) and by the interview topics in a grounded-theory study of safety and health performance by Robson et al. (2016). The interview questions were collated in a semi-structured interview guide, which permitted consistent, but flexible, data collection (TABLE LIV, Appendix M). Semi-structured interviewing facilitated deeper exploration of topics and probing of unanticipated information (Patton, 2002).

For consistency, the researcher conducted all nine interviews face-to-face at the case organization. A professional Spanish interpreter participated in the interview of one Spanish-speaking employee. At the time of scheduling, pre-defined questions were shared with subjects to enhance their recollection and reporting of events (FitzGerald et al., 2008). Immediately before interviews, the researcher verbally reviewed the purpose of the study, risks and benefits of participating, and rights of participants (Appendices D and E). Verbal consent and permission to record interviews was secured before research questions were posed. Interviews then proceeded according to the Interview Guide. During interview, every effort was made to put the employee at ease and foster candor. Each interview was completed in less than 75 minutes. Subjects who complete their interview received a gift card of nominal value. Following each interview, the researcher documented unrecorded comments, observations, and personal reflections in a field note. Field notes served as a separate data source.

3.   Field Notes

Field notes are a vital source of data in qualitative and mixed studies. Notes or memos, which are a product of analytic memoing, are documented by the researcher to capture contextual observations and comments or to reflect on data from other sources (Strauss, 1987; Yin, 2014). Reflective memoing enables "question-raising, puzzle-piecing, connection-making, strategy-building, problem-solving, answer-generating, [and] rising-above-the-data" (Saldana, 2009). "There is no such thing as 'inadmissible evidence' in trying to understand the issues or situations you are studying." (Maxwell, 2013).

In this study, field notes were periodically generated after on-site visits, interviews, and analysis of collections of documents. Because sources were stratified by unit of analysis, memos were also stratified. When drafting memos, the researcher considered data sources, observations, emerging themes, data patterns and relationships, contradictory information, research questions, and study problems. A field note template appears in Appendix N.

4.   Archival Documents

Documents, like interviews, are another major source of data in qualitative and mixed research. Archival documents include any historic record, either paper or electronic, that communicates information about a topic of interest. "For case study research, the most important use of documents it to corroborate and augment evidence from other sources" (Yin, 2014).

In this study, documents were obtained from two locations – the case site and the internet. The former were referred to as private documents and the latter as public documents. Document selection was guided by constructs; Critical Incident Reports and interview content; and observations and discussions with case employees and OSHA On-Site Consultation staff. Specifically, interview subjects were asked to name research relevant documents. Thereafter, a list of private documents was solicited from the case organization; not all documents, though, existed or

were available (Appendix O). Examples of preferred private documents were the organization's

mission statement, strategic plan, policy manual, safety-related memos, OSHA Form 300 (aka Log

of Work-Related Injuries and Illnesses), and OSHA Form 33 records (aka Safety and Health

Program Assessment Worksheet). Public documents about the case organization were obtained

from the internet by searching the company's name. Cultivated were articles related to business and

safety achievement, OSHA inspection detail, and capital investment firm records. The names of all

collected documents were recorded on the Data Source Inventory (TABLE LVI, Appendix P).

c.   Data Collection: Phases 3 and 4

Data were not collected in phases 3 and 4 of this study (TABLE VII).

5.   Data Analysis

Agar (1991) states that approaches to analysis must align with the study design, research

questions, and gathered data. To prepare for analysis, CIRs, survey questionnaires, interviews and

field notes were immediately stratified by unit of analysis. Archival documents, which supported the

case context, were also separated (Figure 7).

Figure 7: Relationship between Data Sources and Units of Analysis
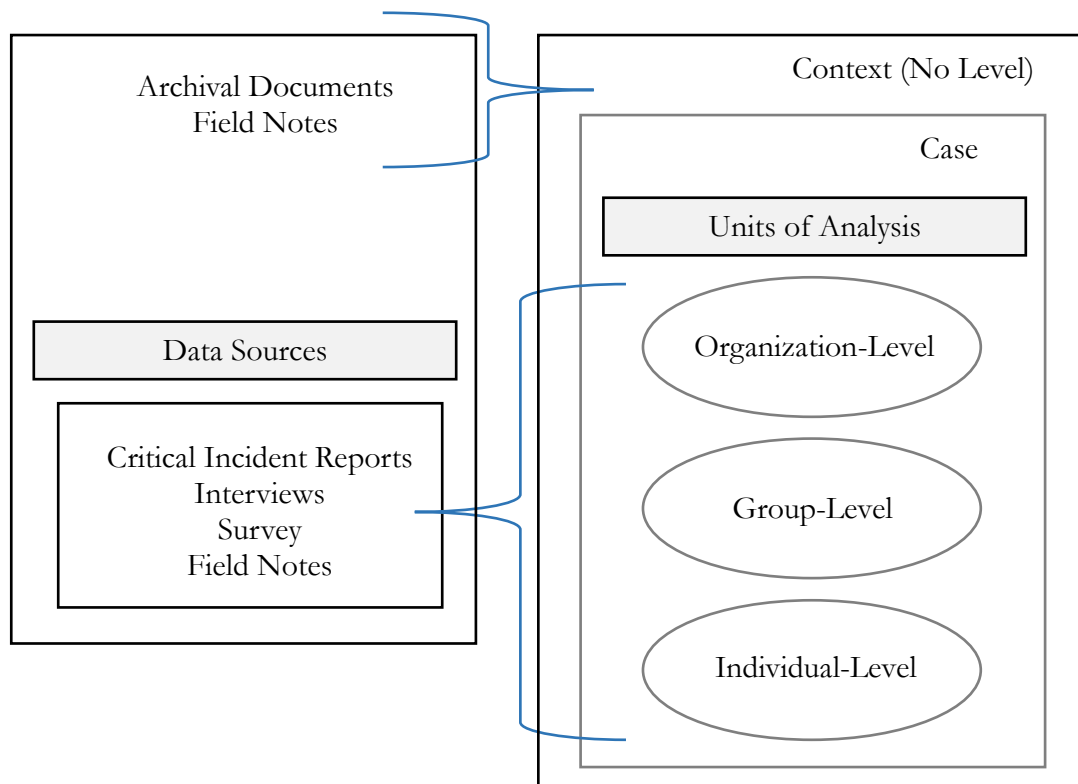
Data analysis occurred in all four phases of this study. In mixed research, qualitative and quantitative data were separately analyzed before data were integrated and re-examined. Qualitative data underwent content analysis, quantitative data were described and statistically tested, and within-source and cross-source examination methods were applied to integrated data. The Measurement Table aids the understanding of analysis in this complex, embedded design and mixed data framework (TABLE LIII, Appendix F). Analysis, by phase, will be discussed next.

a.   Data Analysis: Phase 1

1.   Injury and Illness Rate Verification

To affirm the case's exemplary status and to assure accurate data recording, the company's TRC data were verified. Redacted entries on OSHA Forms 300 and 300A between 2007 and 2017 were compared with recording requirements in 29 CFR 1904.7, Recording and Reporting Occupational Injuries and Illness. No data variations were identified. The Student's T-Test was also applied to Total Recordable Case and Days Away, Restricted, Transferred rate data to statistically assess marked performance improvement.

2.   Critical Incident Reports

In phase 1, CIR analysis was limited to data preparation and analytic memoing. First, each CIR was uniquely numbered and inventoried (Appendix P). CIRs were then screened and examined for completeness. To screen successfully, subjects' must have answered all screening questions and met all four eligibility criteria. To be considered complete, answers must have been offered for at least one research question and more than half of demographic questions. CIRs that failed to meet screening and completeness criteria were removed. Qualifying documents were read, contemplated, and re-read to identify potentially-important dates, actions, personnel roles, and data relationships. After reflecting on each level-specific collection of CIRs, field notes were generated.

b.   Data Analysis: Phase 2

In phase 2, after data were prepared for analysis, two types of analyses occurred – individual source analysis and within-source analysis. Regarding the former, individual pieces of narrative (i.e., CIRs, interview transcripts, documents, field notes) first underwent content analysis. Thereafter, in a process called within-source analysis, the collection of individual pieces of narrative from the same source (i.e., CIRs) were combined and examined for themes. Also in phase 2, the group of Work Unit Climate questionnaires were descriptively and statistically analyzed.

1.   Data Preparation

CIRs were prepared for analysis in phase 1. Here, documents and field notes were labeled and inventoried. Work Unit Climate questionnaires were also labeled, inventoried, screened and examined for completeness. Screening and completeness criteria were specified in phase 1.

The researcher transcribed interview recordings verbatim and redacted proper names, the company name, and other personally identifiable information. Each de-identified transcript was uniquely labeled (i.e., source, number) and inventoried. For methodological transparency, a separate list of interview participants and dates was maintained. To verify content correctness, four of nine interviewees review a themed summary of their respective interview transcripts. This member checking technique boosted validity by verifying the true intent of participants (Shenton, 2004; Creswell, 2013).

Finally, to prepare narrative sources for content analysis with MAXQDA 2018.2 qualitative data software, paper and electronic documents were converted to a software-compatible electronic format.

2.   Content Analysis

To facilitate the comparison of text across sources, all narrative materials underwent content analysis. Content analysis is the process of fracturing narrative and labeling or coding thematic text segments (Hsieh and Shannon, 2005). A specific type of content analysis named directed or hybrid content analysis permits the use of *a priori* themes while simultaneously allowing for the discovery of new or emergent categories (Taylor-Powell and Renner, 2003; Hsieh and Shannon, 2005). For focus and flexibility, this study used both *a priori* and emergent coding. *A priori* codes were directly aligned with the constructs in the conceptual framework. To specify how and when each *a priori* code was applied, the researcher compiled a coding guideline containing operational definitions and related key words (TABLE LVII, Appendix Q) (Maxwell, 2013). Emergent codes, which were not considered at the start of this study, arose during investigation under the researcher's vigilant eye.

To conduct content analysis, the researcher purchased a MAXQDA 2018.2 software license and securely managed data on a personal computer.

The principal investigator served as the primary coder. Using the coding guideline, a second experienced qualitative analyst independently coded a random 10% of all narrative. To validate the assignment of *a priori* codes, intercoder consistency or agreement was measured with the Kappa coefficient. Percent agreement equaled the number of code agreements divided by the sum of code agreements and non-agreements. Landis and Koch (1977) proposed a scale for strength of agreement: 0=poor, 0.01-0.02=slight, 0.21-0.4=fair, 0.41-0.6=moderate, 0.61-0.8=substantial, and 0.81-1.0=almost perfect. For this investigation, at least substantial (≥0.61) intercoder agreement was sought, substantial agreement was achieved (Kappa=0.72). In qualitative research, Kappa is not statistically meaningful; however, "the purpose of comparing independent coders is to discuss the differences, figure out why they occurred, and learn from the differences in order to improve coding agreement in the future" (MAXQDA, n.d.). When coding differences arose, both coders discussed and resolved discrepancies. The coding guidelines were modified to reflect coding improvements, and all previously coded narrative was adjusted accordingly.

To conduct content analysis for an individual piece of data, the principal investigator read the narrative and searched for text that aligned with coding guidelines (TABLE LVII, Appendix Q). To preserve the surrounding context, no less than one paragraph was coded. After major coding was complete, similarly coded quotations were gathered as a group, re-read, reflected upon, and as appropriate, organized into sub-themes. Sub-themes emanated from patterns in the data and related to topics in the literature review and key words in the Measurement Table (TABLE LIII, Appendix F). For example, the major code *external environment* was divided into seven sub-themes or sub-codes, including regulation, markets, and suppliers. Once sub-coding was complete for a given data source (i.e., group-level interviews), codes and code patterns were examined in greater detail.

Specifically, code frequencies were counted; word clouds and co-occurrence tables were created; and source summaries were generated. In qualitative research, code counts, though not statistically meaningful, indicated the relative importance of each theme. Code counts and summaries were transferred to respective Within-Source Data Tables (TABLES LVIII, LIX, LX, and LXI, Appendices R, S, T, and U).

Thereafter, in the process of within-source analysis, entries in the Within-Source Data Tables were compared and summarized across constructs. Because this study valued both converging and conflicting evidence, data similarities and differences were preserved. Within-source summaries and code frequencies were transferred to the Cross-Source Data Table (TABLE LXII, Appendix V).

3.   Survey Analysis

In this study, one survey was used to collect ordinal data about work unit climate. Because the purpose of the survey was to inform understanding rather than to determine quantitative significance, descriptive statistics carried more value than inferential parameters. For the six closed-response items, the researcher tabulated measures of central tendency (i.e., mode response) and measures of relative standing (i.e., response frequency, proportion of favorable/unfavorable responses). Given this study's embedded design, categorical data, and low response frequencies, response proportions between units of analysis were analyzed using the Freeman-Halton Extension of Fisher's Exact Test.

Survey responses were presented graphically (i.e., bar graph, frequency table) and in narrative form. Regarding the latter, for each closed-response item, a narrative summary of results, by unit of analysis, was prepared. This process, called qualitization, transforms quantitative data into qualitative data, and thereby facilitates the integration of mixed data (Tashakkori and Teddlie, 2009). Because qualitized narrative was generated by the researcher rather than a subject, qualitized

narrative did not undergo content analysis. Qualitized summaries for each construct were transferred to the Cross-Source Data Table (TABLE LXII, Appendix V).

c.   Data Analysis: Phase 3

In phase 3, qualitative and quantitative data across sources was integrated to yield summaries, visual diagrams, tables, and timelines. Integrating multiple forms of data is the most difficult, but the defining, aspect of mixed research. "Without integration, different methods may sit in parallel, potentially leading to multiple studies, and not the desired "mixing" of methods implicit in mixed methods research" (Yin, 2006).

1.   Cross-Source Analysis

In this phase, the data in the Cross-Source Data Table were compared by construct theme and unit of analysis (TABLE LXII, Appendix V). For example, for each external environment theme, the code summaries for CIRs, interviews, archival documents, and field notes were compared and re-summarized to yield cross-source summaries and total code counts.

When integrating multi-source, mixed data, the researcher was mindful of the study's purpose – to measure similar aspects of the same phenomenon, namely the achievement of low rates of injury and illness. Therefore, even though data convergence was most valued, divergence was not discounted. Convergence meant that data perspectives were similar from source to source, whereas divergence meant that perspectives were different or complementary.

2.   Timelines

In qualitative research, timelines aid the visualization of data (Bagnoli, 2009). "Time and narrative are inextricably woven together, in that narrative almost always involves time and requires a temporal component to be meaningful" (Sheridan et al., 2011). Because qualitative data richly describes processes, the chronology of events can be discerned (Yin, 2009; Miles et al., 2014).

For this study, to display the processual achievement of low-injury performance, the researcher created two timelines. An event timeline diagramed the temporal arrangement of pivotal events that marked the achievement of exemplary safety and health status (i.e., OSHA inspections, hiring of key personnel, specific accidents). A list of pivotal events was culled from Critical Incident Reports, interviews, documents, and field notes. An injury-illness rate timeline that displayed TRC rates across the study timeframe was also created.

d.   Data Analysis: Phase 4

Finally, in phase 4, the constellation of data was synthesized. Guided by the Cross-Source Data Table and the Data Integration Diagram (Appendix W), the research questions were answered. The secondary questions, which informed the primary question, were answered first. For example, to identify the organization level factors that played a role in the achievement of low rates of occupational injury and illness, the researcher examined cross-source data from the Leadership, Mission and Strategy, and Culture constructs. The information from all constructs was synthesized to answer the primary research question.

Ethical Obligation

The researcher, a Certified Industrial Hygienist, was ethically obligated to identify and report unsafe and unhealthy workplace conditions (ABIH, n.d.). During research, if uncontrolled safety and health hazards were discovered, the principal investigator promised to report the situation, upon discovery, to the case and to the Doctoral Committee. As specified in the Letter of Information (Appendix X), the case site was responsible for investigating and correcting hazards. Because the case site had an exemplary safety and health program, and because the data of interest were retrospective, unsafe conditions were not anticipated.

Information Management

This study's conceptual complexity and voluminous data warranted a formal organization plan. According to Yin (2014), a well-defined research protocol and transparent chain of evidence allows others to examine the derivation process. To track data about thirteen constructs and three units of analysis from six sources, a variety of data tables were employed, including a Measurement Table (TABLE LIII, Appendix F), Data Source Inventory Table (TABLE LVI, Appendix P), Within-Source Data Tables (TABLES LVIII, LIX, LX, and LXI, Appendices R, S, T, and U), and Cross-Source Data Table (TABLE LXII, Appendix V). To store raw data, data tables, and all original data-related materials, the researcher established a private University of Illinois Box.com account.

As previously stated, the information collected for this study was de-identified and confidential. Data were securely stored under the control of the principal investigator; only the principal investigator and the Doctoral Committee had access to research data. As indicated in the Letter of Information, neither raw, preliminary, unaggregated, nor unfinalized data were shared with the case site. All information was retained until interpretations were rendered and analyses final. Thereafter, original data will be destroyed.

Validity Considerations

An important research consideration is the trustworthiness of the research process and the outcomes (Guba and Lincoln, 1981). Even though qualitative and mixed research have been considered less rigorous and less desirable than quantitative approaches, case research can be conducted in a thorough manner (Shenton, 2004; . The quality of mixed data "is determined by standards of quality in the qualitative and quantitative strands … if the qualitative and quantitative data are credible, then the mixed methods study has data quality" (Tashakkori and Teddlie, 2009).

In qualitative and mixed applications, the terms credibility, transferability, and reliability replace the quantitative terms validity, generalizability, and reliability, respectively (Billups, n.d.). This case study, like other high-quality studies, addressed quality parameters and incorporated tactics that offset threats to trustworthiness (TABLE IX). Before discussing these tactics, the research assumptions were disclosed.

TABLE IX: APPROACHES TO INCREASE STUDY QUALITY (ADAPTED FROM YIN, 2014 AND BILLUPS, N.D.)

Threat	Research Stage	Tactic
Construct Credibility	Study Design, Data Collection	Disclosed research assumptions Clearly defined/described constructs Used multiple sources of evidence Repeated engaged with participants
Internal Credibility	Study Design, Data Analysis	Employed a conceptual model Pilot tested data collection instruments Member-checked collected data Employed two-person translation team Employed dual qualitative coding Searched for rival explanations
Dependability	Data Collection	Specified research methods Followed research methods Employed dual qualitative coding Displayed the chain of evidence Managed information
Transferability	Study Design	Employed a theory of change Defined the study population Defined case eligibility criteria

A.   Assumptions

The identification and disclosure of assumptions improves study quality (Yin, 2014). The following assumptions pertained to this study.

- The Bureau of Labor Statistics' Total Recordable Case (TRC) data are accurate and accurately reflect the injury and illness patterns of U.S. businesses.

- Regardless of differences, all medium businesses share common organizational functions, including, but not limited to the need for leadership and the existence of core processes. This assumption aligns with organization development theory.

- Medium businesses in different industrial sectors share common functions.

- OSHA SHARP organizations, which are characterized as having exemplary occupational safety and health programs, truly embody occupational safety and health excellence.

- Theories and models of organization performance and change readiness, on which this research is founded, are applicable to occupational safety and health.

B.   Credibility

Construct credibility, akin to construct validity, is the extent to which findings represent and measure the phenomenon that is being explored (Lincoln and Guba, 1985). In other words, how well do the study's variables measure what they intend to measure? Threats to construct credibility were countered by disclosing research assumptions, aligning research questions and constructs, clearly describing constructs, and defining coding guidelines and rules of code application.

Internal validity or credibility regards the strength of association between the independent and dependent variables. In this study, construct data were the independent variables and outcome performance was the dependent variable. A study with high internal believability links results to independent variables rather than rival explanations. Threats to internal credibility, then, challenge this association. To counter threats, research questions and the conceptual framework were clearly

defined. To collect consistent data about independent variables, the researcher employed an interview guide and pre-defined data collection tools (Patton, 2002). In addition, member checking verified the accuracy of interview data (Billups, n.d.). Internal credibility was also boosted by the search for contrary data, which can cloud the relationship between independent and dependent variables (Yin, 2014). Where identified, inconsistencies were surfaced and alternate explanations offered. High quality OSH studies should "consider contradictions in the data and offer explanations for incongruent findings" (MacEachen et al., 2010).

C.   Dependability

Dependability, also known as reliability in quantitative studies refers to the repeatability of the research or the likelihood that future researchers will arrive at the same conclusions, if the study were conducted using the same procedures (Billups, n.d.). In qualitative circles, where contextual complexity is ever-present, dependability is difficult to assure. Dependability is threatened by lack of consistent data collection, inconsistent data analysis, and lack of procedural transparency (Yin, 2014). Transparency is the process of displaying a traceable, organized chain of evidence. In their systematic review, MacEachen et al. (2010) stated that high quality occupational safety and health studies provide "a clear description of the methods employed and justification for why a particular approach was best suited to answer the research question. …rich in context that enhanced the understanding of research findings…. [with] clear links between the data (quotes, case studies, etc.) and reported findings".

In this study, multiple actions optimized dependability, including disclosing research and personal assumptions, detailing study methods, using an interview guide for consistency, defining *a priori* codes, continuously checking coding guidelines and using two coders to improve coding reliability (Denzin and Lincoln, 2011; Bloomberg and Volpe, 2012).

D.   Transferability

In case study research, where statistics are not the driving force, study transferability, rather than generalizability, is the goal (Billups, n.d.). Transferability refers to the relevance of the research in a broader context. "By describing a phenomenon in sufficient detail, one can begin to evaluate the extent to which the conclusions drawn are transferable to other times, settings, situations, and people" (Lincoln and Guba, 1985). Transferability is threatened by the absence of a defined, systematic research approach (Schram, 2003).

To enhance this study's transferability, the study design and research questions were grounded in theory, the study population and case selection criteria were specified, and the methods were described in detail (Patton, 2002; Billups, n.d.). Conceivably, the theory of change may transfer to other private, medium-sized firms. The findings may also transfer to other OSHA SHARP companies in states under federal OSHA jurisdiction.

Institutional Review Board Approval

This social sciences research study involved human subjects as defined by the Department of Health and Human Services [45 CFR 46.102]. A Claim of Exemption application was filed with and granted from the Office for the Protection of Research Subjects at the University of Illinois at Chicago (Research Protocol # 2018-0100) (Appendix Y). The research protocol was amended to add research personnel and a data source and to modify data storage and security (Appendix Z).

Dissertation Products

Due to the volume of data and need to transparently share a range of data about each construct, this dissertation will culminate in a traditional 5-chapter product. Following completion of the dissertation, at least two articles will be submitted to reputable journals (i.e., Safety Science, American Journal of Industrial Medicine, Journal of Occupational and Environmental Medicine, Journal of Small Business Management).

CHAPTER IV

Introduction

This case study explains how one medium-sized U.S. business transformed its occupational safety and health program and dramatically lower rates of work-related injury and illness. Chapter 4 describes the case, study participation, and response quality. The bulk of this lengthy chapter is devoted to the research results. A range of qualitative and quantitative data from fourteen constructs is objectively highlighted. Even though very few divergent perspectives were evident in this qualitatively-dominant mixed methods study, when available, contradictory data are presented. Importantly, due to the volume of data, the research questions are answered in chapter 5.

Chapter 4 is organized by construct. Following the case description and summaries of data sources and participants, the data for fourteen constructs is presented. TABLE X outlines the contents of this chapter.

TABLE X: CHAPTER 4 OUTLINE

Major Heading	Minor Heading
I. Introduction	
II. Case Description	
III. Data Sources and Participation	A. Critical Incident Reports
	B. Work Unit Climate Survey
	C. Interview Screening Questionnaire
	D. Documents
	E. Field Notes
IV. Units of Analysis	
V. Data by Construct	A. External Environment Construct
	1. External Environment Construct: Suppliers-Services
	2. External Environment Construct: Regulation-Standards
	3. External Environment Construct: Resources
	4. External Environment Construct: Markets-Customers
	5. External Environment Construct: Investor
	6. External Environment Construct: Summary
	B. Leadership Construct
	1. Leadership Construct: Direction-Setting
	2. Leadership: Team-Building
	3. Leadership Construct: Summary
	C. Mission and Strategy Construct
	1. Mission and Strategy Construct: Mission
	2. Mission and Strategy Construct: Strategy
	3. Mission and Strategy Construct: Summary
	D. Culture Construct
	1. Culture Construct: Overt Culture
	2. Culture Construct: Covert Culture
	3. Culture Construct: Summary
	E. Core Processes Construct
	1. Core Processes Construct: Hazard Controls
	2. Core Processes Construct: Safety Activities
	3. Core Processes Construct: Reward-Discipline
	4. Core Processes Construct: Summary
	F. Structure Construct
	1. Structure Construct: Safety Arrangement
	2. Structure Construct: Corporate Arrangement
	3. Structure Construct: Summary
	G. Management Practices Construct
	1. Management Practices Construct: Traditional Practices
	H. Work Unit Climate Construct
	1. Work Unit Climate Construct: Management Priority of Safety and Health
	2. Work Unit Climate Construct: Major Safety and Health Shortcuts

Data Sources and Participation

This single case study employed an exemplar case; a systems model; an appreciative, retrospective design; multiple data sources; and embedded units of analysis. Details about the study design, data collection, and analysis were outlined in chapter 3. Briefly, though, data from Critical Incident Reports, a Work Unit Climate Survey, interviews, private and public documents (i.e., Safety Meeting Notes, Safety Manual, web-available articles), and field notes were collected using a semi-sequential or phased collection approach. All sources, except the Work Unit Climate Survey, yielded qualitative data and answered all research question. Quantitative data from the Work Unit Climate Survey answered one research question – what group-level factors are perceived to play a role?

At the study's outset, all 100 case employees – 40 Spanish-speaking and 60 English-speaking employees – were offered the opportunity to complete a Critical Incident Report, Work Unit Climate Questionnaire, and an Interview Screening Questionnaire. The latter questionnaire guided the purposeful selection of nine interview participants. Following interview, private and public documents were collected. Throughout the study, the researcher recorded written observations, subjects' comments, and personal perceptions in field notes. Of the one-hundred seventy-six data submissions, 16 were submitted by organization-level subjects, 9 were interviews, and nearly one hundred were private and public documents. Appendix AA displays the number of data submissions by source and unit of analysis.

The next section presents source-specific participation information, and where appropriate, a high-level summary of the data.

A. Critical Incident Reports

The Critical Incident Report (CIR) was used to gather narrative safety and health information. Subjects used this qualitative data collection tool, also known as a Short Story Worksheet, to answer open-ended, reflection-oriented questions about the case.

1.   Response Rate

Thirty-one workers completed a Critical Incident Report (CIR) for an overall response rate of 31%. Two records, one from a Spanish-speaking subject and the other from an English-speaking subject, screened unfavorably due to part-time employment and lack of response for employment status. Two additional records were incomplete; one respondent failed to answer all required questions, and another failed to select a single option for a required question (i.e., main type of work). The adjusted response rate was 27% - 24 CIRs from English-speaking subjects and 3 from Spanish-speakers. Qualifying CIRs were received from 40% of the English-speaking workforce, but only 7.5% of Spanish-speakers (TABLE XI).

TABLE XI: CRITICAL INCIDENT REPORTS, RESPONSE CHARACTERISTICS

Primary Language	Count					[a]Percent of Workforce with Qualifying Submissions
	Submitted	Screen Failures	Screen Successes	Incomplete	Qualifying	
English	27	1	26	2	24	40
Spanish	4	1	3	0	3	7.5
Total	*31*	*2*	*29*	*2*	*27*	

[a]Percent of Workforce with Qualifying Submissions = (Number of Qualifying Responses/Number of X-speaking Workers) x 100

2.   Respondent Characteristics

Subjects completing CIRs ranged in age from 18 to 65 years. Twenty-seven were male, three were female, and one did not indicate a sex. Respondents were educated at the college, high school, and less than high school levels with 70.7% completing at least some college. Most participants

considered their main type of work to be production, but executive and operation-level workers were represented. Twenty-seven of thirty-one respondents spoke primarily English. Qualified and disqualified respondents appeared similar in age, sex, type of work, and primary language; however, disqualified participants were more highly educated (TABLE XII).

TABLE XII: CRITICAL INCIDENT REPORTS, RESPONDENT CHARACTERISTICS

	Respondent Characteristic	Count	
		Qualified Respondents	Disqualified Respondents
Age Range (years)	18-25	5	
	26-35	5	1
	36-45	4	2
	46-55	7	
	56-65	4	
	65+		
	No Response	2	1
Sex	Female	2	1
	Male	25	2
	No Response		1
Highest Grade Level	Less than High School	3	
	High School Graduate	5	
	Some College	8	1
	College Graduate	11	2
	No Response		1
Main Type of Work	Manufacturing/Production	16	2
	Business Operations/Support	6	1
	Executive/Leadership	5	
	No Response		1
Language	English	24	3
	Spanish	3	1

3.   Response Quality

To gauge response quality for CIRs, subjects were asked to rate their expended effort and the difficulty completing Short Story Worksheets (Figure 8). Ninety-two percent of respondents perceived no difficulty completing CIRs. No participant found CIR completion to be either very or extremely difficult. Eighty-one percent expended a little bit of effort or more on Short Story Worksheets.

Figure 8: Critical Incident Reports, Response Quality
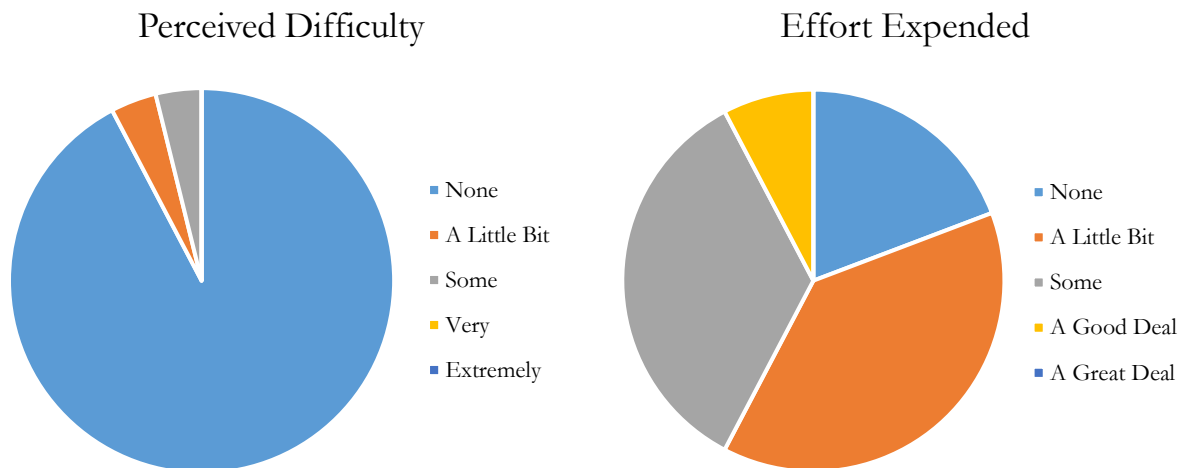
4.   Source Summary

Critical Incident Reports or Short Story Worksheets were a preliminary source of qualitative data. Even though only 2% of quotations were cultivated from CIR submissions, all *a priori* and emergent constructs were represented. Organization- and group-level subjects each provided one-quarter of quotations; more than half were offered by individual-level participants (Figure 9).

Figure 9: Critical Incident Reports, Percent of Quotations by Unit of Analysis
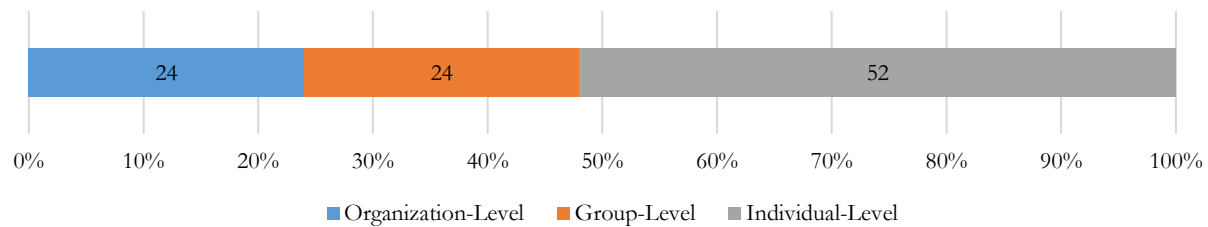
All CIRs were legible, and nearly all were concisely written using short phrases or sentences. Six CIRs contained lengthier narrative, up to 200 words. CIRs cited a variety of factors that were perceived to improve corporate safety and health, including company ownership, specific staff (i.e., Director of Quality and Safety, Safety Manager), safety activities and programs (i.e., STOP™, OSHA training, Job Safety Analysis, 6S, incentive), hazard control measures, and management commitment. Several subjects similarly mentioned the Safety Manager, safety training, and STOP™ program.

B.   Work Unit Climate Survey

1.   Response Rate

All company employees were offered the opportunity to participate in the Work Unit Climate Survey. The response rate and adjusted response rate were 28% and 25%, respectively. One questionnaire from a part-time employee failed screening. Two more questionnaires were excluded due to multiple responses for a required question and a hand-written comment that confounded another subject's response. Of the 25 qualifying questionnaires, 22 were completed by English-speaking subjects and 3 by Spanish-speaking subjects (TABLE XIII).

TABLE XIII: WORK UNIT CLIMATE SURVEY, RESPONSE CHARACTERISTICS

Primary Language	Count					[a]Percent of Workforce with Qualifying Submissions
	Submitted	Screen Failures	Screen Successes	Incomplete	Qualifying	
English	25	1	24	2	22	37
Spanish	3	0	3	0	3	7.5
Total	*28*	*1*	*27*	*2*	*25*	

[a]Percent of Workforce with Qualifying Submissions = (Number of Qualifying Responses/Number of X-speaking Workers) x 100

2.   Respondent Characteristics

Subjects ranging from 18 to 65 years completed Work Unit Climate questionnaires. Four respondents were female, and twenty-four were male. Respondents were educated at the college, high school, and less than high school levels; slightly more than half reported at least some college education. Subjects worked in executive leadership, business operations, and production; half were in the latter category. Only twelve of 28 subjects had been employed for more than four years. Qualified and disqualified respondents appeared similar in age, sex, type of work, and primary language; however, disqualified participants were more highly educated and less experienced with the company (TABLE XIV 4-5).

TABLE XIV: WORK UNIT CLIMATE SURVEY, RESPONDENT CHARACTERISTICS

	Respondent Characteristic	Count	
		Qualified Respondents	Disqualified Respondents
Age Range (years)	18-25	3	
	26-35	7	1
	36-45	5	1
	46-55	7	
	56-65	2	1
	65+		
	No Response	1	
Sex	Female	3	1
	Male	22	2
	No Response		
Highest Grade Level	Less than High School	3	
	High School Graduate	5	
	Some College	8	
	College Graduate	9	3
	No Response		
Main Type of Work	Manufacturing/Production	14	
	Business Operations/Support	7	1
	Executive/Leadership	4	1
	Other Response		1
Years Employed at Company	Less than 1	5	1
	1-3 years	8	2
	4-7 years	5	
	More than 7	7	
Language	English	22	3
	Spanish	3	0

3.   Response Quality

Ninety-one percent of respondents perceived no difficulty completing Work Unit Climate

Questionnaires. No participant found the questionnaire to be either somewhat, very, or extremely

difficult. Sixty-five percent expended a little bit of effort or more completing the Work Unit Climate

Questionnaire, while 35% put no effort into their responses (Figure 10).

Figure 10: Critical Incident Reports, Response Quality

Perceived Difficulty

Effort Expended

- None
- A Little Bit
- Some
- Very
- Extremely

- None
- A Little Bit
- Some
- A Good Deal
- A Great Deal
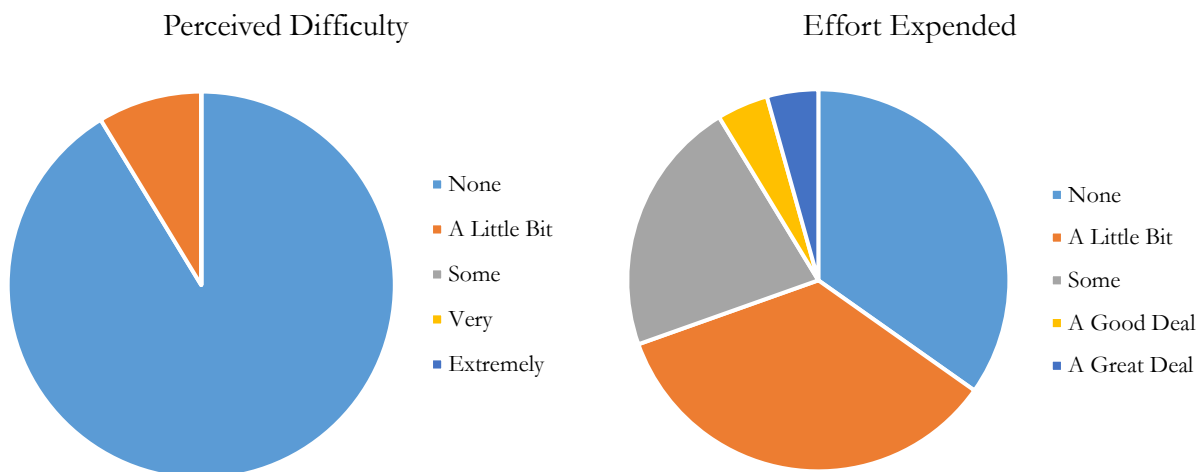
4.   Source Summary

The Work Unit Climate Survey, which was the study's only source of quantitative data, pertained to one construct – work unit climate. Qualifying questionnaires were submitted by four executives, 7 group-level subjects, and 14 individual-level participants. Responses to each question are detailed in the Work Unit Climate Construct section of this chapter.

C.   Interview Screening Questionnaire

1.   Response Rate

The sole purpose of the Interview Screening Questionnaire (ISQ) was to identify interview subjects. Of the 100 workers invited to complete an ISQ, 26% submitted a questionnaire. Two records, one from a Spanish-speaking employee and the other from an English-speaking employee,

failed screening due to part-time employment and lack of response for employment status. Three

other questionnaires were incomplete, because no contact information was provided. Consequently,

the adjusted response rate was 21%. Qualifying questionnaires were received from 32% of the

English-speaking and 5% of Spanish-speaking workforce (TABLE XV).

TABLE XV: INTERVIEW SCREENING QUESTIONNAIRES, RESPONSE
CHARACTERISTICS

Primary Language	Count					[a]Percent of Workforce with Qualifying Submissions
	Submitted	Screen Failures	Screen Successes	Incomplete	Qualifying	
English	23	1	22	3	19	32
Spanish	3	1	2	0	2	5
Total	*26*	*2*	*24*	*3*	*21*	

[a]Percent of Workforce with Qualifying Submissions = (Number of Qualifying Responses/Number of X-speaking Workers) x 100

2.   Respondent Characteristics

Subjects in all age and education categories submitted ISQs. Twenty-two of twenty-six

respondents were male. Even though most participants were production workers, one quarter were

operations staff, and 15% were executives. Eleven respondents had been employed at the company

four years or more. Qualified and disqualified respondents were not noticeably different in age, sex,

or primary language. In general, disqualified subjects were less experienced, more educated, and

likely to work in production or business operations (TABLE XVI).

TABLE XVI: INTERVIEW SCREENING QUESTIONNAIRE, RESPONDENT CHARACTERISTICS

	Respondent Characteristic	Count		
		Qualified Respondents	Disqualified Respondents	*Interview Subjects*
Age Range (years)	18-25	2	1	*1*
	26-35	6	1	*1*
	36-45	5	1	*2*
	46-55	4	2	*2*
	56-65	3		*3*
	65+			
	No Response	1		
Sex	Female	3	1	*2*
	Male	18	4	*7*
Highest Grade Level	Less than High School	2	1	*1*
	High School Graduate	5		*2*
	Some College	5	1	*2*
	College Graduate	9	3	*4*
Main Type of Work	Manufacturing/Production	11	2	*3*
	Business Operations/Support	6	1	*3*
	Executive/Leadership	4		*3*
	No Response		2	
Years Employed at Company	Less than 1	4	2	
	1 – 3	7	2	*2*
	4 – 7	5		*3*
	More than 7	5	1	*4*
Language	English	19	4	*8*
	Spanish	2	1	*1*
Extent of Safety and Health Knowledge	Very Small			
	Small	1	1	
	Moderate	6	1	*2*
	Large	9	3	*5*
	Very Large	5		*2*
Willingness to Interview	Very Small	2		
	Small	2	1	
	Moderate	4	1	*1*
	Large	9	3	*6*
	Very Large	4		*2*

3.   Interview Subjects

Four ISQ questions guided the purposeful selection of interview subjects – length of employment, main type of work (i.e., unit of analysis), extent of safety and health knowledge, and willingness to discuss. Because few tenured workers from the organization- and group-levels completed questionnaires, main type of work and length of employment were limiting parameters. Safety knowledge and willingness to discuss safety were not limiting. Ninety-five percent of respondents reported at least moderate safety and health knowledge, and 81% were at least moderately comfortable discussing safety.

Submissions were first stratified by main type of work and then ordered by experience. Most of these best-qualified subjects were available for interview. However, because one organization-level worker and one group-level worker were not available, two less-experienced interview subjects were necessarily selected.

Nine interview subjects represented all age, sex, education, and primary language categories. Two were female, and one spoke primarily Spanish. Four subjects had more than seven years of company experience, and two reported 1 to 3 years of experience (TABLE XVI).

Eight of nine subjects completed the full interview. Due to time constraints, one subject participated in a partial interview. Interviews ranged from 29 to 72 minutes in length, and interview transcripts ranged from 4 to 18 pages in length with an average of 10 pages.

4.   Source Summary

The Interview Screening Questionnaire proved to be an efficient and effective method of identifying potential interview subjects. Interviews, as a main source of qualitative data, interviews yielded just shy of 1,500 quotations across all constructs – more than 25% of all text-based data. Group-level subjects provided more quotations than subjects at other levels (Figure 11).

Figure 11: Interviews, Percent of Quotations by Unit of Analysis

| 33.5 | 45.9 | 20.6 |

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%

■ Organization-Level   ■ Group-Level   ■ Individual-Level
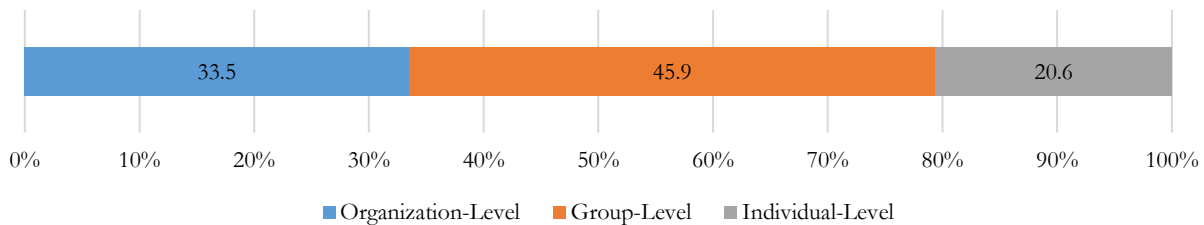
D.   Documents

1.   Private Documents

The case organization provided a variety of internal documents for this investigation, including their 64-page safety manual; 54 Safety Meeting Agendas and Meeting Notes dated August 2013 through January 2018; completed Safety and Health Program Assessment Worksheet Form 33 forms from 2013, 2015, 2016, and 2017; OSHA 10-hour and 30-hour training schedules; 2016 OSHA SHARP Certificate; and examples of a completed JSA, Toolbox Talk, STOP™ Card, and Work Instruction. Also provided were 14 department-specific monthly audit checklists; and the safety portion of two Safety, Quality, Delivery, and Cost (SQDC) supervisor reports. Finally, the company shared redacted copies of their OSHA Form 300 and 300A records from 2007 through 2017.

Requested, but not provided, were current and past organizational charts; OSHA inspection documents from 1998, 2008, and 2012; corporate strategic plans; Annual Operating Plans; Key Performance Indicators; Board of Directors Meeting Notes; change-of-ownership documents;

examples of Tailgate Meeting content; and pre-2013 safety-relevant documents. According to the case organization, some requested documents did not exist.

2.   Public Documents

To supplement the document pool with information that was not be obtained from private documents, fourteen publicly-available documents were retrieved from the internet. Documents included business articles; OSHA Inspection Detail from 1998 and 2012; corporate website excerpts; and capital investment owner information. Half of public documents directly mentioned workplace safety and health, and half referenced relevant contextual factors (i.e., change of ownership). OSHA Inspection Detail from 2008 was not found.

3.   Source Summary

Even though documents were intended to provide supplemental data, they contributed 68% of the study's qualitative information. For some constructs (i.e., structure, performance), documents were the principle data source. Of the quotations found in documents, ninety-one percent came from private materials (Figure 12). Specifically, Safety Meeting notes contained voluminous, but somewhat redundant, information about every construct. Safety and Health Program Assessment Worksheet Form 33 forms, which were completed by OSHA On-Site Consultants, served as a third-party source of private information. Public documents were useful for corroborating data about OSHA inspections and capital investment owners.

Figure 12: Documents, Percent of Quotations by Private versus Public Source
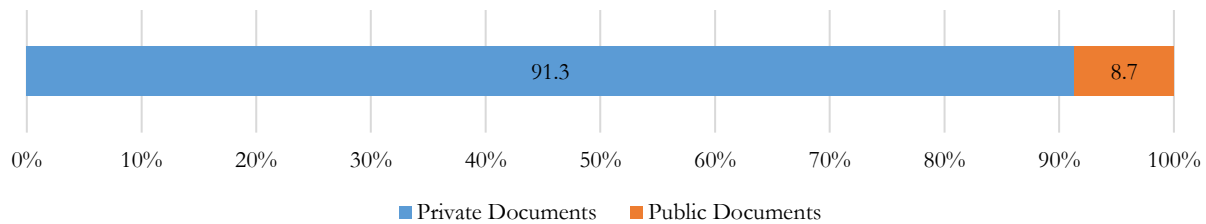
E.   Field Notes

The researcher drafted eighteen field notes. Nine notes followed each of nine interviews. Additional field notes were generated after the researcher reflected on collections of Short Story Worksheets; Safety Meeting Notes; OSHA On-Site Consultation documents; the Safety Manual; and private training documents, Work Instructions, audits, Toolbox Talks, STOP cards, and JSAs. The researcher's observations and subjects' comments were qualitatively coded; the researcher's personal reflections were not.

This source generated 3% of the study's qualitative information about most constructs, especially structure and core processes. Of the quotations in field notes9, according to Figure 13, 83.7% were linked to no unit of analysis (i.e., documents).

Figure 13: Field Notes, Percent of Quotations by Unit of Analysis
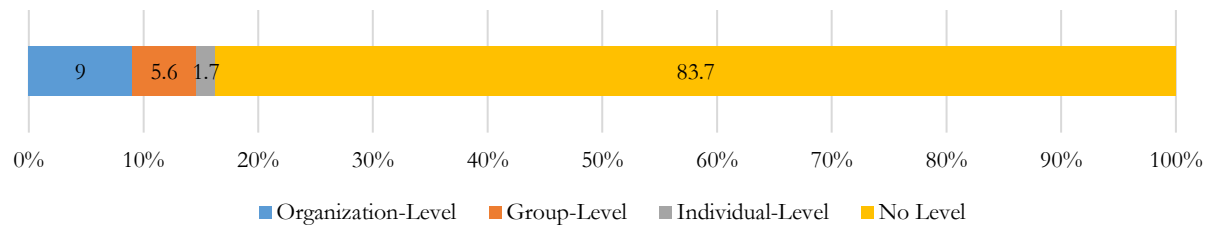
Units of Analysis

Units of analysis were employed in this multi-source, mixed methods study to facilitate data collection and synthesis. Three of four units or strata corresponded to the to the functional levels in a typical mid-sized business organization – organization-level, group-level, and individual-level. These units also corresponded to the levels in the Burke-Litwin Model of Organization Performance and Change (Figure 3), which served as the foundation for this study's conceptual framework (Burke and Litwin, 1992). Subject-generated data was collected from all units of analysis, and upon collection, CIRs, interviews, and Work Unit Climate questionnaires, were immediately stratified by level. A fourth unit, entitled no-level, was reserved for documents and some field notes, which could not be linked to a functional level. Throughout analysis, data remained stratified until final synthesis.

Stratification by unit of analysis offered two advantages. First, stratification divided the large volume of data into manageable analytical chunks. Second, because the conceptual model acknowledged that different business functions occurred at different levels in the organization, stratification preserved subjects' level-specific perspectives of change. That said, this study did not intend to compare and contrast level-specific perspectives; though interesting, that was not within the scope of research. That said, there were a couple palpable similarities and differences across

units of analysis. Regarding the former, data from nearly all units of analysis contributed to every construct. Regarding the latter, more quotations were assigned to group-level sources than to organization- or individual-level sources.

Results by Construct

This section contains a range of raw data from thirteen *a priori* constructs – external environment; leadership; mission and strategy; culture; structure; management practices; core processes; work unit climate; individual tasks and skills; individual change readiness; organizational change readiness; time; and performance. A fourteenth construct, hazards, emerged from the narrative. Qualitative data were obtained about all constructs. Quantitative data was gathered about two constructs, work unit climate and performance. The integration of qualitative and quantitative data will be discussed under each respective construct.

Qualitative data were analyzed in the following manner. First, narrative sources were stratified by unit of analysis. For each piece of narrative, such as a group-level interview transcript, one or more major codes were assigned to at least a paragraph-sized text segment, according to the *A Priori* Code List and Coding Guideline (TABLE LVII, Appendix Q). Very often, multiple major codes fit a single quotation. After major coding was complete, similarly coded quotations were collated by construct and unit of analysis, reread, and subjectively grouped into themes. All quotations for that theme were assigned a representative sub-code. Potential themes were drawn from the construct-specific literature in chapter 2. TABLE XVII lists the number of construct-specific themes and the most common theme. After sorting and sub-coding were complete, corresponding themes from different sources (i.e., CIRs, interviews) were compared. Finally, data were compared across units of analysis. In this chapter, those shared perspectives were presented as convergent data, and contrary or different perspectives were presented as divergent data.

TABLE XVII: NUMBER OF THEMES AND COMMON THEMES BY CONSTRUCT

Construct	Number of Themes	Common Theme(s)
External Environment	7	Suppliers-services, Regulation-Standards
Leadership	3	Direction-setting
Mission and Strategy	2	Mission
Culture	2	Overt Culture
Structure	6	Safety Arrangement
Management Practices	3	Traditional Practices
Core Processes	5	Hazard Controls, Safety Activities
Work Unit Climate	7	Working Together, Major Shortcuts
Individual Tasks and Skills	2	Demands-Abilities
Performance	6	Accident Outcomes, Intermediate Outcomes
Organizational Change Readiness	2	Psychological Readiness
Individual Change Readiness	3	Iterative Readiness
Time	2	Dates, Periodicity
Hazards	1	Hazards (100%)

While data were revealed about all constructs, quotations about organizational readiness, structure, core processes, and time were most prevalent. A good amount of data about management practices and performance was also identified. The fewest number of quotations were about the culture and work unit climate constructs. Figure 14 displays the relative prevalence of major-coded segments.

Figure 14: Number and Percent of Coded Segments by Construct
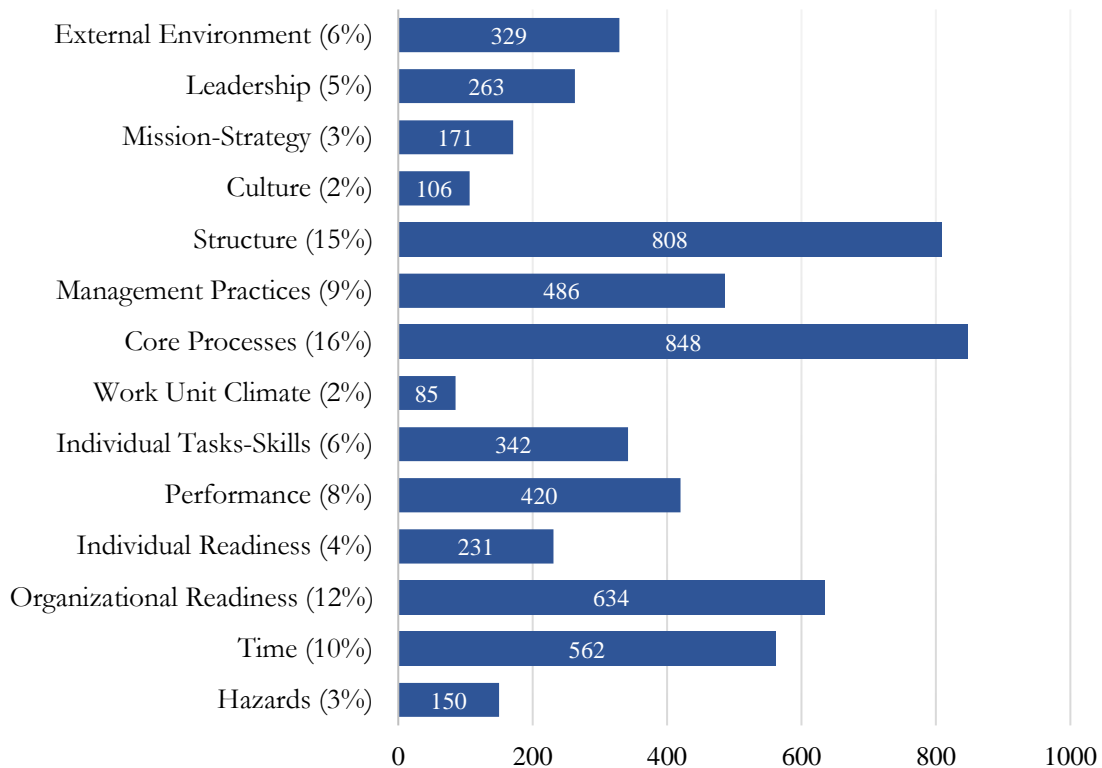
The results for each construct are presented next. Following a brief definition of the construct is a summary of code counts and data themes. In this study, the distribution and frequency of codes are offered for transparency purposes only – counts do not carry mathematical significance. Rather, code counts indicate the relative presence and locus of data.

In this chapter, the terms *construct* and *major code* are interchangeable. The terms *sub-code, theme,* and *minor code,* also synonymous, refer to subsets of a major code. At least one major code and one or more minor codes were assigned to every text segment. In addition, the terms *coded segment*, *text segment*, and *quotation* similarly refer to a piece of coded narrative.

A.   External Environment Construct

Defined for this study, the external environment was any outside condition or situation that influenced the actions and performance of the organization. A total of 328 major-coded segments were identified. These segments were sub-coded to yield 425 minor-coded quotations. This means that several major-coded segments were assigned more than one sub-code. Nearly two-thirds of quotations were drawn from private and public documents, and one-third were offered by organization and group-level interview subjects. Very few individuals mentioned any aspect of the external environment (Table XVIII). For this construct, private documents, specifically Safety Meeting notes, provided the most information about the external environment.

TABLE XVIII: EXTERNAL ENVIRONMENT CONSTRUCT, NUMBER OF SUB-CODED SEGMENTS BY SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	0	3	2	
Interviews	50	65	3	
Field Notes	0	1	3	0
Documents, Private				213
Documents, Public				85
Subtotal	*50*	*69*	*8*	*298*
Total	*425*			

Seven themes emerged from this conceptually vast construct – suppliers-services, regulation-standards, resources, recognition, fees-penalties, markets-customers, and investor. The first three themes were referenced 26%, 25%, and 19% of the time, respectively (Figure 15). The last two

themes – markets-customers and investor, were contextually relevant to the company's safety and health improvement. All five themes are discussed.

Figure 15: External Environment Construct, Percent of Quotations by Theme

Suppliers-Services	Regulation-Guidelines	Resources	Recognition	Fees-Penalties	Markets-Customers	Investor
26.2	25.1	19.3	10.8	6.9	6	5.7
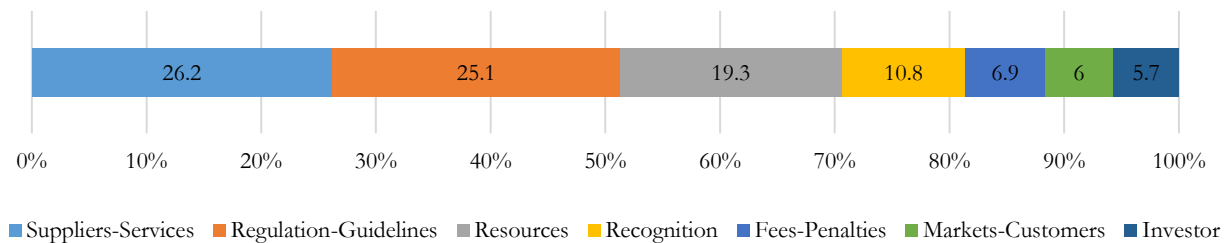
3.	External Environment Construct: Suppliers-Services

One hundred fourteen minor-coded quotations about the external environment pertained to the company's ready-use of suppliers and service providers to improve production and safety. Products and services were purchased, as opposed to resources, which were cost-free. Though interviews and documents converged around this theme, a divergent perspective was offered.

Under the former owner, workers did not always have the necessary tools and equipment, such as material handling and fall protection devices, to do the job.

> *There are certain things that we were unable to finish, because we didn't have the tools, because we had to improvise. Sometimes improvising was not always safe to get the job done. (Interview, Individual, I7IL-54)*

Under the new owner, though, the company was more willing and able to purchase items that assisted production and safety. Employees were even permitted to contact suppliers.

> *Well, if it's equipment or something that they need to do a job safer, we look into that and possibly purchase the new equipment. I think the big change was when the company was sold to a corporate investment firm.*

We really started to get support for what we needed to get the shop safer – new equipment or whatever we need. (Interview, Organization, I4OL-85)

a.   Suppliers

Numerous quotations showed the company's outreach to suppliers for a variety of new

product purchases, including security cameras, equipment casters, material handling suction cups,

certification tags, chemical protective gloves, and industrial hygiene monitoring equipment.

6) New Fire System- Superior will be here the week of March 23, on the night shift to install the new system. It will take them 2 weeks to do the install. Superior still needs to provide a map with specs for the conduit system to [Maintenance Supervisor]. Per [Maintenance Supervisor & Safety Manager]. (Document, Private, D30NL-7)

7) New Horse- [Purchasing Manager] will order half of the casters in January & half of the casters in February due to the high cost of the casters. When casters get here maintenance will schedule putting the casters on the horses. (Document, Private, D16NL-8)

12) Nitrile Gloves for Latex Allergy- [Safety Lead] working cost with Healthcare Specialties. Min/ Max has been set up in Tool Crib & we will begin stocking item when a cost if agreed upon. (Document, Private, D14NL-13)

Before production-related items were purchased, the company's engineering department defined

product specifications.

5) Large Sliding Door in Bonding- Engineering has concept, and drawings are in progress. Once drawings have been completed it will be submitted for quote. May be a Capital Expenditure item. [VP of Engineering, Quality and Safety] (Document, Private, D16NL-6)

Suppliers also provided parts and materials and served as sources of rental equipment, such as lifts

for elevated work.

10) Casting Mezzanine Floor- Steel plate has been installed to cover hole in the mezzanine floor temporarily. [Purchasing Manager] has ordered 10 sheets of replacement flooring for a permanent solution. Material has been ordered, but delivery date has not been confirmed. (Document, Private, D19NL-11)

5) Tie-Off Bars for Finishing & Fabrication- [Engineering] has identified a prefabbed tie-off system that may suit our needs. He will compare its cost to the cost of fabricating one. [Director of Logistics] to get prices on used Genie lifts (Document, Private, D53NL-6)

Two group- and organization-level subjects and field notes recounted the company's purchase of an

important safety and health product in 2010 – the DuPont STOP™ Training Program. STOP™, an

acronym for Safety Training Observation Program, was a safety education tool. For the company,

this purchase represented an early, conscious move toward better safety.

> *The first step that I specifically remember was the* STOP™ *safety program - enrollment in that. You know, created by DuPont; I think it was DuPont. And, it was just... That's the kick-off that I really remember. (Interview, Group, I3GL-23)*

> *… So then, our HR Director at the time, [redacted name], she started the* STOP™ *Safety Program – DuPont* STOP™ *Safety, and we started that with training all the employees. … (Interview, Organization, I4OL-37)*

b.   Services

According to multiple quotations, the company engaged service providers to repair and to

preventively maintain critical production equipment, including cranes, rigging, and curing ovens.

> *4) [Company] Parking Lot- Quotes to concrete the entire [company] parking lot are coming back per [Maintenance and Tooling Manager]. This will open up parking, and get the employee cars off the streets as well as fix the safety issue of holes in the parking lot. (Document, Private, D27NL-5)*

> *Spreader beam condition: Spreader beams have been inspected by outside, qualified personal who suggested that we by [sic] different rigging/ shackles. [Maintenance and Tooling Manager] to get [Safety Lead] information to get new rigging ordered. (Document, Private, D12NL-8)*

> *4) Floor in Front of Oven #1- The floor has been mud jacked, and back filled with grout. This solution has alleviated the safety issue. The committee will close this item, but has the option to reopen if this issue arises again- Closed (Document, Private, D19NL-5)*

> *6) [The company] Truck well- [The Maintenance and Tooling Manager] completed bids, and had truck well repaired- Closed (Document, Private, D22NL-7)*

The company accessed training services, too. According to three interview and documentary

sources, in 2013, the Safety Representative investigated OSHA training opportunities and costs for

company employees.

> *12) OSHA 10 Class- [Safety Lead] to get pricing on online classes. Further discussion is needed- [Safety Lead; Director of Quality and Safety]. (Document, Private, D15NL-13)*

> *5) Training/ Certification tracking in Mosaic- [VP of Human Resources], [Director of Human Resources], and [Safety Manager] are working with Mosaic on getting [Safety Manager] permissions to input employee trainings into Mosaic. (Document, Private, D61NL-6)*

Not every supplier or service request, though, was immediately endorsed. One subject told an uncorroborated story of a safety-critical preventive maintenance request that was initially rejected due to high cost. That request, which regarded overhead garage doors, followed the catastrophic failure of an 1800-pound door that nearly crushed shop floor workers.

> *We put a cost structure in place. We put a schedule in place. Here's what we've got to do. We have PMs that get done on them, but they're pretty spread out, so we adjusted all the PMs. We can't do them [overhead door inspections], because we have to have qualified people, so we have to have a third party do it. And, when the cost came in for that, 'no, we're not doing it.'… The pushback from the shop floor about that got them fixed. (Interview, Organization, I9OL-146, 156)*

2. External Environment Construct: Regulation-Standards

A significant amount of multi-source and cross-level data, specifically 109 quotations, converged around the theme of regulation-guidelines. This theme was assigned to quotations that mentioned OSHA inspections or mandatory or voluntary technical standards.

a. Regulation

The Occupational Safety and Health Administration (OSHA), who has authority to conduct programmed, post-accident, targeted, and complaint-related audits, conducted OSHA inspections at the company, on at least three occasions over the past two decades, according to public documents and interviews.

> *Yeah, and we were getting inspections from OSHA pretty regularly, because of our accident rate. So, they were constantly coming over and checking on the shop. (Interview, Organization, I4OL-29)*

> *It seemed like there was a period when we had OSHA in here with a lot of concerns, possibly fines. In fact, I know there was some fines. (Interview, Group, I3GL-17)*

In 1998, the company was subject to a post-accident investigation following a fatality and severe injury. Two citations were issued for violations of material handling and portable tool/equipment use.

> *Inspection: 302071832 – [Company Name]*
> *Inspection Information - Office: [redacted]*

One group-level interviewee recalled the company's comprehensive OSHA audit in 2008, which

resulted in citations and fines. This account was not corroborated.

> *We had an OSHA compliance visit in 2008. It kind of took us off guard – you don't see OSHA a lot on [specified geography]. So, it was probably, well, the second time we'd seen them, but the first time that we had a wall-to-wall inspection. (Interview, Group, I1GL-5)*

Several documents and interview subjects recounted a third OSHA inspection in March 2012.

According to one document and one interview subject, the company's high accident rates prompted

the inspection. OSHA identified serious and other-than-serious violations of general safety

conditions, chemical handling, guarding of openings and holes, confined spaces, hazardous energy,

and machine guarding.

> *Section 5(a)(1) of the Occupational Safety and Health Act of 1970: The employer did not furnish employment and a place of employment which were free from recognized hazards that were causing or likely to cause death or serious physical harm to employees in that employees were exposed to flammable hazards: a) [company] at [address], [city, state, zip code]: On and before 3/5/12, the employer did not ensure that flammable chemicals such as Lucite syrup were stored in a laboratory-safe or flammable material refrigerator/freezer. This condition exposed employees to fire and burn hazards. (Document, Public, D75NL-10)*

Even though subjects linked chemical air quality problems with the 2012 inspection, public OSHA

documents did not show evidence of an airborne chemical violation.

Well, this particular one was all about air quality and ventilation, right. We never really had anybody get sick, get hurt, get injured. We were never even able to get an understanding that someone made a call (an OSHA complaint). They were here, something happened, they went through our casting area, and it's kind of, like, methyl methacrylate - it smells pretty bad in here, and that's all it took. And it just snowballed from there. (Interview, Organization, I9OL)

The company's 2012 OSHA violations resulted in citations and fines.

During that compliance visit in 2012, it wasn't a pleasant experience for [company] just because there was a lot of citations. The only place they didn't find a citation was in the area that [Safety Representative] had control over, because [Safety Representative] had done all that work in 2008. …. At that time, it was a lady named [redacted] - I forget her last name, but she was one of the OSHA compliance officers. She actually turned around and shook [Safety Representative's] hand and said, "you're doing a really good job back here." That was the only positive thing that they really had to go back and tell executive management was "hey, the lab didn't get fined". (Interview, Individual, I1GL-14)

Organization- and group-level sources confirmed that despite the destabilizing nature of fines and risk of shutdown, the company weathered all OSHA inspections, including the 2012 inspection.

We had just come off a major OSHA fine, and an OSHA problem, and a complaint, and a compliance issue. It cost the company, by the time all was done, about $500,000. (Interview, Organization, I9OL-25)

Well, bottom line at that point, it was really about the money. A $300,000 air handling system on top of the fines that were levied at the time was…it was expensive, and it was very painful, as far as financially for the company. (Interview, Individual, 1GL-41)

There aren't a lot of companies that could handle a $500,000 fine and process improvement. (Interview, Organization, I9OL-28)

In 2016, after achieving OSHA SHARP certification, the company earned a temporary reprieve from some types of OSHA enforcement.

Per your request a SHARP Certificate of Recognition has been awarded to:
    [Company]
Additionally, this company is exempt from OSHA programmed inspections for the following period:
    Dates: August 3, 2016 – August 2, 2017
Enclosed is the letter and SHARP certificate for you to present to the company.
                                                        (Document, Private, D3NL)

b.   Standards

The standards sub-theme applied to quotations that mentioned safety code requirements and best-practice guidelines. Even though most text segments were about workplace safety and health, some regarded quality and environment.

150

Evidence demonstrates that, historically, the company did not follow OSHA standards.

Quite literally, we weren't paying much attention to it. 300 Logs were years behind – I'm sorry, yeah, 300 Logs were years behind. … OSHA reporting was way behind. (Interview, Organization, I9OL-21 and 23)

You know, we go back to those early days, [Safety Committee] had its effectiveness in addressing problems, but obviously not strong enough, because their opinions of safety issues versus OSHA's opinions of safety issues were very, very different. (Interview, Group, I3GL-25)

However, according to organization and group interview subjects, in 2008, to rectify OSHA audit findings and to create compliance-based programs, the company appointed a temporary Safety Representative.

We had an OSHA compliance visit in 2008. … And at that point, they didn't have anybody to do the OSHA compliance piece, so [Safety Representative] got involved in that. (Interview, Group, I1GL-5)

Following the 2012 inspection, strong evidence from group interview sources and documents touted the company's increasing attention to mandatory and voluntary safety and health standards. The company sought some of their first compliance advice from OSHA's Onsite Consultation Program.

So, [Safety Lead] had very little safety and health training, and [Safety Lead] didn't know much about the regulations. [Safety Lead] had been through DuPont's STOP™ program. It is more behavior-based – it doesn't really tell you the rules. So, anyway, [Safety Lead] got a lot of information from [OSHA Onsite Consultation auditors] when they came down from the SHARP office and inspected us. We did wall-to-wall and then went through the paperwork. We didn't have a lot of the (compliance) programs that we should have had. (Interview, Group, I1GL-33)

In 2014, to comply with OSHA and other safety and health standards, including Hazard Communication, fire protection, OSHA recordkeeping, the company drafted numerous policies and programs.

[Safety Representative] wrote our hazard communication program at the time. [Safety Representative] did our respiratory protection program at the time. Um, [Safety Representative] redid our material safety data sheet books at that time, and then put the indexes in them and things like that...hazard communication pieces, as far as labeling; PPE; risk assessment – [Safety Representative] had a huge hand in that. Pretty much everything to try to get us into compliance. (Interview, Group, I1GL-5)

To maintain compliance, in 2016, the company reviewed the integrity of their OSHA Programs.

8) OSHA Program Annual Review- Annual review of OSHA programs is in progress & will be completed before December 31st, 2016. (Document, Private, D50NL-9)

3) SHARP Certification- [Safety Manager] is currently working through the goal list provided by SHARP auditors to be completed before next year's recertification with the help of the safety committee. One of these includes a review of all OSHA programs which is being added to the safety meeting agenda. Another is safety training which is also part of the safety meeting agenda. (Document, Private, D49NL-4)

A sizable part of the company's standards and compliance effort centered on training. All data sources showed that the company implemented OSHA-based training – OSHA 10-hour training.

I believe that by training your employees like [company] in STOP™ safety and OSHA 10 has been one of the most beneficial factors in making this place a way safer place to work. (CIR, Individual, S14IL)

… The Operators continue on with the OSHA 10; it's five weeks at two hours a week, and at the end they get their OSHA 10 card. (Interview, Group, I1GL-156)

As the need for hazard and regulatory awareness increased, compliance training expanded. Eventually, both OSHA 10-hour and 30-hour courses were mandated, first for installation and shop floor personnel, and second for all personnel.

2) New Hire Safety Training- New hire training is in progress, and will continue as we hire more members for the team. [Safety Manager] to look into scheduling an OSHA 30 Hour Training for new Installation supervisors. [Safety Manager] will need a couple supervisors from production. (D64NL-3)

… [Company] is going above and beyond by offering OSHA 10- and 30-hour cards to their employees. … At this time, 70% of employees have received their OSHA 10-hour card, with the long-term goal of having 100% of [company] employees earn a 10-hour card. Originally, OSHA 30-hour courses were reserved for managers and supervisors. However, the 10-hour course has been such a success that non-managerial employees are requesting to take the 30-hour course as well. (Document, Public, D85NL-17)

As the safety transition progressed, the company routinely paid detailed attention to safety standards.

8) Wall Cleaning Fall Protection in Tool Prep Area- Production is working with everyone involved with the cleaning of the walls to find an efficient safe solution. The first meeting was held on 1/20/2017, and the safety team will be brought in to review the final product to ensure it meets all safety policies, and federal regulations. (Document, Private, D52NL-9)

3) SHARP Audit –… ALL respirator certified employee must be clean shaven – expectation is to shave every other day to be in compliance. Per [Safety Manager] (D32NL-4)

Safety and health improvements were not implemented in isolation, according to public documents and an executive subject. In 2015, for example, the company simultaneously pursued ISO 9000 certification.

25. A review of the overall safety and health management system is conducted at least annually.	*3*
Comments: Program review is ongoing. [Company] is also trying to attain ISO 9000 certification.	

<div align="right">

(Document, Private, D82NL-25)
</div>

Two years later, the company pursued best-practice recognition for environmental standards.

> *7) Environmental Management System- The first draft of the EMS has been authored by [Safety Manager]. A rough draft of the management system was submitted to [State Department of Public Health and Environment] with the Silver Tier application. (Document, Private, D56NL-8)*

> *The Safety Manager (SM) spearheads the company's waste and environmental initiatives. Following implementation of the safety management system, the SM intends to seek ISO 14001 certification, which specifies the requirements for an excellent environmental management program. Referring to special certification, the Safety Manager says, "I'm into all that." (Field Note, F1NL-20)*

1.   External Environment Construct: Resources

Eighty-four quotations attested to the company's use of external no-cost or low-cost resources to meet workplace safety and health needs and to fill knowledge gaps. A large amount of data from group-level interviewees and public and private documents converged around the OSHA On-Site Consultation program. The company had been aware of this external resource since the early 2000s and had obtained their first consultation around 2003.

> *I forget what year it was, but our injury rates were very high back then. I want to say around 2000 or 2001. I can't remember exactly what the paperwork said, but OSHA had actually said 'you actually might want to look into our Onsite Consultation Services, because obviously you're doing something wrong.' So, the company knew about it, they just hadn't implemented it. So, the company, even previous to us starting it in 2013, had known about it, and had them over at least one time previous to that. Possibly even times after that. (Interview, Group, I1GL-54)*

1. A Comprehensive, baseline hazard survey has been conducted within the past five (5) years	*3*
Comments: [Company] had a "wall-to-wall" inspection with OSHA compliance in 2012. They have developed a positive working relationship with OSHA compliance. This is the first comprehensive survey done by the [OSHA Onsite] Consultants in the last 5 years, but [company] did use the {OSHA Onsite] Consultants approximately 10 years ago.	

(Document, Private, D81NL-1)

A decade later, in 2013, the company partnered with the OSHA On-Site Consultation Program to

pursue safety and health compliance and excellence. Evidence showed that the On-Site Program's

Form 33, the Safety and Health Program Assessment Worksheet, was a useful resource to guide

improvement. A wall to wall safety audit uncovered many safety shortcomings.

> 12) SHARP Form 33- [Safety Lead; Assistant Plant Manager; and Bonding Manager] were all assigned
> line items from the Form 33 to do list. They will find solutions to the problems, and give a small presentation
> to the committee next safety meeting
>> *[Assistant Plant Manager]- Change analysis is performed whenever a change in facilities, equipment,
>> materials, or process occurs.
>> * [Bonding Manager]- Material Safety Data Sheets are being used to reveal potential hazards associated
>> with chemical hazards in the work place.
>> *[Safety Lead]- Workplace injury/illness data are effectively analyzed. (Document, Private, D16NL-
>> 13)

In 2014, prior to a follow-up Onsite Consultation visit, the company used Form 33 to conduct a

self-audit.

> 4) SHARP Form 33- JHA/JSA are nearly completed to a level satisfactory to schedule a second
> SHARP audit. After a review of all 60 questions on SHARP Form 33 [Safety Manager] feels confident
> that we have the correct answers to the questions about our safety culture & procedures to score a 2 or 3 on
> all questions especially the 15 questions that were either not evaluated or we scored low on during the first
> audit. (Document, Private, D20NL-5)

In 2015, 2016, and 2017, subsequent On-Site Consultations were conducted to monitor safety and

health improvement.

> 3) SHARP Audit – Will be May 22nd, 2015. This audit will be like an OSHA audit. We will be
> given 2 months to abate and hazards identified. We have 2 mezzanines to repair and 1 mezzanine to create
> prior to their visit. [Safety Manager] did a shop audit, and then a follow up audit. He has sent out the
> needed fixes to each department. …   Per [Safety Manager] (Document, Private, D32NL-4)

> 3) SHARP Audit – Audit went very well. Still waiting on official report. [Onsite Consultation Staff] only
> reported 11 minor hazards and all have been corrected at this time. [Safety Manager] sent documentation of
> hazard abatements back to [Onsite Consultation Staff]. This certification would protect us from random
> inspections but we would still be eligible for audits in the case of a death, hospitalization, or a formal
> complaint. (See attached) (Document, Private, D33NL-4)

> OSHA SHARP Form 33 forms from 2013, 205, 2016, and 2017 attested to the company's regular
> interaction with OSHA Onsite Consultants. Form 33 documents provided scores and comments about the

status of the company's OSHA compliance and safety-excellent processes. Scores and comments, between 2013 and 2016, demonstrate clear safety improvement. (Field Note, F18NL-14)

Evidence attested to the company's long-standing relationship with On-Site consultants to identify

and abate hazards and set future safety and health improvement goals.

7)   SHARP Audit- Audit was held on April 28th, and both facilities passes with flying colors. The safety team is working closely with [OSHA Onsite Consultation] personal on the referral process for SHARP status (Document, Private, D44NL-8)

1. A Comprehensive, baseline hazard survey has been conducted within the past five (5) years.	3
Comments: [Company] has utilized the [Onsite] consultation program many times in the past years. They have been working towards the goal of achieving, then maintaining SHARP since 2013.	

(Document, Private, D6NL- 1)

One interview source considered On-Site consultants to be a supportive external resource worthy of

contact, without hesitation.

[Safety Manager] has got [product installers], if they need to reach out - the same way that [Safety Manager] would reach out to [OSHA Onsite Consultants]. … (Interview, Group, I1GL-173)

Evidence shows that the company sought several other external, technical and assistive

resources during their safety improvement journey, including Toolbox Talks, a Campbell Institute

white paper, Lean Six Sigma tools, local health and wellness entities, and city government.

Yes, every employee goes through … an introduction to 6S (Lean Six Sigma), because 6S is how we sustain our walking and working surfaces, our shop cleanliness, how we don't' block electrical panels or fire extinguishers, or things like that. Everybody gets that initial training. (Interview, Group, I1GL-156)

5) Parking Safety Issue- ... [The Safety Manager] spoke with [named person] of the City of [redacted] & she came to assess the issue of us putting up signs to warn motorists that employees are crossing the street. [Named person] says she will not agree to us putting up our own signs at this time, but did indicated that she was concerned that the industrial park has no speed limit signs. The City has committed to putting up speed limit signs and has asked that we monitor the situation after they do so to see if the problem gets better. … – [Safety Manager, Maintenance and Tooling Manager] (Document, Private, D21NL-6)

5) Vaccinations- [VP of Human Resources] is already scheduling traveling employees for vaccination. [Safety Manager] has set up an account with the [redacted name] County Health Department so employees can go there & get vaccinated without having to pay up front. (Document, Private, D36NL-6)

We do a health week. … That was one of great things we did in 2016 and in 2017, and we're planning 2018 - it was a great success. We've made a little competition out of it. We've gotten things from local

vendors. You know, we got one of the athletic clubs to come here and give us a great deal. (Interview, Organization, I9OL-190)

2.   External Environment Construct: Markets-Customers

Even though few quotations mentioned markets and customers, as the life-blood of the

organization, both were vital. Here, the term *markets* refers to potential customers, and *customers*

refers to clients under contract.

a.   Market Access

Documents showed that, in the 2000s and early 2010s, two market-related phenomena were

impinging upon the company – the market's orientation toward safety and the company's high rates

of injury and illness. Regarding the former, the company's international market opportunities were

dominating market share.

> *"The strongest activity right now continues to be Asia," [redacted name] says of export markets for [company]. "But there are things that are kind of happening all over the world." The company has completed projects in more than 50 countries. [Redacted name] expects the list to lengthen … (as) the economies grow in developing nations. China, South Korea and Singapore have become top export markets. "China is just a powerhouse now compared to what it was even 10 years ago, [redacted name] says.*
> *But on a continental scale, South America and Africa also offer what [redacted name] quantifies as "huge" potential. While the ratio of domestic to international sales varies year to year, [redacted name] estimates that exports now account for about two-thirds to three-fourths of sales. (Document, Public, D68NL 10)*
>
> *As about 20 percent of 2017 sales went to domestic customers, the company is also growing in several other international markets. "It used to be 90 percent States, 10 percent international," says [VP of Operations]… (Document, Public, D79NL-23)*

Markets increasingly linked safety to contract eligibility. To bid on projects, the company was

required to disclose safety performance information, including their high injury and experience

modification (EMod) rates.

> *… [executives] started to realize, that on top of all of it, safety and health make sales. When you start to look at contracts... Nowadays, when you look at a construction contract, more than half of it is about safety and health and environmental. You know, they want to know about your experience modification rating. You can't fake that. They want to know about your incident rate. That's another thing that you can't' fake. … And I believe our executive management realizes that, and our sales team realizes that. … (Interview, Group, I1GL-162)*

… they're not just looking that we have a safety program, they want details behind the safety program. They want to know what we do. They want to know what our Toolbox Talks are - who's involved in them. They want to know that we have a weekly training, monthly training, what we do, how we handle that, and they want the proof that backs that up. …, but every bid package is different. So, like in [redacted city], they'll want to know for the last six years, if we had near misses, if we had accidents, if we had this, if we have that, what the numbers were, how many employees were on for each one of these. I mean, they want in-depth. Then you'll have another project in the Middle East that they just want to know if you have the certification, so they're not going to get in trouble. I mean, it's just different. (Interview, Group, I6GL-7)

… so there's the bid package section, like an RFP (Request for Proposal) or RFI. We'll send that out; at that point we're competing with people. And then they'll look at it, and they they'll say – most of the time, in my opinion... What they're looking at is seeing that we have those things in place in our shop, because that means that it's going to transition to our on-site. We do have some things for on-site that have to be tracked, but mainly that's what I see. . They're also, in certain countries and areas, I believe, looking at that information to make sure that they did their due diligence to pick the best company that is out there and is doing the safest work. Because nobody wants their project tied to a major accident that happens – God forbid. Nobody wants their project to be tied to that either. So, I think that that's a portion of it. So, when a bid package is sent out, most of the time, we're signing saying that we are verifying that this information is correct. (Interview, Group, I6GL 32)

According to organization-level sources, the company's market eligibility and sales were adversely affected by high EMod and accident rates.

For one, it was our EMod score (refers to the Experience Modification Rating, which is assigned by a corporate insurer to rate a firm's injury experience). And, our accident rate was so high that we were starting to lose out on jobs in the US. Because certain companies won't let you bid the project, if you're an unsafe company – if you have a certain number of accidents. So, we had to get that score down to be eligible for these contracts and jobs in the United States. (Interview, Organization, I4OL-37)

If we were over... If we were even at a 1 on our EMR, we're going to make less sales. (Interview, Group, I1GL-162)

To combat market loss, by 2016, the company generated a customizable Site Safety Plan that was included in bid packages.

… This was early 2015. We were just implementing our safety management system to reach out to the job sites, because not only are we responsible for what happens here, we have multiple job sites going on all around the world at all times. So that was something we implemented later – that really started taking effect in 2016. … (Interview, Group, I1GL-165)

In their Safety Manual, the company also affirmed the link between worker safety, sales success, and customer safety.

The success of our operation will depend not only on sales and service, but also on how we perform in the field of safety and health for all employees as well as our customers. (Document, Private, D1NL-60)

As the company's safety record improved, so did market access.

> *Yeah, for sales, we're able to win projects in the Unites States, because of our safety rating. (Interview, Organization, I4OL-118)*

b.   Customer expectations

Post-contract, customers, especially on installation sites, were concerned about safety. One group-level source stated that "general contractors don't want you on the job site, if you're going to be a problem; you're going to cause incidents..."

> *When it goes to contract – I'm trying to think of any example – they will require safety on-site, as far as crane usage, hard hats, those items. They'll say that you need to have the PPE, as far as what is required on-site; they'll usually list that out, but it's not necessarily putting our information into the contract. (Interview, Group, I6GL 32)*

> *… And realizing that they don't want you… Those general contractors don't want you on the job site, if you're going to be a problem; you're going to cause incidents…. (Interview, Group, I1GL-162)*

Customers required product installers to possess a level of safety knowledge and ability.

> *… Before we implemented our safety management system, we were working on the [city] [installation project] and they wanted a site-specific safety program, and we didn't have any of that in place. … We eventually... After talking with them and the general contractor, the only way that we could go on site - and I actually had to basically sign and have our sub-contractor sign that we follow their safety management system – just a document stating that. And it was an eye-opener. My guys were down there doing the finishing work. … and the same general contractor that wasn't going to let us on site, because we didn't have a site-specific plan, sent an e-mail directly back to our sales team, our executive management, and myself, praising our team for being out there and for their safety consciousness. They said that the sub-contractor that was working next to them had nine safety incidents in a month, and our guys had zero. They had no violations! Everybody was always following the safety program that we had set out. So, to go from down here to up here (interviewee moves his hands from low to high position) in the eyes of the same contractor, that was a big boost to our executives and our sales team. (Interview, Group, IGIL-165)*

3.   External Environment Construct: Investor

The last external environment theme discussed in chapter 4 regards the capital investment firm that purchased the company in 2013. Even though very few quotations mentioned the investor, subjects perceived this external factor to be foundational to the achievement of safety

excellence. Uncorroborated public documents displayed the firm's acquisition interests and

philosophy.

> *[Capital investment firm] provides closely-held lower middle market companies with the capital to finance either the exit of an existing equity holder, core growth or an acquisition strategy. … (We) focus on "goal oriented" transactions such as family succession, management succession, growth or acquisition, divergent ownership goals or a passive owner who wants to sell the business to active management. (Document, Public, D67NL-6)*

Upon ownership, the investor did not replace the company's management, but rather augmented management with an executive consultant and a Board of Directors to optimize operational and financial success.

> **FOLLOWING ACQUISITION, OUR APPROACH IS AS FOLLOWS:**
> *The management team will continue to be responsible for the day-to-day operations of the company and is typically incentivized to create shareholder value through stock ownership. If needed, we have the ability to supplement the existing management team. (Document, Public, D67NL-45)*

> *They brought in [redacted name]; he's our CEO now. They brought him in in the beginning as a consultant to feel out the business and see how operations ran, and then they put him in as the CEO probably three years ago. And, he's been pretty key in supporting production, the shop, and safety. (Interview, Organization, I4OL-93)*

Even though investment firm documents made no mention of workplace safety and health,

cross-level interview subjects perceived the investment firm to be concerned about hazards and

risks.

> *Ok, so, we got purchased by venture capitalists. They came in – they owned like seventeen other businesses, and they're very safety oriented. (Interview, Organization, I9OL-25)*

> *Well, [former owner] owned the company, and [former owner] sold it to [Capital Investment Company]. [Former owner] remains on the Board, and a few other people remain on the Board with small ownership stakes, but [Capital Investment Company] bought the company to invest in it and see it grow. I've looked at their website a little bit, and they're real specific about the kinds of companies that they want to buy and what they hope to turn them into - specific lengths of time they've been in business, specific manufacturing niches and specific… I've already said ROIs. I think, that just that transformation from being solely owned, into this, was part of the culture change. It was kind of the catalyst for the safety...the safety program. (Interview, Group, I3GL-73)*

4.   External Environment Construct: Summary

The external environment construct uncovered seven extra-organization themes. Five

themes were frequently cited or perceived to be relevant to the company's achievement of safety

excellence. Private documents, especially Safety Meeting notes, and group-level interview subjects served as the sources of most data.

Even though investor and markets-customers themes were less often mentioned, subjects perceived both factors to be foundational to safety success. Many quotations attested to the company's used of product suppliers and service providers to improve production and safety. At least two of three OSHA inspections in 1998, 2008, and 2012 resulted in safety violations and citations. To improve OSHA compliance, the company attended to OSHA standards. Quality and environmental standards were voluntarily implemented. OSHA's On-Site Consultation program and their Form 33 assessment tool were the company's principle safety and health resources. The company also valued health and safety guidance from the internet and local private and public businesses. TABLE XIX summarizes the external environment construct.

TABLE XIX: EXTERNAL ENVIRONMENT CONSTRUCT SUMMARY

Primary Data Sources		Private Documents, Interviews
Primary Units of Analysis		No Level, Group-Level
Prominent Themes		Suppliers-Services, Regulations-Standards, Resources, Markets-Customers, Investor
Summary of Prominent Themes	Suppliers-Services	• The company frequently engaged suppliers for new products, parts, materials, rental equipment, and training programs, such as fire suppression systems, material handling horses, gloves, replacement flooring, and the DuPont STOP™ Program. • Service providers were hired as needed for training services and for repair and preventive maintenance of production equipment, including OSHA training, parking lot repair, and inspection of rigging equipment.
	Regulation-Standards	• At least thrice between 1998 and 2012, OSHA conducted post-accident, targeted and programmed inspections at the company. At least two inspections resulted in citations and/or fines. • The company earned a temporary reprieve from some OSHA enforcement after earning SHARP certification. • After 2013, the company was more attuned to safety programs like Hazard Communication and fire protection; and OSHA training, like OSHA 10-hour training. • Quality and environmental standards were implemented alongside safety standards.
	Resources	• The company was aware of the OSHA On-Site Consultation Program a decade before they requested an initial audit in 2013. • Repeat On-Site audits in 2015, 2016, and 2017 uncovered fewer safety management system shortcomings and led to 1-year and 3-year SHARP certification in 2016 and 2017. • Form 33 proved to be a useful status evaluation tool to guide self-assessment and self-improvement. • The company sought several other technical and assistive resources from the internet and local private and public entities, including Toolbox Talks, a Campbell Institute white paper, and Lean Six Sigma tools.
	Markets-Customers	• Markets and customers are the company's life blood. • Markets increasingly linked safety to contract eligibility and the company's high experience modification rates interfered with market access. • Customers expected a safe product installation process.
	Investor	• The capital investment firm that purchased the company in 2013 was safety-minded.

B.   Leadership Construct

The leadership construct pertained to situations where executives made decisions, directed

the organization, and behaved as role models. There were 262 major coded quotations about

leadership and 286 sub-coded quotations. Half of all coded segments appeared in private

documents, and one quarter were offered by executive-level subjects. Like the external environment

construct, very few individual-level workers mentioned leadership (TABLE XX).

TABLE XX: LEADERSHIP CONSTRUCT, NUMBER OF SUB-CODED SEGMENTS BY
SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	4	6	1	
Interviews	70	44	5	
Field Notes	1	0	0	1
Documents, Private				140
Documents, Public				14
Subtotal	*75*	*50*	*6*	*155*
Total	*286*			

Three themes emerged from the data – direction-setting, team-building, and motivating-role-

modeling. More than 70% of all leadership quotations regarded direction-setting and approximately

20% regarded team-building (Figure 16). These dominant sub-themes are discussed here.

Figure 16: Leadership Construct, Percent of Quotations by Theme
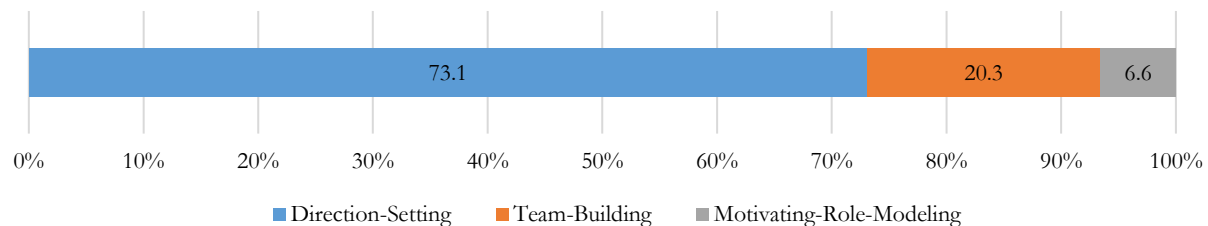
1.   Leadership Construct: Direction-Setting

This sub-theme regards the conduct of strategic thinking, planning, and managing by executives. Leaders set organizational direction by seeking information, involving employees, naming short- and long-term priorities, defining paths forward, and monitoring progress and performance. Two facets of direction-setting were apparent in this study's quotations – a business facet and a safety facet. Both pivoted around company ownership.

a.   Former Owner

A few statements from organization and group level interview subjects suggested that the company, under the former owner – prior to 2013 – paid little attention to business-related visioning and strategizing. All decisions made by the single owner centered on production and earnings.

As a company, we had no vision. Quite literally, we weren't paying much attention to it … (Interview, Organization, I9OL-21)

When you're owned by an owner-entrepreneur, and all the decisions have to go through them... (Interview, Organization, I5OL-9)

In the beginning, we would manufacture these products and not really know what our costs were. … All [former owner] cared about was he's got this much money in the bank, and he's not losing money. We didn't have to report to a Board or anything, so he wasn't that concerned about what our costs were, as long as we were getting the product done and he was making money. (Interview, Organization, I4OL-95)

Documents, though, implied that the former owner did consider the strategic business direction. As

the company's international market expanded, the owner established a sister company in Asia.

> *In response to increasing demand in Asia, [company] opened a sister company in [Asian country] to*
> *manufacture panels and other products. (Document, Public, D68NL-28)*

Around 2011, a second U.S. business to support design and installation was opened.

> *[Company] chief executive [owner] also has created another company, [redacted name], housed in its own*
> *building across from [company], designs and supervises construction of projects that [company] manufactures.*
> *(Document, Public, D76NL-22)*

Under the former owner, there was a general absence of strategic thinking and acting on

behalf worker health and safety. This notion was supported by the shifting daily priority of safety

and health. In addition, following a 2012 OSHA inspection, when threatened with regulatory

citations and financial penalties, the former owner failed to set and monitor a corrective plan.

> *[The company was] under this microscope of one man picking the way things were being done. When on*
> *Monday it was this, but by Friday it was something totally different – safety is out the window – 'I'm more*
> *concerned about this.' And the next week, safety's back on the table. The week after that, it's not on the*
> *table anymore. (Interview, Group, I3GL-77)*

> *[In response to OSHA citations in 2012 …] As a company, we didn't react to it, we didn't respond to it.*
> *They gave us X number of days to put a plan in place; we didn't put a plan in place. They came back and*
> *said, 'where's your plan?' And we said, 'what plan?' So, he said, 'OK, here now … They never completed*
> *the implementation of the correction until [Director of Quality and Safety] was here. So, between [Safety*
> *Manager] and [Director of Quality and Safety], in particular, and the maintenance guys, is when we finally*
> *finished up the implementation and got past it. (Interview, Organization, I9OL-30)*

One exception was the implementation of the DuPont STOP™ Safety Program around 2010, which

unlike other prior safety initiatives, was awareness and behavior-oriented, not compliance-oriented.

> *The first step that I specifically remember was the STOP™ safety program. Enrollment in that. You know,*
> *created by DuPont; I think it was DuPont. And, it was just... That's the kick-off that I really remember.*
> *We were going to do safety and take a different approach instead of just a Safety Committee that meets once a*
> *month, and talks about safety issues, and then makes changes within the plant. Everybody was going to be*
> *brought in - you're in charge of safety, you're in charge of safety, you see something... Every individual was*
> *capable of and expected to coach every other employee. (Interview, Group, I3GL-23)*

In either case, under the former owner, there was no evidence of formal or written direction-setting,

either for business or safety.

b.   New Owner

Data from organization- and group-level interviewees highlights corporate direction-setting actions by the new capital investor. From a business standpoint, the new owner strategically planned to improve operational effectiveness and financial efficiency.

> *Some of that is when they sold the company five years ago - it had to be professionalized. (Interview, Organization, I5OL-9)*

> *So, we've been trying to push to get (sales and cost) as early on in this process as possible, so we help with the design and play to our strengths. So, that's the fundamental change in how the company operates. … we would get to stuff that we repeat more often. With the tagline of [redacted – building custom products], we are going to be pushing the limits all the time. (Interview, Organization, I5OL-30)*

Product decisions, such as increasing access to international markets, were also strategic.

> *Since 2015, exports have driven [company's] growth as China emerged as the company's top market. "It's over 50 percent of our business now," says [VP of Operations]. "We've done a lot of big projects in China. China is booming." In 2016, the company launched a website specifically for the Chinese market. (Document, Public, D79NL-20)*

Even as executives set the direction, not all departments followed suit. The department of quality and safety, for example, did not have a formal budget.

> *You know, we came up as a privately-held organization owned by one man. …that drives the fire-fighting, because, you know, why should we plan? OK. Now we don't even have budgets for all departments. (Interview, Organization, I9OL-164)*

> *We do not have a budget for quality and safety. …we don't have one. So, you won't find a budget that says, here's what you're going to do, or here's what you're capable of, or here's what you have. Quality and safety group does have SMART goals for 2018; we're building them for 2019. We, as a corporation, have embraced SMART goals. (Interview, Organization, I9OL-242)*

An abundance of converging data from all units of analysis and sources showed that safety and health direction-setting, under new leadership, was evolutionary. Interview subjects agreed that the change of ownership catalyzed safety improvement.

> *I think that just that transformation, from being solely owned into this, was part of the culture change. It was kind of the catalyst for the safety...the safety program. … It sped it along a little bit. I honestly don't know what they did or said behind closed doors or in meetings about how safety is going to be approached. But my perception and opinion on it is, you know, just having them there made it...lent more legitimacy to the program – to all the programs, not just safety, but benefits and the change in organizational structure. Now, we have a lot more structure, and a lot more linear approach towards goals and what's expected. People*

165

aren't as intently under the microscope, and they have the freedom to exercise and to give empowerment to departments and department heads and let them do what they think is important while staying inside of these umbrellas of quality, safety, delivery and cost, and your KPIs (key performance indicators) and things like that. 'Don't care how you do it, as long as you can meet the goals that are put in front of you.' (Interview, Group, I3GL-73 and 77)

…the Safety Manager's perception that the owning venture capitalists were concerned with safety and that "we have the best safety record of all of them." (Field Note, F1NL-39)

Different sources offered various reasons for leaders' safety commitment, including the new company's democratic leadership style, ethical obligation, concern for reputation, regulatory pressure, and financial preservation.

It's hard to say. Are they doing it, because it's the right thing to do? That's part of it. Are they doing it, because OSHA's making them? That's part of it. Would they be doing it, if there was no such thing as OSHA? Only what was necessary. I think that's just the nature of lots of businesses. Maybe you wait until something happens to really fix it, because you are focused on cash flow. … So, you know, I mean, I think it's just a combination of all of those factors – a governing, and they want to do what's right. … Keeping the insurance premiums down. Keeping active employees wanting to come work here, because there aren't accidents, or there's not a bad reputation. The ability and need to get work… (Interview, Group, I3GL-101)

Nearly all executive- and group-level respondents perceived safety to be a threat to the owner's investment. Accidents diminished the company's market share. Worker's compensation costs cut at profit. Safety problems jeopardized the production schedule. Work was physically dangerous for employees, and ethically risky for the company.

Accidents involving bodily injury to [company] employees, or which result in property damage can have a substantial detrimental impact on assets or profit objectives. We also have a moral and legal responsibility to provide and maintain a safe operation. (Document, Private, D1NL-71)

This threat, and the reality of regulatory citation and penalty in 2012, led the company to intentionally prioritize occupational safety and health around 2013.

I mean, the expectation was 'lower our EMod (Experience Modification Rating).' That was the only expectation. … [Capital investment owners] addressed it with [President], and [President] drove it. (Interview, Organization, I9OL-36)

OSHA reporting was way behind. Our worker's comp insurance was through the roof. I mean, just nothing was out there. So, vision-wise, what [President] ultimately said was 'you need to improve our safety presence,'

and that was pretty much as far as it went. ... So, the vision was 'improve it, make our safety presence better.' (Interview, Organization, I9OL-23)

40. Top management policy establishes clear propriety for safety and health.	*3*
Comments: The first page of the employee manual contains a policy from management on the priority of safety and health.	

(Document, Private, D81NL-40)

The details of safety strategizing, though, defaulted to veteran company staff and those in charge of safety and health.

> *… [investment owners] didn't really know what we needed. So, we would go to them and tell them 'we need this to make this safer.' (I4OL-87)*

> *I think… I think for what [company] does is they've allowed people like [Safety Manager] and [Director Quality and Safety] to come in and expand, as far as the safety part goes. They've allowed them to come in and say, 'this is what we need to do' and they allowed them to do it. (I2IL-121)*

As the Director of Quality and Safety and the Safety Manager defined the safety improvement strategy, overseeing executives were not immediately involved in the direction. However, between August 2013 and January 2018, at least one executive, either a Director, Vice President, or the President or CEO, monitored impact by attending Safety Committee meetings.

> *[Executives] didn't really pay attention - didn't really come out and talk. It took a while – it took quite a while. … Got about 6 months into it when we got the Safety Committee (involved), then...then, the executive group started coming in. You know, 'what are you doing about EMod?' 'We're doing all of this.' 'Well, has it gone down yet?' 'OK, EMod is a one-time-a -year thing – you know this, right?' 'No, we don't.' 'You know, we expect it to….' 'It's one time a year, and it's good for the next year.' 'So, we won't even know until next year in April what kind of status and where we're at.' 'Well, I expect it to go down.' 'We're on board – it's going down.' 'How much?' 'Well, I don't know, we'll figure that out when we get there, but these are the tools were doing to get to that.' (Interview, Organization, I9OL-69)*

> *…if you look at our Safety Committee meetings or the agenda, a lot of it is employee-brought up stuff. And, there's things that are bigger than me and my bosses, things that are bigger than the safety group, and that's when you take it to the Committee, because you have decision-makers there that are a little higher up. You have Vice Presidents and CEOs and the President sitting in there saying, 'this is what we have to do, and how we've got to do it, and that's where we can actually get,' by looking at trends and near misses and speaking about incidents. (Interview, Group, I1GL-100)*

As time went on, leaders became increasingly involved in safety direction-setting. Many quotations attested to leaders' support of employee involvement, the safety management system, safety

incentive program, disciplinary policy, work pauses, inclusion of safety in annual reviews, safety

training, and total worker health.

49. Top management values employee involvement and participation in safety and health issues.	3
Comments: Positive indicators for this attribute include the Safety Committee, STOP safety program, Monday morning tool box talks, employee satisfaction surveys, JHAs, etc.	
Employee Participation	Score
50. There is an effective process to involve employees in safety and health issues.	3
Comments: [Company] provides a plethora of ways for employees to be involved in their safety program. Several examples are listed in item #49.	

(Document, Private, D6NL-49)

45. Managers allocate the resources needed to properly support the organizations safety and health system.	3
Comments: This is evidences not only from [Safety Manager's] comments, but the fact that management has completely supported the large amount of time that it will take to five supervisors and OSHA 30 hour course and line-level employees an OSHA 10 hour course. This is in addition the time and cost it took to train [Safety Manager] to become a certified trainer.	

(Document, Private, D6NL-45)

In addition to safety training conducted for the STOP™ program and necessary OSHA written programs, [company] is going above and beyond by offering OSHA 10- and 30-hour cards to their employees. [Safety Manager] teaches the courses in-house, and management supports his efforts by allowing employees to complete their training during normal working hours. (Document, Public, D85NL-17)

We did have a high injury rate, and it was a very dangerous field to work in until we said, 'no, we're going to shut this down, and we're going to figure out how to do it, and we're going to come together as a team and figure out how to do it, or we're not going to do it.' … Shutting down an operation is not cheap. It's going to be really hard to get your bean-counters and your managers to get behind that and say, 'OK, we're going to do it,' but when you start to show them – when they've already seen the cons, and you start to show them the pros to get them actually to do that, it became the culture. (Interview, Group, I1GL-136)

We did a health week in 2017, and we're planning one in 2018. That was one of great things we did in 2016 and in 2017, and we're planning 2018 - it was a great success. … … the health week and all that kind of stuff is coming from the company. (Interview, Organization, I9OL-190)

Company leaders even supported decisions to pursue workplace safety and health excellence.

This being said it is also refreshing to know that [company] did not stop at just compliance, but has excelled at making [company] a safer place to work. (CIR, Group, S6GL)

When faced with obstacles, executives identified and prioritized the needs.

Well, the best I can speak to that is they take the easy ones and fix them right away, and they take the harder more expensive ones and try to get them into a queue through planning or capital expenditure planning

or things like that. You know, they've still got a long ways to go, and if there was an endless supply of money, I'm sure they'd fix it. So, they just have to prioritize certain projects to get them done. But, they did put their money where their mouth is, and they fixed certain things. (Interview, Group, I3GL-98)

But, it's, like, [Safety Manager] and [Director of Quality and Safety], both...they see something that needs to be done, whether it's on the quality side or safety or health or any of that. It's, like, every other department, you put in your proposal, and they all meet as a team and look over it, and decide what they're going to do, and how they're going to roll that out. (Interview, Group, I6GL-61)

By monitoring indicators of safety performance and witnessing improvements – lower EMR, lower medical bills, lower rates of injury – executive's commitment to safety deepened.

… They've started to realize, that on top of all of it, safety and health make sales. … And I believe our executive management realizes that, and our sales team realizes that. … And, I think they're also starting to realize that our product is a little more pricey than most people in our industry. Part of that is our quality, but the second part of that is people want us on the job site. They see our SHARP certification, and they see the fact that all of our employees are OSHA trained On-Site. They're CPR trained On-Site. We have a very robust program, and that's worth it to those general contractors to pay a little bit more to get us on their site, because we are safety conscious. (Interview, Group, I1GL-162)

Now, executives are committed to sustaining safety, because, according to one source, a safe workplace minimized production interruptions and characterized a mature organization; the company considers itself mature.

Well, I think that the significance of (safety) is like IT - it's only a problem when it's a problem. Everybody expects it to be OK. And safety and stuff, you can give a lot of lip service to it, but it doesn't cost you anything until it costs you something. So, you don't…. I think that just comes from experience, and the company is very experienced. (Interview, Organization, I5OL-48)

…There's a commitment on the part of senior leadership that [safety excellence is] an important piece. Two words that I like, that I've used for the last fifteen years, and that's focus and discipline. And the fact that, if it's important, measure it, and we do measure that. Whether it be NCRs (non-conforming records) - that's more quality than it is health and safety - but we have procedures in place and we have training in place… (Interview, Organization, I5OL-36)

Even though there was strong evidence of leadership commitment to safety, there were divergent perspectives. One source believed that intentional cuts to preventive maintenance and incentive funding might jeopardize worker safety, for example.

Probably the biggest one – I shouldn't say the biggest one, but the one that hurt the most was they took the budget away for the incentive system. … It - it hurt. Me, personally, the way I function, I pride myself on being under everything. So, if you give me a $12,000 budget, I'm coming it at $11,000 or under. So, the first year was $12,000, and then it went to $10,000, and we were good. And every year, I came in under.

169

I only used 80% of the budget, and we had phenomenal things, and our growth was exponential. And then it was like, 'your budget is a $1,000 next year.' I'm kind of, like, '$1,000?' (Interview, Organization, I9OL-114)

In addition, the exclusion of safety from Annual Operating Plans and 1-, 3-, and 5-year corporate

strategic plans, and the presumption that plans were not transparent to employees, suggests that

safety was tactically, rather than strategically, important.

Safety and quality didn't even show up on our 2018 AOP (Annual Operating Plan). Any way - it's not 'our focus is going to be on improving quality,' 'our focus is going to be improving safety,' or 'we're going to incorporate safety this way through our annual op' – it didn't even show up. (Interview, Organization, I9OL-234)

2.   Leadership: Team-Building

Team-building referred to staffing and resource allocation actions that executives took to

meet job demands and achieve goals. In this study, nearly all 58 quotations were about safety.

Differences in team-building under the former owner and new owner were apparent.

a.   Former Owner

According to interview sources, executives under the former owner intermittently staffed the

safety and health function. Their reactive effort often followed negative events, such as accidents

and inspections. For example, in late 1998, after a fatality and post-accident OSHA inspection, the

company hired their first full-time Safety Manager.

Shortly after [redacted name] started, it was probably within the first year that [redacted name] was here, we had a death here at the plant. … And, I think from that point and on, they started to try to look at safety, and making sure that employees were working and doing the proper thing. It took a few years. Then they actually hired a Safety Manager to oversee the shop floor. (Interview, Organization, I4OL-13)

When I first started here, you had a guy that had another role, and then he did safety, and he may have been here for a year or two. He's retired now, but you had an older guy that retired that they called Santa Clause. (Interview, Individual, I8IL-8)

In 2008, after another OSHA inspection, leaders temporarily assigned a shop floor worker to

spearhead compliance improvement.

Ok. We had an OSHA compliance visit in 2008. … So, when they got hit with that, [redacted name] was kind of a floating employee. [Redacted name] bounced around from department to department and just kind

of helped out where they needed help. And at that point, they didn't have anybody to do the OSHA compliance piece, so [redacted name] got involved in that. … That was after the OSHA visit. So, just kind of cleaning up the compliance things that they had found – the gaps we had in the company. (Interview, Group, I1GL-5)

This happened again following the 2012 OSHA inspection.

[Redacted name] wasn't the Safety Manager at the time – [he] was just a lab tech. It was early 2013, when the previous management, who is no longer here – we had a regime change. But they came to [Safety Lead] in 2013, like in January, and asked [Safety Lead] if [he] would do what [he] did for the lab for the rest of the company. So, [he] said yeah. [Safety Lead] wasn't full-time in safety, [he] was still running our lab, and [he] had additional safety responsibilities that were put on [him]. (Interview, Group, I1GL-23)

Between these events and continuing beyond 2010, executives, such as the Director of Human Resources and Vice President of Engineering, oversaw safety.

Well, you know, you're probably right, because you have [Human Resources Director], she was the HR lady here and she did safety. … So, [HR Director], she probably did 10 years, maybe more. (Interview, Individual, I8IL-8)

… So, in 2012, we had our human resources department kind of oversaw safety. It wasn't very preventative, it was very reactive. They handled the claims and all that stuff. … (Interview, Group, I1GL-25)

One interview source described a team-building decision that unintentionally, but fortuitously, augmented corporate safety improvement – the rehire of a former CFO as the President.

[Redacted] … was the former CFO. The owner-founder brought him back, because he was transitioning the company, and [former CFO] recognized that there was a (safety improvement) need. [Former CFO] was very good at identifying the right people in the place. He was CFO, left for ten years, and came back as President, not as CEO. (Interview, Organization, I5OL-16)

b.   New Owner

Strong evidence demonstrated that, beginning in 2013, under new ownership, executives made team-building decisions that proved crucial to the achievement of safety excellence. Interview subjects touted the value of hiring of the current Director of Quality in 2013. This executive, who was selected to oversee manufacturing quality and continuous improvement, quickly assumed functional responsibility for safety.

Hiring a Director of Quality 4 years ago – focus on safety (CIR, Organization, S30OL)

When … [Director of Quality and Safety] hired as safety Director … (CIR, Group, S6GL)

Well first, very much so, it started as a quality position. It was come in, get the quality where it needs to be, do continuous improvement, get the process as improved, get documentation in place, get the system up and running. They didn't really have a system here. They had been through, like, in the two years prior to [Director of Quality and Safety], they had been through five quality managers – five quality directors. So, it was all about get the system in place, get it up and running. When [Director of Quality and Safety] got here, they found out [he] had safety experience. They found out [he] had functioned from a safety environment before; they found out [he] had managed and ran them. The HR person said 'good,' so, [he] inherited it. But, it came down to the same thing - what's our safety system? What's that? So, it was build the process, build the method, build the system, implement, manage, grow... (Interview, Organization, I9OL-9)

An abundance of multi-source, multi-unit evidence judged the 2014 appointment of a full-time

Safety Manager as notably beneficial to safety team-building. The Director of Quality and Safety,

shortly after assuming his role, advocated for this staffing decision given the sheer volume of safety

work and the poor state of the safety program.

… The quality system and the safety system were both in minimalistic. [Director of Quality and Safety] couldn't do them both at once. [Director of Quality and Safety] physically couldn't do all that work - just the sheer volume of work. Trying to get through all of that was going to be the first thing. (Interview, Organization, I9OL-50)

The Director selected an internal employee, who had demonstrated skills that aligned with the job

demands.

You know, [Director of Quality and Safety] watched [redacted name] … saw what he did … knew where he was at … knew how (safety) conscious he was. He was what [Safety Director] was looking for. (Interview, Organization, I9OL-50)

And, they decided at the time they needed another Safety Manager, so [redacted name] was a pretty good candidate for that, because he's pretty driven. He can deal with the day to day OSHA regulations and all that stuff … (Interview, Organization, I4OL-29)

I personally first started to notice a positive change in safety mindset when [Safety Manager] was put in charge of safety. [Safety Manager] is the face that we all see when it comes to safety implementation and someone above him created this position. (CIR, Group, S6GL)

I think they're pretty much committed to [Safety Manager]; they made him full-time. (Interview, Individual, I8IL-103)

Beyond staffing and staff alignment, executives ensured that staff had the skills, authority,

and confidence of leadership to carry out their duties.

I think… I think for what [company] does is they've allowed people like [Safety Manager] and [Director Quality and Safety] to come in and expand, as far as the safety part goes. They've allowed them to come in and say, 'this is what we need to do' and they allowed them to do it. So, I mean I think that's… because some companies say they want safety – 'we want safety,' but they'd rather they do this instead. I think [company] has allowed them – and I don't think they could have achieved as much as they did without [company] being a part of that. (Interview, Individual, I2IL-121)

Another big piece of it was just [Safety Manager's] own education – not knowing what to do. And that's where [Director of Quality and Safety] stepped in and made sure that [Safety Manager] had the education [he] needed. (Interview, Group, I1GL-107)

[President], president of [company], agrees. "Workplace safety is of utmost importance. We have full commitment to [Safety Manager] and everything he does." (Document, Public, D80NL-24)

30. Individuals with assigned safety and health responsibilities have the authority to perform their duties.	*3*
Comments: {Safety Manager] has the full backing of upper management. At least three types of authority are necessary for a responsible person to perform assigned safety and health tasks effectively-these are (1) authority over the work, (2) authority over needed resources, and (3) authority over subordinates.	

(Document, Private, D82NL-30)

Another example of leadership team building was developing positive rapport with other managers, specifically the Plant and Assistant Plant Managers and supervisors.

I think that the way and the rapport that [Safety Manager] and [Director of Quality and Safety] have with [Plant Manager] and [Assistant Plant Manager] and the other supervisors and how we're driving them, and how we're reporting, and how we're working with them to keep the environment safe, they're driving it to a different sustainability level than the executives are ever going to get it to. (Interview, Organization, I9OL-142)

Executives gave similar decision-making authority and resources to the Safety Committee.

Executive Management:
- *Will designate a committee to review consistency with those procedures outlined in our program.*
- *Will give maximum support to all programs and committees whose function is to promote safety and health. (Document, Private, D1NL-85)*

3.   Leadership Construct: Summary

Private documents and organization-level interview subjects were the primary sources of leadership information. Even though three data themes were apparent, two – direction-setting and team-building – were cited often.

Sources perceived that leadership direction-setting, for both business and safety, was lacking under the former owner. Despite this perception, former leaders created new product design, installation and international facilities and implemented at least one proactive safety program, the DuPont STOP™ Safety Program. Team-building was also reactive and temporary. For example, following a late 1998 fatality, the first fill-time Safety Manager was hired around 2000.

Both direction-setting and team-building improved after 2013, under new company owners. New owners, who focused on financial and operational optimization, developed cost savings programs and production efficiencies. Safety, which was a tangible threat to market share, financial preservation, operational efficiency, regulatory pressure, and ethical obligation, became a priority. Soon thereafter, the Director of Quality and Safety and the Safety Manager were hired to implement safety improvements. The safety direction continued to evolve as executives became more aware of and engaged in the Safety Committee, safety programs, activities, prioritization of needs, and performance, even the achievement of safety excellence. These construct highlights are summarized in TABLE XXI.

TABLE XXI: LEADERSHIP CONSTRUCT SUMMARY

	Primary Data Sources	Private Documents, Interviews
	Primary Units of Analysis	No Level, Organization-Level
	Prominent Themes	Direction-setting, Team-building
Summary of Prominent Themes	Direction-setting	• Subjects perceived a lack of business-related direction-setting by the former owner. Documents, though, implied the owner's strategic consideration of international markets, product design, and installation. • Safety direction-setting was insufficient under the former owner, despite implementation of the DuPont STOP™ Safety Program around 2010. • From the time of new ownership in 2013, the company's business direction focused on operations, markets, and finances. • The safety direction evolved under the new owner for reasons, including market share, financial preservation, operational efficiency, regulatory pressure, and ethical obligation. • After 2013, executives participated on the Safety Committee and became increasingly engaged with and supportive of safety programs, activities, prioritization of needs, and performance, even the achievement of safety excellence. • Positive safety direction-setting was undercut by slashed incentive funding and the exclusion of safety from annual and strategic planning.
	Team-building	• Former executives intermittently staffed the safety and health function after the occurrence of negative events, such as OSHA inspections and accidents. • The first full-time Safety Manager was hired around 2000. • A former CFO was rehired as President to shepherd the ownership transition in 2013. • New executives hired the Director of Quality and Safety and the Safety Manager, who were perceived to be crucial to the achievement of safety excellence. • New executives ensured that staff had knowledge, skill, authority, and executive support to carry out their duties.

C.   Mission and Strategy Construct

Mission and strategy were theorized to play a role in the company's successful safety and health transformation. For this study, mission referred to the company's believed and stated purpose or reason for existence. Strategy regarded the methods to achieve that mission. Because sources neither used the term *mission* nor *strategy*, quotations were largely implicit. One hundred seventy-one text segments were assigned the mission and strategy major code. Of the 194 minor-coded quotations, more referenced the strategy theme than the mission theme – 125 and 69 quotations, respectively. An equitable number of quotations emanated from public documents and organization- and group-level subjects. Private documents offered more quotations. Individual-level subjects made virtually no mention of this construct (TABLE XXII). Very few divergent quotations were apparent.

TABLE XXII: MISSION AND STRATEGY CONSTRUCT, NUMBER OF SUB-CODED SEGMENTS BY SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	1	3	0	
Interviews	39	45	5	
Field Notes	0	0	0	1
Documents, Private				61
Documents, Public				39
Subtotal	*40*	*48*	*5*	*101*
Total	*194*			

1.   Mission and Strategy Construct: Mission

Three perspectives about the mission theme were apparent – the company's business mission, the capital investor's mission, and the safety mission. Over time, the missions became increasingly intertwined.

The mission of the company was to develop innovative products that served national and international customers. One document cited the official mission statement.

> *To continuously research, develop, and market unique engineered plastics which improve the quality of our lives. (Document, Private, D84NL-17)*

Another document claimed that the business mission was founded on the principles of safety, quality and productivity, historically, however, most organization and group level subjects perceived the mission to be anchored in profit and production.

> *…You know, previously it was 'get the [plastic] out the door and get the money.' (Interview, Group, I1GL-83)*

All group- and one individual-level subjects stated that, by the early 2010s, when the company's product market had become largely international, customers requested evidence of positive safety performance. Workplace safety and health began to function in direct support of the business mission.

> *… (Executives) started to realize, that on top of all of it, safety and health make sales. When you start to look at contracts... Nowadays, when you look at a construction contract, more than half of it is about safety and health and environmental. You know, they want to know about your experience modification rating. You can't fake that. They want to know about your incident rate. That's another thing that you can't' fake. And realizing that they don't want you… Those general contractors don't want you on the job site, if you're going to be a problem; you're going to cause incidents. And I believe our executive management realizes that, and our sales team realizes that. If we were over... If we were even at a 1 on our EMR (Experience Modification Rating), we're going to make less sales. (Interview, Group, I1GL-162)*
>
> *…the company, they want to keep safety, because if you have a lot of injuries - and it's part of the reason (that the company improved safety and health) - you lose jobs. Companies don't want to do business with you. (Interview, Individual, I8IL-34)*

The capital investment firm, who assumed company ownership in 2013, and who concurrently owned other companies, had a mission to professionalize and grow their companies

through sales, principled financial management, and operations improvements, according to public

documents.

> *Working with management, we seek to create value by identifying areas of the company that can be taken to the next level (Document, Public, D67NL-47)*

There was little evidence that the capital investor prioritized occupational safety and health as an

independent phenomenon. However, one organization- and one group-level subject perceived the

investors to be very safety-centered.

> *…but I also can say that [investment company] is very safety-minded. They have a lot of companies under them. They have some companies that are better (at safety) than others, and some that are worse than others. Anyway, it's on their radar, so they… I know that they support that. (Interview, Group, I1GL-49)*

> *Ok, so, we got purchased by venture capitalists. They came in – they owned like 17 other businesses, and they're very safety oriented. … (Interview, Organization, I9OL-25)*

Under the guidance of new owners and the President, the company prioritized safety. In their 2014

Corporate Statement of Policy, the company vowed to act in ways that promoted safety and

provided safe employment for workers.

> *So, vision-wise, what [President] ultimately said was 'you need to improve our safety presence,' and that was pretty much as far as it went. … So, the vision was 'improve it, make our safety presence better.' The EMod had to be lower - we wanted it less than one; at the time, we wanted it less than one. … (Interview, Organization, I9OL-23)*

> *The company in general has made significant improvements towards bringing safety & safety awareness to the top of their priority list. I'm sure that there are multiple reasons for this but the end results is that it is working. (CIR, Group, S6GL)*

> *It is the policy of [company] to provide a safe place of employment, and to establish safe operating practices, which will result in safe working conditions and efficiency of operations. (Document, Private, D1NL-59)*

There was some evidence that safety was on equal footing with production. During quarterly Board

of Directors meetings, safety was part of the conversation. Managers, too, advocated for safety just

as they advocated for products and production.

> *But, you'd catch managers saying, 'now, the number one thing that we've got to focus on is getting stuff out the door…. oh, and safety, too.' So, they'd catch themselves, because we were all learning and training and remembering how important safety was. That was in the earlier stages of it. (Interview, Group, I3GL-54)*

Oh yeah. I think that [safety is] on the same level. Each department has…like, [Safety Manager] is the head of it, and [Director of Quality and Safety] is overseeing that, and [VP of Engineering, Quality and Safety] is overseeing that - …, who is on the executive team. He's speaking up for safety just as much as he's speaking up for engineering. (Interview, Individual, I6IL-65)

2.   Mission and Strategy Construct: Strategy

Like the mission theme, three perspectives were apparent for the strategy theme - the

company's business strategy, the investment firm's ownership strategy, and the safety strategy.

Even though more coded segments eluded to the safety strategy, the ownership and business

strategies provided contextual value.

Under the former company owner, there was no evidence of a formal business strategy, but

strategy was implied. Documents show that the company's historic actions were aligned with their

growing international market and their need to design and install products. Consequently, the

owner-operator opened a sister company in Asia and created a partner product design and

installation business in the U.S.

> *In 2001, [company] expanded to [Asian country] as [company] Asia Ltd in order to provide itself with a manufacturing arm to support the booming projects fabrication plant in [city, state]. The company was attracted to [Asian country] due to the very good ports and good manufacturing environment within an attractive BOI scheme. … Initially product was made primary for the USA market. (Document, Public, D77NL-4)*

> *[Company's] chief executive [owner] also has created another company, [redacted], housed in its own building across from [company], designs and supervises construction of projects that [company] manufactures. (Document, Public, D76NL-22)*

Similarly, under the former owner, there was very little evidence of formal safety strategizing. In the

2010 timeframe, though, some interview data showed that the company intentionally pursued a

proactive safety initiative – the DuPont STOP™ Safety Program. Unlike nearly all prior safety

initiatives, the DuPont STOP™ Safety Program was not compliance-oriented.

> *The first step that I specifically remember was the STOP™ safety program. Enrollment in that. You know, created by DuPont; I think it was DuPont. And, it was just... That's the kick-off that I really remember. We were going to do safety and take a different approach instead of just a Safety Committee that meets once a month, and talks about safety issues, and then makes changes within the plant. Everybody was going to be*

brought in - you're in charge of safety, you're in charge of safety, you see something... Every individual was capable of and expected to coach every other employee. (Interview, Group, I3GL-23)

Interviews and documents illuminated the management strategy of the new capital investor.

As an external entity, the investor preserved the company's management structure, personnel, and

production functions, but augmented executive functions.

> *They're a unique investment company where they don't really go in and replace all the management. They try to keep everything intact. They try to help out. With us, they helped us develop cost saving programs and systems to track what our costs actually are. In the beginning, we would manufacture these products and not really know what our costs were. (Interview, Organization, I4OL-95)*

> **FOLLOWING ACQUISITION, OUR APPROACH IS AS FOLLOWS:**
> - *The management team will continue to be responsible for the day-to-day operations of the company and is typically incentivized to create shareholder value through stock ownership. If needed, we have the ability to supplement the existing management team.*
> - *Early on, we make sure that that the management information system (MIS) is optimized as we view it as important tool for both management and the Board of Directors.*
> - *Among other actions, this typically includes implementing methods to increase sales, improving operating margins, making ROI justified capital expenditure, most effectively allocating capital and addressing other, important operating issues. (Document, Public, D67NL-47)*

> *They brought in [redacted name]; he's our CEO now. They brought him in in the beginning as a consultant to feel out the business and see how operations ran, and then they put him in as the CEO probably three years ago. (Interview, Organization, I4OL-93)*

Once the investor became the new owner, one executive subject perceived the existence of a formal,

company-specific 1-, 3- and 5-year strategic business plans; however, no corroborating evidence was

found. Documents show, though, that the company, under new ownership, acted in strategic

fashion by investing in research, development, and marketing.

> *Innovative new processes are another opportunity, and fire-rated [plastic] structures are just one aspect. "Coming up in the near future, we're starting to cast structures to shape," says [VP of Operations]. "We're in the R&D phase of building molds." (Document, Public, D79NL-26)*

> *Since 2015, exports have driven [company's] growth as China emerged as the company's top market. "It's over 50 percent of our business now," says [VP of Operations]. "We've done a lot of big projects in China. China is booming." In 2016, the company launched a website specifically for the Chinese market. (Document, Public, D79NL-20)*

Even as safety became an organizational priority of the new owner, there was no evidence of intentional safety planning by high-level executives. To support this notion, one interview subject recounted the existence of Annual Operating Plans (AOP) that made no references to safety.

> *Safety and quality didn't even show up on our 2018 AOP. Anyway - it's not 'our focus is going to be on improving quality,' 'our focus is going to be improving safety,' or 'we're going to incorporate safety this way through our annual op' – it didn't even show up. So, this is very much – [Director of Quality and Safety] is driving this. [Director of Quality and Safety] is making a plan, because [Director of Quality and Safety] want(s) sustainability. That kind of goes back to one of those linking things. The only way we're going to sustain it is to keep planning and thinking further ahead and look for the next avenue of where to go. (Interview, Organization, I9OL-234)*

Rather, the strategic approach to safety was delegated to those with corporate safety responsibility – the Director of Quality and Safety and the Safety Lead turned Safety Manager.

> *…So, the vision was 'improve it, make our safety presence better.' The EMod had to be lower - we wanted it less than one; at the time, we wanted it less than one. So, it was 'get us something that's going to do that.' (Interview, Organization, I9OL-23)*

> *(Initially) … it came down to the same thing - what's our safety system? What's that? So, it was build the process, build the method, build the system, implement, manage, grow… So, the first thing was, where are we at with our safety policy and our safety procedures. That's where we started. We had some; they were in an employee handbook. And, we just started with a, like, a survey. People couldn't even tell us where the rules and policies were, ok. We're at step one. (Interview, Organization, I9OL-9 and 60)*

One of their early strategic moves was advice-seeking from OSHA On-Site Consultants in February 2013.

> *So, [Safety Lead] had very little safety and health training, and [Safety Lead] didn't know much about the regulations. [Safety Lead] had been through DuPont's STOP™ program. It is more behavior-based – it doesn't really tell you the rules. So, anyway, [Safety Lead] got a lot of information from [OSHA Onsite Consultation auditors] when they came down from the SHARP office and inspected us. We did wall-to-wall and then went through the paperwork. We didn't have a lot of the programs that we should have had. We only scored 60% on SHARP Form 33. It was very...we didn't have a lot to go on. Anyhow, we kind of went from there. (Interview, Group, I1GL-33)*

At that time, the company set an objective to achieve safety excellence.

1. A Comprehensive, baseline hazard survey has been conducted within the past five (5) years.	3
Comments: [Company] is a former [redacted name] Consultation client that has been working towards the goal of SHARP since 2013.	

(Document, Private, D83NL-1)

Shortly thereafter, according to half of the executive and group-level interview participants, the

Director of Quality and Safety integrated safety with quality systems.

> *And [Director of Quality and Safety] was hired on in September of 2013. So, he came in and [Safety Manager] went to work under him. What we did from there is we started…. [Director of Quality and Safety] is very, um, management system driven – system driven. We're talking Lean Six Sigma, ISO, things like that. So, we started to integrate everything in under that kind of umbrella. (Interview, Group, I1GL-35)*

> *We started doing Gemba walks (a Japanese-derived Six Sigma term for personal observation of the workplace) and going down that Lean Six Sigma path, but that was what we started. (Interview, Group, I1GL-138)*

Even so, a good amount of evidence showed that historic, but improved, safety activities, including

the STOP™ Program and the Safety Committee, informed the modern safety program. In mid-2014,

for example, that the Safety Committee strategically shifted into proactive mode to prevent injuries

and promote safety involvement.

> ***2) Proactive Safety Management-*** *The safety committee has taken large steps in correcting many of the large ongoing hazards throughout the facility in the previous year, and everyone agrees that as a company we have come a long way in improving the way that we as a company view safety. We also agree that as a company we have a long way to go. We will continue to work the agenda & add new items as they become issues, but we are also shifting the focus of the committee to Proactive safety management. Not only focusing on accident prevention, but also focusing on employee moral & employee & supervisor buy-in to the safety program. (Document, Private, D21NL-7)*

The Safety Committee also became the principle forum for communicating and distributing safety.

> *We were selling these changes to the Safety Committee and using the Safety Committee as an outlet to disperse it through the rest of the employee body. It worked. I mean, it still works. (Interview, Group, I1GL-92)*

A host of data confirmed that the company leveraged its unique fabrication capability to

create production and safety equipment.

> *Um, our engineering group is really good. They can design a lot of things, and they understand the safety factors and design requirements. I think we're very good at the design portion of our [plastic] and our products, as well. We know that, because none of our competition have their own engineering group; they all outsource it all. So, that is very much a differentiating factor for us, and it's one I think we're really good at. (Interview, Organization, I9OL-164)*

We've built almost all of our safety equipment here in-house. Because what we do is so unique, and the product is so specialized that we had to fabricate, design, and build our own safety equipment. We'll have a get-together, what we call an IOR – an interoffice review. We'll get the people involved, engineering, and we'll come up with ideas and brainstorm, and get a drawing and actually model it. (Interview, Organization, I4OL-104)

Because of the unique nature of their work, [company] fabricates many of their production tools and equipment in-house. Safety is always included in the design of these tools and equipment, effectively engineering out potential hazards. (Document, Public, D85NL-18)

Engineering designed the equipment, and the Tooling Department built it.

We got buy-in from engineering to help us design or purchase something - a tool - that's going to help them work the height of the tool and create a safe work environment. So, we've got engineering buy-in working with us. (Interview, Organization, I9OL-216)

3)   Wall Cleaning Fall Protection in Tool Prep Area- [Engineering] has met with tool prep personal, and has created a drawing that the committee and affected personal are satisfied with. [Engineering] will make a few minor adjustments for safety features, and release print to Tooling Department. [Engineering] is getting with [Tool Prep-Process Control Manager] to see if the device must be collapsible. (Document, Private, D65NL-4)

4)   Tie-Off Bars for Finishing & Fabrication- Drawing are complete, and [Tooling Manager] estimated a single tie-off system would cost $10,000.00 to construct ($4500.00 for parts, $6500 for labor). [Plant Manager] will speak to [VP of Operations] and [Director of Operations] about approving the expense. (Document, Private, D56NL-5)

As safety needs were identified, fabrication became an expeditious, financially conservative way to

meet needs, and a mechanism to spur employee involvement and readiness.

That sort of in-house building talent or innovation is really important. It saves the company effort and time and money. For example, the bar that we use for the tunnel. Before, the bar was very small and it didn't reach both sides. So, what happened is that a larger one was built and it was adjustable to us; we could adjust it to meet our needs and requirements.… (Interview, Individual, I7IL-83)

I think our employees are one of our major assets. If they feel something isn't safe, they'll go up to engineering. They can go and talk to anybody about safety if they're not comfortable, and we'll work through it. If we need to build, we have our own steel fabrication shop. We can build whatever we need. (Interview, Organization, I4OL-104)

The time I recall when we made the choice to create the new safety tie off system. The guys seemed to be invested more in the safety system. … 2017 … It helped the employees realize that safety is something that they can work with on a daily basis. (CIR, Organization, S2OL)

According to group- and organization-level subjects, the safety strategy not only focused on

developing safety policies and enforcing safety activities, it addressed key facets of change, such as

promoting ongoing safe behavior, augmenting safety knowledge and skills, maintaining worker

engagement, and monitoring and measuring progress. Multiple sources and units of analysis

recounted the strategic use of daily, weekly, and monthly safety tasks to keep safety top-of-mind.

> *It was decided that every employee has to do at least one JSA (Job Safety Analysis) a day in every department. Every employee has to participate in the Toolbox Talks weekly; we'd like them to be done on Monday. I'll tell you the reason behind that in a minute. And, they've got to do one STOP™ card a month. So, now they have a daily, weekly, and monthly responsibility. What we're trying to do is put safety in front of them at least once a day, every day. All we are doing is raising hazard awareness. (Interview, Group, I1GL-70)*

The strategy also involved empowering employees to pause work when unsafe situations were

identified and rewarding employees for the right behavior.

> *We're not going to sell them the new safety management system, because they don't care – everybody wants to know 'what's in it for me.' So, we rolled out the safety incentive program, which was really just a way to get them to participate in the safety management system. We handed out t-shirts, we gave a presentation for 30 minutes, and then we let them go. (Interview, Group, I1GL-84)*

> *At that time, we had just started introducing JSAs. The tail-gate meetings were in progress. The STOP™ cards were in progress. We were introducing the JSAs, and [Safety Manager] really kind of sat down and thought, what do(es) [Safety Manager] need these guys to do. So, [we] want them to fill out STOP™ cards. [We] want them to do JSAs. [We] want them to do a weekly Toolbox Talks. [We] need them reporting near misses...things like that. So, [Safety Manager] wrote our incentive program, which actually now closely…. Our incentive program really is a reflection of our current safety management system, as far as employee participation goes. (Interview, Group, I1GL-67)*

Though uncorroborated, the order of worker engagement, specifically whether to start with

executives or line workers, was perceived to be an important strategic factor. The safety team first

targeted shop floor, which was the hub of safety risk. Second, they engaged mid-level managers,

including department managers and the Plant Manager. They theorized that once engaged, this

group would sustain safety and health.

> *…your middle management, until you've integrated everything and made it all a priority, then they have conflicting priorities. So, if you say 'well, you've got to do safety, but you've also got to get the [plastic] out of the door, then safety will lose out every time, because getting the [product] out the door is where the money comes from. Let's face it, money is the driver of business. It always will be. (Interview, Group, I1GL-74)*

To make safety a priority for middle managers, alongside production, a competitive incentive system was introduced.

> *The next piece of the puzzle we did is we pitted every department against each other. So, now your middle management has safety responsibility, because they are the hardest sell when you're trying to sell safety and health (Interview, Group, I1GL-77)*

> *… So, anyhow, now the managers have skin in the game. Now the employees are looking to them saying 'hey we want to win these prizes.' … In doing that, we drove the employees to force their managers to take the time for safety and health. (Interview, Group, I1GL-80)*

The strategy to harness executives centered on demonstrating positive results.

> *Your executives, you're going to show them how much money they are saving. You're going to show them the lagging indicators. You're going to show them insurance premium. You're going to show them these things going down – what I can save you, at first, but what I am saving you. So, they're a pretty easy sell. (Interview, Group, I1GL-75)*

Finally, there was strong evidence from all sources that the strategy of monitoring, measuring, and continually improving were employed to gauge progress and needs. The company measured Form 33 performance; the conduct of safety activities - Tailgate meetings, Toolbox Talks, Job Safety Analyses, STOP™ cards, and near misses; and lagging performance.

> *We started doing metrics. We were the first group in our whole organization to do metrics. We were the first group to start measuring things. Then we started reporting them out. It was important to report them out, even if people weren't reading them. We were still sending them out. … And, a lot of that was to sell these upper...to sell upper management. 'Here's how much money we're saving you, here's what the difference is.' (Interview, Group, I1GL-138)*

3. Mission and Strategy Construct: Summary

Mission and strategy quotations were mentioned by documents and organization- and group-level interview subjects. Twice as many quotations regarded strategy. As was the case for other constructs, mission and strategy were less apparent under the former owner and more purposeful under the new owner.

Historically, production and sales were the implied mission - workplace safety and health was a shifting priority. At that time, even in the absence of a formal business strategy, strategy was

implied by the opening of partner companies in Asia and the U.S. Similarly, the safety strategy, though lacking, was implied, for example, by the company's implementation of the DuPont STOP™ Safety Program. After 2013, under new corporate ownership, the safety mission was birthed, in part, from the company's ongoing desire to satisfy international customers and the investor's mission to augment operations and finances. Even as top executives laid annual and short-term business strategies, safety was not included. A meaningful safety strategy evolved under the guise of the Director of Quality and Safety and the Safety Manager. That multi-faceted strategy involved OSHA On-Site Consultation, continuing historic safety activities (i.e., STOP™ Program, Safety Committee), leveraging the company's fabrication capability, assigning regular safety requirements, adding incentives, authorizing pause work, measuring and monitoring of performance, and implementing changes in tiered fashion. TABLE XXIII summarizes the mission and strategy construct.

TABLE XXIII: MISSION AND STRATEGY CONSTRUCT SUMMARY

	Primary Sources	Private Documents, Interviews, Public Documents
	Primary Units of Analysis	No Level, Group-Level, Organization-Level
	Prominent Themes	Strategy, Mission
Summary of Prominent Themes	Mission	• Workplace safety and health was a shifting priority under the former owner. • Safety became a priority when workplace safety and health influenced the financial and operational mission of the capital investor and market mission of the company.
	Strategy	• The historic business strategy was informal and implied by the opening of a sister Asian company and creation of partner design and installation firms. • The new investor's strategy focused on simultaneous augmentation of the executive function and preservation of the management structure and production function. • The historic safety strategy, though informal and lacking, was manifested by the implementation of the DuPont STOP™ Safety Program. • The new owner's safety strategy defaulted to and evolved under those with corporate safety responsibility, namely the Director of Quality and Safety and the Safety Manager. • The safety strategy involved OSHA On-Site Consultation, continuing historic safety activities (i.e., STOP™ Program, Safety Committee), leveraging the company's fabrication capability, assigning regular safety requirements, adding incentives, authorizing pause work, and measuring and monitoring of performance. • There was a strategy for implementing safety changes, too. The shop floor was first targeted and then middle management. Improved performance drew in executives.

D.   Culture Construct

In this study, culture referred to the collection of organization-wide overt and covert rules,

values and principles that endured and guided organizational and occupational safety and health

behavior. Just over 100 quotations were linked to the culture code, and all pertained to safety

culture. Interviews collectively yielded more quotations than documents. A rather equitable number

of quotations were offered by all units of analysis (TABLE XXIV).

TABLE XXIV: CULTURE CONSTRUCT, NUMBER OF SUB-CODED SEGMENTS BY
SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	2	3	4	
Interviews	15	27	17	
Field Notes	2	0	0	2
Documents, Private				30
Documents, Public				7
Subtotal	*19*	*30*	*21*	*39*
Total	*109*			

Quotations were divided into two themes – overt culture and covert culture. More than

three-fourths of sub-coded quotations made reference to overt or tangible elements of safety

culture, such as slogans, logos, attire, posters, celebrations, rituals, and spoken and written

statements about safety. Less than 25% of sub-coded segments mentioned underlying or covert

thoughts, feelings, and actions about safety. A few divergent perspectives about covert safety

culture were evident.

1.   Culture Construct: Overt Culture

Theoretically, culture is not a static condition; however, it is relatively stable over months

and years. For this case, across the research timeframe, the safety culture shifted from absent to

present to proactive.

In the 2000s, according to interview subjects, when workplace hazards were not well

controlled, workers accepted the inherent risks and personally assumed the burden of safety.

> *Ok, when we weren't guarding those hazards back in 2006 when I came on board, it was a lot scarier. It's scary to look at it now and say, 'this is how we guard this, and this is how we take care of that.' But back then, there was none of that. It was just like 'well these hazards exist,' and 'be careful.' (Interview, Group, I1GL-174)*

> *The culture was hard to battle. When I first started here, I would see people laying under suspended panels painting them. You know, suspended from the frame – really, really dangerous acts. The 'we've always done it that way' mentality. (Interview, Group, I1GL-103)*

At that time, despite some attention to safety concepts and policies, a safety culture was virtually

non-existent.

> *When I started here …, it was scary. I want to say, my second day here, I watched my supervisor at the time break somebody's middle two fingers on his hand, and then told me – demanded – that I did the same thing that this guy was doing after they sent him off to the hospital, so we could get his job done. I told them 'no' and left the premises. I was called the next day. They asked me why I left premises – if I had quit, and I told them the story and asked them to look at my co-worker's hand. And I said, 'well, he wanted me to do exactly what the other guy was doing, and he told me if I didn't, I was fired, and so I left. (Interview, Group, I1GL-43)*

> *It was 2007 – 6, 7, 8 – when safety was just talk. (Interview, Group, I3GL-17)*

As the company began improving safety in 2014, core values and general safety rules were

documented in the employee manual. Even though safety was important, it did not overshadow

customer service.

> *Core Values*
> · *Service to Our Customers Above All Else*
> · *Commitment to Safety and Excellence*
> · *Continuous Improvement*
> · *Work with Passion, Commitment and Enthusiasm*
> · *Work as a Team*
> · *Being Pioneers-Not Following Others*
> · *Attention to Profitability*
>
> *(Document, Private, D84NL-19)*

12. Effective safety and health rules and work practices are in place.	2
Comments: An employee manual is in place that includes safety rules and general rules of conduct.	

(Document, Private, D6NL-12)

Stories of impactful past accidents and injuries were surfaced by nearly all sources and units of analysis. Strong evidence showed that these stories, told by witnesses, managers, and safety team members, were shared to reinforce the dangerous nature of the company's work … and the need for safety.

> *We've had a fatality here. We've had a catastrophe here. The fatality was in 1999, and the catastrophe was in 2008. They've seen what can happen. (Interview, Group, I1GL-122)*

> *So, another example, is that about...there was a death about 25 years ago, and that has been talked about. (Interview, Individual, I7IL-116)*

> *I can tell you the stories that I've heard. Such as, one of the guys got his toes cut off. We did have a fatal accident here. Those were long before my time, so I don't know any details about them. … They kind of talked about it before, but now it's really a subject that when we go out (to the production floor), you've got more people looking out for everybody. And I think that stems from things that happened long ago, before most of us got here. (Interview, Individual, I2IL-28)*

> *… Me and a couple of these other guys were here when [redacted name] got killed. … So, I knew him … But, that, for us…. I mean, hearing that that day... And, some of the injuries that have happened, like when [redacted name] got hurt. I think that's the biggest eye-opener you're ever going to get. With him, a cylinder fell, and he lost a couple toes. So, things like that. (Interview, Individual, I8IL-28)*

> *Stories of the worker fatality in the late 1990s and traumatic amputation of another employee's toes years later are told as part of the company's journey toward safety and health excellence. (Field Note, Organization, F2OL-7)*

Sources across levels commented in unison about the daily safety mantra at that time.

> *So, they're always talking about safety. They are always telling us and reminding us about safety. Those of us who had been here longer, well we're just like 'yeah, didn't you tell us this two months ago?' 'We've heard this before.' But, the fact is there are new employees who need to hear this, and there are other employees that have been there long but need to be reminded. (Interview, Individual, I7IL-95)*

> *Constant Reminder of Safety, it's never put on the Back burner or considered 2nd. It's constantly on the forefront and on people's minds. (CIR, Individual, S18IL)*

> *Just constant talk of safety. … Now...now…, again, it's becoming deeper – more deeply rooted in the culture, because they're talking about it all the time. Even managers and leaders were held to the same cultural expectation. (Interview, Group, I3GL-54)*

Beyond repeated safety reminders, there was evidence that leaders, managers, and workers were expected to partake in regular safety activities. Sources perceived these activities to be ritualistic for the purpose of building safety culture.

190

(The STOP™ Safety Program) … allows and creates a culture and an atmosphere of, you know, we're all responsible for each other's safety, and I should be comfortable going up to anybody, in any department, and saying, 'I saw what you did there, and maybe I can recommend a safer approach.' Or, even if I couldn't do that, I could stop work; it gives you a stop work option, because we need to stop work, if what's going on here is not safe and we need to rethink what we're doing. There should be no retaliation or anything else. So, it was a freeing concept. (Interview, Group, I3GL-34)

The fact that safety is a major part of our job. We are always reminded by filling out JSA's every day and the safety guy, [Safety Manager] is always walking through the work area. (CIR, Individual, S11IL)

But [STOP™ Safety program] was an eye-opener to a lot of people on the shop floor on how to work safe and be aware of your surroundings and watch out for other people. I think that was a big, big help in kicking things off, and letting the shop floor employees know that we were serious about safety. (Interview, Organization, I4OL-39)

Even as the company implemented these culture-building efforts, one interview subject perceived them to be unimportant.

I can look back and perceive the value that came out of [daily Gemba Walks] was it was… building a foundation and the initial parts were the culture change. Nobody liked to do it. It wasn't an important thing, but people were paying attention to what they were reporting. And, the notion of the continuous expectation of reporting is going to happen, and we're not going to get away from it, so embrace it. (Interview, Group, I3GL-65)

Visual reminders of safety, specifically Safety, Quality, Delivery and Cost Boards, were positioned throughout the plant to display performance and to keep safety top-of-mind.

They also have some reporting boards that I'm not part of; I do not have an SQDC board. And, again, it's a visual station throughout the plant in each department that reports, in order of importance, safety, quality, delivery and cost. It's a four-sided rotating board, and you can see them here and there around the place. One side of it is safety – quality - delivery that's on time - and cost, but they put in order of importance. Where at one time it seemed like all they cared about is making money, you know, safety, quality, and on-time delivery are more important than cost, which I think is a positive thing. (Interview, Group, I3GL-65)

As the company consistently made safety-supportive decisions, met employees' safety needs, and celebrated safety successes, workers began to believe that the company valued health and well-being. A safety culture was present.

Any PPE I need is provided. They give us a $100 boot allowance, because we have to have steel toe shoes. My safety glasses - they give me $100 a year to replace my safety glasses. So, I think for them, putting that effort forth to take care of us means that they're going to – they want to take care of us. (Interview, Individual, I2IL-140)

And, if there's a serious safety concern, we just stop. We're going to shut everything down, and we're going to make sure it's done right before we do it. … Until we started to do that, until we actually had the people that… Shutting down an operation is not cheap. It's going to be really hard to get your bean-counters and your managers to get behind that and say, 'OK, we're going to do it,' but when you start to show them – when they've already seen the cons, and you start to show them the pros to get them actually to do that, it became the culture. It definitely became the culture. I think a big part is learning how to measure that and sell that. (Interview, Group, I1GL-130 and 136)

When we do these (safety) lunches, I make sure they get the recognition. So, I make sure it's like '[redacted name] and his guys did all this cooking,' you guys come down. And, we make the posters, and we post them up, and we say, '[redacted name's] cooking.' I think that's part of it. (Interview, Organization, I9OL-128)

… We had a celebratory lunch for (OSHA SHARP certification), too. I think that just goes along with the bonuses and everything to recognize us. I think that's the major impact that we feel as employees, to put it that way. (Interview, Individual, I2IL-144)

Safety consistency and persistence fostered trust between employees at all levels of the organization, created health and safety norms and values, and imparted confidence that safety was sustainable.

I think our employees are one of our major assets. If they feel something isn't safe, they'll go up to engineering. They can go and talk to anybody about safety if they're not comfortable, and we'll work through it. (Interview, Organization, II4OL-104)

It's part of a culture change, you know, and it's taken almost ten years of repetition and enforcement and expectation and not letting up on…. hey, this is required. … I mean I think that (STOP™) program, plus some of the other things that they have brought in and tried to do. It's all about the culture, and that's what's the biggest change. (Interview, Group, II3GL-40)

The Executive Team made the decision to make Health and Safety part of [company] culture. … Truly part of our culture. Having open discussions about health and safety. There isn't a fear behind the policies, instead it is ingrained in our day to day work. (CIR, Group, S31GL)

Multi-source, cross-level evidence testified to the company's current, proactive safety culture.

There has been a change in culture that has happened at a lvl [sic] above [Safety Manager] to improve safety, that safety culture exists from the top down to [Safety Manager] and has given him the resources to be successful. It is not one person that has created this but many, and each one has played their part. (CIR, Group, S6GL)

"I think it's night and day from where we were to where we are now. Just within the last five years, how far we've come with safety is just amazing to me. … I think what they've done here in the last 5 years just making employees aware and letting everybody know that management is behind them and on-board with safety, has just been huge." (Interview, Organization, I4OL-126)

"Everyone here walks the walk." (Document, Public, D80NL-23)

2.   Culture Construct: Covert Culture

Virtually all covert culture quotations were offered by organization-, group- and individual-level subjects. Like the overt safety culture, the covert safety culture also shifted positively over time.

Data showed that, years ago, when the organization pivoted around production, safety shortcuts were common, even amidst the company's attempt to promote safety.

> *After the initial Safety Manager retired (around 2000), management got a little bit more involved in managing departmental and shop safety. The Plant Manager, specifically, did a lot with trying to get departments to manage their people and make sure they were doing the proper thing – working safely and following policies – the policies that we did have at the time. A lot of things back in the early days was 'get it done no matter what it takes.' So, people were taking shortcuts and skirting around this to get things done. (Interview, Organization, I4OL-24)*

> *I think back in those earlier days, it was just get the job done and get it done on time and get it done quickly. There was a lot of short-cuts, and it was easy to do them. It was,' well we know we can do this, because it's tribal knowledge,' and whether it was safe or not was 'ah, we probably won't get hurt.' (Interview, Group, I3GL-70)*

Early in the safety transition, even as the safety mantra ensued, a negative cultural undercurrent remained.

> *In 2014, our accidents actually spiked, because the old way of thinking was still kind of there. My feeling was it was more of a… What happened was everybody kind of threw their hands up and said, 'we don't have to deal with this anymore, because we have one guy, and everything safety - that's him.' 'We don't have to deal with it, and we're good.' So, everybody threw their hands up, walked away from it, and our accidents spiked. (Interview, Group, I1GL-65)*

By 2016, though, for unclear reasons, employees began to accept personal responsibility for safety. Quotations from CIRs, interviews, and documents demonstrated that employees knew they were responsible for safety.

> *Our way of thinking has changed over the last four, five years on how we do things. They think of the safest way to do it. … (Interview, Organization, I4OL-67)*

> *… I mean, I think that we all have our responsibility to safety. That kind of goes back to [company], in my opinion, has done a very great job at making it a culture. So, everybody is responsible. (Interview, Group, I6GL-19)*

Workers comfortably reported safety problems.

Here, there isn't that fear. Every time I've seen, I've actually been impressed, because there isn't that fear that comes around when talking about safety and what you're supposed to do. It's more of 'this is what you need to do, and if you don't know, then you ask' – it's questioning. (I6GL-40)

Oh, and the benefits (of safety improvement) … greater comfort in talking to somebody else about a safety issue. (Interview, Group, I3GL-129)

Strong evidence shows that, without fear of reprisal, and without regard for an employee's position within the company, employees in all positions of authority accepted the safety rules.

43. Managers personally follow safety and health rules.	*3*
Comments: Managers follow safety rules and are held to the same disciplinary policy as employees.	

(Document, Private, D83NL- 43)

The managers and supervisors, every time I've seen something, like, you wear glasses and you put them on top of your head – they say 'hey, your glasses are on top of your head and not on your face.' It's calling that out, and it's more of the culture than a fear. (Interview, Group, I6GL-40)

One hourly employee asked the CEO to kindly put his safety glass(es) on, covering his eyes not his forehead. (CIR, Organization, S32OL)

You know, one time I walked through - I wasn't working - and there's a path you can take (across the shop floor) if you're not dressed appropriately. So, I was wearing high boots, and the first thing out of their mouth was 'you got PPE and steel toe in there?' So, yeah, I don't think anyone around here worries about bringing any of that up. (Interview, Individual, I2IL-150)

You can't babysit somebody all the time, but if you see them doing something, like going to lean a big piece of steel against the wall, you say, 'no you can't do that.' There's things that you do and don't do. (Interview, Individual, I8IL-3)

There was some evidence that unspoken peer allegiance was a factor during the safety transition.

On one level, workers knew one another away from work.

I mean, for [Safety Manager], it was a little bit easier (to get workers on to comply with safety initiatives), because if [Safety Manager] didn't train these guys, [Safety Manager] grew up with them. It wasn't hard to get them on board… It wasn't someone walking in fresh off the street and just saying 'hey we're going to do this now.' That would never work in our environment - in our culture. (Interview, Group, I1GL-122)

On another level, a strong safety culture spurred a sense of camaraderie and belonging at the company.

Beyond this, [executive] states that "we're all one family" and acknowledges that many employees have worked together for years. They want to see each other go home safely every day. (Field Note, Organization, F2OL-9)

194

Despite a host of positive references to safety culture, there were hints of indifference –
even counterculture. Though examples were not well corroborated, interview subjects spoke of the
potential for workers to falsify or exaggerate safety concerns.

> *You do get people working the system. You get work stoppages. It's probably legit, but you know if you get frequent work stoppages, that's unnecessary. I wouldn't say that's something I've observed, but those are possible. (Interview, Group, I3GL-129)*

Company leaders, too, who openly prioritized and promoted safety and health, sometimes acted in
ways that marginalized or discouraged safety.

> *Safety and quality didn't even show up on our 2018 AOP. Any way - it's not 'our focus is going to be on improving quality,' 'our focus is going to be improving safety,' or 'we're going to incorporate safety this way through our annual op' – it didn't even show up. (Interview, Organization, I9OL-234)*

> *It's a very big shift (from a $12,000 safety budget in 2015 to a $1,000 budget in 2017). Um. We saw a little bit of a downturn. We still do hear from people, you know, 'why would I do all this for $35 gas?' – type of thing. … I mean, you know, there was grumbling – rightfully so. I understand. … So, it kind of hurt. (Interview, Organization, I9OL-114)*

Once established, though, the strong safety culture sustained safe behaviors, even when pressure to
act unsafely mounted.

> *…we've seen different things (challenges to the integrity of the safety program), and people have said, 'no, I'm not doing it that way.' You know, 'we're not going to do that.' 'You have two hours to…' 'Fine, I'll get it done, but I'm not doing it that way.' So, I think they will get tremendous pushback, if it goes the wrong direction. If it goes...if it touches on people's ethics and morals, they're going to get a lot of pushback. We've had it a couple of times already. One of our garage doors - the spring broke, and the garage door was up. (Interview, Organization, I9OL-146)*

 3.   Culture Construct: Summary

Only 2% of quotations addressed culture, and all regarded of safety culture. Interviews and
private documents were the primary sources of culture information. Even though all units of
analysis were well represented, more data came from no-level and group-level sources.

The historic absence of safety culture under the former owner, as evidence by exposed
hazards and worker shortcuts, was reversed, over time, as the company undertook overt actions –
telling stories of historic dangers and accidents; constantly speaking about safety; conducting

195

ritualistic safety activities, such as Gemba Walks and JSAs; and incentivizing safe behavior. At the same time, the company's hidden or covert culture was shifting, too, from shortcutting safety to advocating for safety (TABLE XXV).

TABLE XXV: CULTURE CONSTRUCT SUMMARY

	Primary Sources	Interviews, Private Documents
	Primary Units of Analysis	No Level, Group-Level
	Prominent Themes	Overt Culture, Covert Culture
Summary of Prominent Themes	Overt Culture	• Historically, when hazards were unguarded, there were virtually no perceptible signs of safety culture. • To create a safety culture, core values were documented, stories of past accidents and injuries were told, a verbal safety mantra emerged, visual performance boards were posted, and safety activities were ritualistically conducted. • Consistent and persistent safety actions fueled trust, values, norms, and a cultural proactivity.
	Covert Culture	• Historically, risk-taking behavior was customary, and workers projected the responsibility for safety onto the Safety Manager. • By 2016, employees accepted personal responsibility for safety by following safety rules, reporting safety problems, and caring for one another. • Amid the strong safety culture were hints of safety indifference, such as the potential to falsify safety claims and incentive budget cuts.

E.   Structure Construct

This construct refers to the way an organization arranges its people and functions into levels of responsibility, decision-making, authority, and relationships. The structure code was applied to more than 800 segments of text. Often, coding was triggered by a job title, so while code counts

were high, redundancy was common. Private documents, specifically Safety Meeting Notes, were, by far, the single largest source of information about structure; nearly 80% of codes were found there. Interview subjects – all levels – also spoke of structure. Other sources proved less valuable (TABLE XXVI).

TABLE XXVI: STRUCTURE, NUMBER OF SUB-CODED SEGMENTS BY SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	6	5	4	
Interviews	70	94	59	
Field Notes	4	3	1	37
Documents, Private				794
Documents, Public				41
Subtotal	*80*	*102*	*64*	*872*
Total	*1,118*			

Sub-coding resulted in 1,118 quotations and five themes - safety arrangement, operations-managers, executives, individuals, corporate arrangement, and Board of Directors. Nearly forty percent of sub-coded quotations were about the safety arrangement. Twenty-two and twenty-one percent of segments regarded operations-management and executives, respectively. Corporate arrangement was only mentioned 6% of the time (Figure 17). Given their centrality to this study, both safety and corporate arrangement are discussed in this chapter.

Figure 17: Percent of Structure Quotations by Theme

37.8	22.1	20.9	12.4	6.2	

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

■ Safety Arrangement   ■ Operations-Managers   ■ Executives   ■ Individuals   ■ Corporate Arrangement   ■ Board of Directors
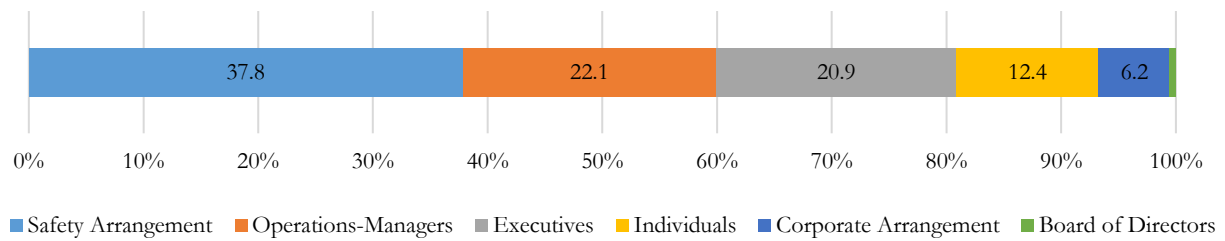
1.   Structure Construct: Safety Arrangement

The safety structure theme regarded the physical and functional arrangement of people and responsibilities related to safety. More than 400 quotations coalesced around three main topics – safety leadership, Safety Manager, and Safety Committee.

a.   Safety Leadership

There was some evidence about executive oversight of the safety function under the former owner. For a time in the 2000s and 2010s, according to a handful of sources, the Vice President of Engineering, Director of Human Resources, and Director of Safety assumed this role.

Human Resources was the head of safety, and they took care of safety. … (Interview, Group, I1GL-25)

So then, our HR Director at the time, [redacted name], she started the STOP™ Safety Program – DuPont STOP™ Safety, and we started that with training all the employees. (Interview, Organization, I4OL-37)

[Redacted name], he was our Vice President of Engineering. I think he was kind of handling safety at the time, and then [Director of Quality] took that over. (Interview, Organization, I4OL-35)

And, there was another Director of Safety, before [Director of Quality and Safety], which is [Safety Lead's] current supervisor, and [they] set up the SHARP visit, which happened at the end of February 2013. (Interview, Group, I1GL-23)

Around 2013, after corporate ownership changed, the company hired a Director of Quality, who soon assumed safety oversight.

Well first, very much so, it started as a quality position. It was come in, get the quality where it needs to be, do continuous improvement, get the process as improved, get documentation in place, get the system up and running. They didn't really have a system here. They had been through, like, in the two years prior to [redacted name], they had been through five quality managers – five quality directors. So, it was all about get the system in place, get it up and running. When [Director of Quality] got here, they found out [he] had safety experience. They found out [he] had functioned from a safety environment before; they found out [he] had managed and ran them. The HR person said 'good,' so, [Director of Quality] inherited it. (Interview, Organization, I9OL-9)

I think [Director of Quality] inherited [safety] after a certain period of time. He was hired as the Director of Quality when they brought him in. (Interview, Organization, I4OL-35)

After ownership and hiring changes, the safety reporting hierarchy became apparent. The Safety Manager reported to the Director of Quality and Safety, who initially reported to the President and then to the Vice President of Engineering, Quality and Safety, who reported to the CEO.

The creation of the Safety Director or Safety Manager – that position. … That carries down in chain of command. The Director of Quality and Safety - there were additions to title. There was the Vice President of Engineering, Quality and Safety, and then there was the Director of Quality and Safety, and the Safety Manager. Those title changes gave it more visibility – gave it more traction. (Interview, Group, I3GL-47)

And, there was another Director of Safety, before [Director of Quality and Safety], which is [Safety Lead's] current supervisor… (Interview, Group, I1GL-23)

[Redacted name], President. [Director of Quality and Safety] report(ed) to him, or [he] did report to him. (The President resigned in December 2017). (Interview, Organization, I9OL-9)

You know, in aviation, we would have a direct line to the CEO, but in this case, [Directors] report to [Vice President of Engineering, Quality and Safety], and [Vice President of Engineering, Quality and Safety's] got access. (Interview, Organization, I5OL)

b.   Safety Manager

According to interview and CIR sources, nearly two decades ago, following a fatality, the company employed a full-time safety professional. This hire and the role of other historic safety personnel were virtually unknown to other-than-veteran employees.

That was probably… geez, I want to say it was probably 2000, 2001 – somewhere around there. [First Safety Manager] was an older gentleman. He had a lot of experience out in the oil field – gas and oil safety. So, he came in and started working on a lot of things with policies, as far as fires and fire awareness and evacuation plan, and things like that, and PPE in certain departments. He was here for probably close to two years, I think. (Interview, Organization, I4OL-15)

When I first started here, you had a guy that had another role, and then he did safety, and he may have been here for a year or two. He's retired now, but you had an older guy that retired that they called Santa Clause. … Well, the Santa Clause guy, I think he was (full-time safety), but I think they saddled him with other things too. But safety was his main job, if I remember. (Interview, Individual, I8IL-8 and 16)

Some years ago after the death of an employee, [company] created the Safety Manager position. In doing so, they began to create a culture of safety that had not been seen in this company before. Management became more involved in daily operations and more focus was put on how our processes could be done safely. … (CIR, Organization, S29OL)

The creation of the Safety Director or Safety Manager – that position - that's really only been held by one person. (Interview, Group, I3GL-47)

After the first Safety Manager's retirement, the position was not filled for some years.

He retired, and it took probably… it took several years after that to actually fill the position again. I think that was 2013 when we hired another full-time Safety Manager. (Interview, Organization, I4OL-21)

With the retirement of our first Safety Manager, several years passed before the position was filled again. (CIR, Organization, S29OL)

Following the 2008 OSHA inspection, a floating employee was temporarily assigned to safety tasks.

That same individual was engaged as Safety Lead in 2013, after another OSHA inspection.

We had an OSHA compliance visit in 2008. So, when they got hit with that, [redacted name] was kind of a floating employee. [Redacted name] bounced around from department to department and just kind of helped out where they needed help. And at that point, they didn't have anybody to do the OSHA compliance piece, so [redacted name] got involved in that. … That was after the OSHA visit. So, just kind of cleaning up the compliance things that they had found – the gaps we had in the company. (Interview, Group, I1GL-5)

2013. Well, [he] was the lead, [he] wasn't the manager, because [he] was only handling safety part-time. (Interview, Group, I1GL-29)

An overwhelming number of quotations from all sources commented on the current Safety

Manager's employment. By 2014, the Safety Lead was hired as the company's second full-time

Safety Manager.

And, [Director of Quality and Safety and executives] decided at the time they needed another Safety Manager, so [redacted name] was a pretty good candidate for that, because he's pretty driven. He can deal with the day to day OSHA regulations and all that stuff – boring reading. (Interview, Organization, I4OL-29)

Getting somebody who could support [Director of Quality and Safety] and help [him] with that was a very close second. That's where [Safety Manager] came from. … You know, [he] watched [redacted name]. [Director of Quality and Safety] saw what he did. [He] knew where he was at. [He] knew how (safety) conscious he was. He was what [Director of Quality and Safety] was looking for. …he was hand-picked. [Director of Quality and Safety] never even posted the position. They said, 'here's [redacted name].' You know, 'he's working in the lab, he does this, he's got some safety identification.' Yeah, it took [him] about a month, and it was like, '[redacted name] is in a new position here, you need somebody else running the lab.' So, we got him running the focus. (Interview, Organization, I9OL-50)

When the position was filled again in 2013, the new Safety Manager really took the lead in making [company] #1 in safety, and creating a safe work environment for all employees. (CIR, Organization, S29OL)

In early 2014 - actually mid - about May of 2014, [Director of Quality and Safety] said 'he either works in the lab or…' [He] had two bosses, so [he] had conflicting priorities. He said, 'he either works in the lab under you, or he works as a Safety Manager under me.' So, at that point [he] was pulled out of the lab. [He] trained somebody else to work in the lab. [He] was pulled out of the lab, and that's when [he] was officially made the Safety Manager in about May of 2014. So, we were able to focus a lot more. That was 100% of [his] responsibility as opposed to one foot in production and one foot in safety. (Interview, Group, I1GL-39)

[Redacted name] wasn't the Safety Manager at the time – [he] was just a lab tech. It was early 2013, when the previous management, who is no longer here – we had a regime change. But they came to [him] in 2013, like in January, and asked [him] if [he] would do what [he] did for the lab for the rest of the company. So, [he] said yeah. [He] wasn't full-time in safety, [he] was still running our lab, and [he] had additional safety responsibilities that were put on [him]. (Interview, Group, I1GL-23)

c.   Safety Committee

The Safety Committee was a meaningful part of the company's safety structure. Group-level

sources recalled that for many years in the past, the company had a Safety Committee.

Yes. Yeah, we've always had a Safety Committee. (Interview, Group, I1GL-86)

… I think there's been a committee here as long as I've worked here. You know, we go back to those early days, it had its effectiveness in addressing problems, but obviously not strong enough, because their opinions of safety issues versus OSHA's opinions of safety issues were very, very different.…(Interview, Group, I3GL-25)

Some members in the early days included department representatives, the Plant Manager, and the

Assistant Plant Manager. At that time, attendance was not mandatory.

… And there was a committee, and it… I think they tried to broadly address departments and certain groups. There was a production manager – Assistant Manager - we'll call him Assistant Plant Manager - I

know was on that committee. I presume that the Plant Manager at the time was on that committee. (Interview, Group, I3GL-25)

At one point, I sat in a couple of meetings as kind of 'oh yeah you should come,' and I did and took notes, but it wasn't... At least from my expectation for myself, it wasn't 'you have to be on this committee, and you have to be here every month.' I attended a few, and for whatever reason, stopped. I don't think it was a choice – 'well I'm not going to go because it's not effective,' I was just busy, and it fell away, and I just stopped going. For me (attendance was voluntary). I'm only going to talk about myself, because there was never any requirement that... And had there been one, I certainly would have been there. (Interview, Group, I3GL-25)

After 2014, executives – CEO, President, and VPs – and managers were Safety Committee

members.

Right now, [attendees are] every department manager or their sub. So, if they cannot make it, they need to send a lead or one of the more experienced employees. There's members of… All executive management is invited. It's really people from all parts of the spectrum. (Interview, Group, I1GL-86)

[Safety Committee] was all executive and management team people, so Director Level, Vice President Level, supervisor level. … The Plant Manager was on it. The Assistant Plant Manager was on it. There was one supervisor on it, [Director of Safety and Quality], [Safety Manager], the other Directors, and then the other Vice Presidents, and the President. (Interview, Organization, I9OL-72)

At least one employee was unsure about the existence of a Safety Committee. Another was vaguely

confident that a Safety Committee existed, but was not familiar with their work.

We don't really have committees, and if we do have committee, I don't know about them. (Interview, Individual, I2IL-54)

I'm pretty sure they do (have a Safety Committee). Used to hear about the minutes of it, but I haven't heard for a while, but I'm sure they do. They take it pretty serious. (Interview, Individual, I8IL-22)

2.   Structure Construct: Corporate Arrangement

This theme conveyed information about the physical and functional arrangement of the

organization as a whole. Even though very few quotations were collected, they provide interesting

insight into the organization.

a.   Physical Arrangement

The company's physical arrangement can be described by their buildings, layout, and

personnel hierarchy. According to field notes, the company's U.S. location is comprised of at least

two buildings– the main building or custom shop and the adjacent commercial products building

(CPD). After 2014, the company expanded into the CPD.

> *5) Lack of Space at [company]- Quotes have been submitted to the Board to expand [company] floor space, and turn the CPD building (building next door) into a manufacturing facility, and are awaiting approval. (Document, Private, D26NL-6)*

The main building housed reception, production and leadership staff. More than half of the

building was devoted to custom production, and the layout was arranged to support product flow.

To accommodate the creation of large pieces, the chemical mixing and pouring operations were

housed on a mezzanine level.

> *On the [mezzanine] floor above the tool prep area was the polymer lab. … The tool prep zone was in the next high bay. Here, molds were assembled and disassembled and [plastic] panels were cast. … Beyond the ovens and finishing area was a fabrication area where [plastic] panels were cut to size and smoothed with a very large computer-programmed grinding tool – the CNC. … Next, I saw the finishing area for large pieces. … We entered the bonding room, where at least two, gigantic horizontal [plastic] panels were being solvent-welded. … (Field Note, F1NL-9 and 14)*

Executive and business staff worked on the second floor of the main building.

> *I mainly work upstairs (in the executive suite). I very rarely… I make a point of trying to go down on the shop floor once a week, just to make sure I'm staying in contact with all of that … (Interview, Group, I6GL-3)*

The commercial products building (CPD) housed smaller-scale fabrication operations and other

support functions, including research and development.

> *In the commercial products building across the street, several more activities occurred. There, fabrication and finishing of smaller panels occur. Part of this high-bay houses racks of raw materials that are moved by forklifts. … Nearby, one worker was assigned to the Tool Crib, which is a fenced storage area. Fabrication and finishing zones in the commercial products building were similar to, but smaller than, those in the custom shop … A well-organized, clean maintenance shop is positioned in the back of the building. (Field Note, F1NL-15)*

> *The commercial products building also housed a research and development lab – essentially a chemistry lab – that allows the company to conduct cutting-edge [plastic] research. A second R&D lab is planned for a currently-vacant space. (Field Note, F1NL-18)*

As the company expanded, the physical layout changed. For example, the Welding Shop, which was

part of the Tooling Department, was moved from the custom fabrication building to the CPD.

We were out in the new (welding) shop. Our shop started out in here (main building), and they moved it out there (commercial products division building). … (Interview, Individual, I8IL-28)

Behind the CPD was an outdoor storage yard for product molds.

Outside, behind the commercial products building, is the "bone yard." This area contains tens of custom metal and wooden molds from previous projects. (Field Note, F1NL-19)

There was a physical arrangement for the safety function, too. Safety was distributed across

the organization. The Vice President of Engineering, Quality and Safety had an office on the second

floor of the main building. The Director of Quality and Safety was positioned on the custom shop

floor.

We then proceeded to the Director of Quality and Safety's office, which flanks the production floor, and began touring the [plastic] plant. (Field Note, F1NL-7)

The Safety Manager's office was located in the commercial product's building.

The company's personnel arrangement or hierarchy was evident from interview subjects.

Very little evidence, though, mentioned the hierarchy under the former owner. Executive sources

made it clear that the owner was the head.

When you're owned by an owner-entrepreneur, and all the decisions have to go through them, then... (Interview, Organization, I5OL-9)

All [former owner] cared about was he's got this much money in the bank, and he's not losing money. We didn't have to report to a Board or anything, … (Interview, Organization, I4OL-95)

However, when capital investors became the owners, aspects of the company's personnel structure

changed and continued to evolve. For example, the former owner was replaced by a President and a

consulting executive.

… the [CEO] predecessor here, who was the former CFO. The owner-founder brought him back, because he was transitioning the company, and [former CFO] recognized that there was a need. … (Interview, Organization, I5OL-16)

They brought in [redacted name]; he's our CEO now. They brought him in in the beginning as a consultant to feel out the business and see how operations ran, and then they put him in as the CEO probably three years ago. (Interview, Organization, I4OL-93)

Eventually, the consultant-turned-CEO assumed the principle leadership role.

> *So, our President resigned late in December, and [redacted name], the CEO, picked up all of it, so now he is president, CEO, top executive of the company. (Interview, Organization, I9OL-15)*

The executive echelon was rounded out with Directors, who reported to Vice Presidents, who, in-turn, reported to the CEO. Below that, the reporting hierarchy moved from worker to supervisor or manager to Director.

> *You know, in aviation, we would have a direct line to the CEO, but in this case, they report to [Vice President of Engineering, Quality and Safety], and [Vice President of Engineering, Quality and Safety's] got access. … (Interview, Organization, I5OL-7)*

> *Each department has…like, [Safety Manager] is the head of it, and [Director of Quality and Safety] is overseeing that, and [VP of Engineering, Quality and Safety] is overseeing that - who is VP of Engineering, who is on the executive team. … (interview, Group, I6GL-65)*

Finally, a Board of Directors was added to oversee company performance and direction.

> *The Board, yeah. We report to a Board of Directors. [CEO] and all the VPs have monthly meetings with them. They do a quarterly On-Site meeting somewhere. … (Interview, Organization, I4OL-98)*

> *You know, it's tough to break old habits, and change a culture where you had a single owner and the evolution into an investment group and board members and a changing of organizational structure. … [Former owner] remains on the Board, and a few other people remain on this Board with small ownership stakes, but [Capital Investment Company] bought the company to invest in it and see it grow. (Interview, Group, I3GL-71 and 73)*

b.   Functional Arrangement

Like many organizations, the company organized similar work or business functions into departments. According to multiple sources, which referred to department names, there were more than twelve departments. Some past or current departments were Purchasing, Quality Control, Bonding, Engineering, Casting, Shipping, Finishing, and Tool Prep.

> *Specific departments. We had accounting. We had engineering. We had operations broken into all the different departments, so finishing, quality was in there. So, we broke them into those functional areas. I think we had twelve – twelve or fourteen, something like that – functional areas … (Interview, Organization, I9OL-164)*

1) Safety Incentive Program- Safety incentive program winners for Q2 was the Casting department. Prize giveaway was held on 7/13. [Safety Manager] to schedule meeting to discuss the prize for Q3. (Document, Private, D46NL-2)

1) Vertical Cart Maintenance & Storage- [Bonding Manager] to get with the engineering department on design upgrades for the vertical carts so they are more user friendly for bonding personal. [Bonding Manager] has committed to communicating improvements to the engineering department before the next safety meeting. (Document, Private, D44NL-2)

Liquid chemicals were poured into molds in the Casting Department. In nearby Fabrication, products were cut and machined to size with an automated device. Plastic materials were fastened together in the Bonding Department, and in Finishing, products were polished.   The company's material handling department was where workers physically manipulate large, heavy plastic panels. Engineering, too, was a department that integrated design and safety. According to one source, the engineering department was a unique feature of this company.

… None of our competition have their own engineering group; they all outsource it all. So, that is very much a differentiating factor for us, and it's one I think we're really good at. (Interview, Organization, I9OL-164)

There was some evidence that either department names changed over time. For example, around 2013, continuous improvement and safety were subsumed by the department of Quality and Safety.

[Director of Quality and Safety] became the Director of quality control, continuous improvement and safety, which was just like floating departments that they put a director over. (Interview, Group, I1GL-35)

According to multiple sources and units of analysis, the safety team leveraged the company's functional arrangement to implement safety and health initiatives.

Um, our engineering group is really good. They can design a lot of things, and they understand the safety factors and design requirements. I think we're very good at the design portion of our [plastic] and our products, as well. We know that, because none of our competition have their own engineering group; they all outsource it all. So, that is very much a differentiating factor for us, and it's one I think we're really good at. (Interview, Organization, I9OL-164)

Certain issues that would come up on the shop floor, he would make it a topic for the next week to discuss with the employees. So, each department has a 5-10-minute meeting in the morning where they would talk and discuss these topics in the mornings. (Interview, Organization, I4OL-34)

To implement a competitive safety incentive program, the safety team took advantage of the

department structure. They created a competition for all shop floor department and measured

performance by department.

> *The next piece of the puzzle we did is we pitted every department against each other. So, now your middle management has safety responsibility, because they are the hardest sell when you're trying to sell safety and health. (Interview, Group, I1GL-74)*

> *We're already measuring all these things, and now that we're measuring departmentally, we can see where the good departments are and the bad departments are as far as performance in safety and health. It's not that they're bad people – their performance in safety and health. (Interview, Group, I1GL-81)*

The department structure was also exploited for Gemba Walks and weekly tailgate meetings.

> *G-E-M-B-A, it's like Japanese for 'area' – 'this area', if I remember right. So, all the managers, and I don't remember if it was once or twice a day… I remember, specifically in the mornings, we'd all get together at 8:00 as a group, and we'd walk around the plant. We'd start in Bonding. That manager would … 'this is my board, these are the things we're working on, here is my safety cross that shows how many days this department has been accident-free.' … Then we'd go to Tooling, and to Shipping, and then we'd walk all the way to the end, and then we'd have this big long daily meeting every day. In some cases, it was time consuming and repetitious and, um…. (Interview, Group, I3GL-63)*

> *As QC group, we do [Tailgate Meeting] on Friday. Ah, depending on what the subject is that week, [redacted name] gets a paper, he'll read it or have us read it as a group. We'll discuss certain things on it – it depends on how in-depth it is. So, it would be a group talk, and then at the end, we'll all sign it. (Interview, Individual, I2IL-58)*

Performance, too, is reported by department. In daily and weekly manager meetings, each

department reports its performance dashboard. SQDC Boards are also positioned in each

department, and audit findings are reported by department.

> *They also have some reporting boards that I'm not part of; I do not have an SQDC board. And, again, it's a visual station throughout the plant in each department that reports, in order of importance, safety, quality, delivery and cost. It's a four-sided rotating board, and you can see them here and there around the place. … (Interview, Group, I3GL-65)*

> *The Safety Manager prepares monthly safety metrics for the SQDC (Safety, Quality, Delivery, Cost) Report. The 2018 SQDC Report to Supervisors is an Excel spreadsheet that compares safety performance for 13 departments. (Field Note, F18NL-13)*

Departments, as a unit, were held accountable for safety performance.

Performance is graded for STOP cards, monthly safety training, actual and expected JSA counts, number of JSAs per employee, and audit score. For January and February 2018, all departments obtained a composite audit score of 95% or better. All but three departments – Machining, Fabrication, and Bonding - completed 100% of STOP cards and training requirements. JSA performance, though, varied. Even though some departments completed more than one JSA per employee, one department – Fabrication - performed very poorly. … (Field Note, F18NL-13)

3.   Structure Construct: Summary

The structure construct regarded the physical and functional arrangement of the organization.   Quotations were grouped into five themes. Two themes – safety arrangement and corporate arrangement – were frequently cited or perceived to be relevant to the company's achievement of safety excellence. Private documents, especially Safety Meeting notes, and group-level interview subjects served as the sources of most data.

Physically, the company's production functions were split between buildings. Large-scale, custom manufacturing occurred in one building and smaller fabrication occurred in the second. In this medium-sized firm, similar work tasks were organized into at least twelve departments, including Casting, Bonding, Engineering, Tooling and Quality and Safety. The department structure was useful for implementing safety initiatives, monitoring adherence to safety requirements, and for incentivizing safety awards. For example, training and auditing were conducted by department and results were shared with department managers. Across the organization, the reporting hierarchy moved from worker to supervisor or manager to Director to Vice President to CEO to Board of Directors.

Under the former owner, the safety management role was intermittently staffed by full-time, part-time, and temporary workers. Following the ownership change in 2013, when safety became a priority, leader's job titles changed to accommodate safety. Specifically, the term *safety* was added to titles to formalize that function; the Vice President of Engineering and Quality job title was modified to the Vice President of Engineering, Quality and Safety. A full-time Safety Manager was

also hired. The Safety Committee, which existed under the former owner, was now attended by numerous company leaders and managers, and responsibilities were assigned. TABLE XXVII summarizes the results from the safety and corporate arrangement themes.

TABLE XXVII: STRUCTURE CONSTRUCT SUMMARY

	Primary Sources	Private Documents, Interviews
	Primary Units of Analysis	No-Level, Group-Level
	Prominent Themes	Safety Arrangement, Corporate Arrangement
Summary of Prominent Themes	Safety Arrangement	- Under the former owner, the Director of Human Resources, who was responsible for worker's compensation claims, was one leader with partial safety oversight. The safety management function was intermittently staffed by full-time, part-time, and temporary workers. - After 2013, when safety became a priority, leaders' job titles and the safety reporting structure changed. The Director of Quality and Safety, who assumed daily oversight, reported to the Vice President of Engineering, Quality, and Safety. - A second, dedicated Safety Manager was hired in 2014. - A Safety Committee has been part of company's safety structure for many years. After 2014, more was known about participation. - The offices of safety leaders and managers were physically distributed across the company.
	Corporate Arrangement	- Physically, the company was composed of two fabrication facilities – one for large-scale products and one for smaller products. - The reporting hierarchy moved from worker to supervisor or manager to Director to Vice President to CEO to Board of Directors. - Similar work functions were organized into at least 12 departments. - The safety team used the corporate functional arrangement, namely departments, to implement safety initiatives and monitor performance, such as Toolbox Talks, audits, and incentive awards.

F.   Management Practices Construct

Management practices are the actions that managers take to use human and material

resources to carry out a defined strategy. In this study, 487 narrative segments carried the

management practices major code. When sub-coded into three themes – traditional practices, staff

management, and networking, 577 pieces of data were apparent. By far, the single largest source of

data about this construct was private documents, specifically Safety Meeting notes. Even though

400+ quotations emerged from documents, many text segments were redundant. For example, in

Safety Meeting Notes, the same management practice was listed, month after month, until complete.

Group-level sources offered the second highest number of management practices quotations

(TABLE XXVIII).

TABLE XXVIII:MANAGEMENT PRACTICES, NUMBER OF SUB-CODED SEGMENTS BY
SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	4	0	2	
Interviews	42	66	19	
Field Notes	2	3	0	5
Documents, Private				424
Documents, Public				10
Subtotal	*48*	*69*	*21*	*439*
Total	*577*			

Of the three themes, traditional management was much more prevalent with nearly 70% of sub-coded quotations. Twenty percent were about managing staff, and only 12% regarded socializing, politicking, and interacting with outsiders (Figure 18). The most cited theme, traditional management, will be discussed here. Very little divergent data were identified.

Figure 18: Management Practices Construct, Percent of Quotations by Theme
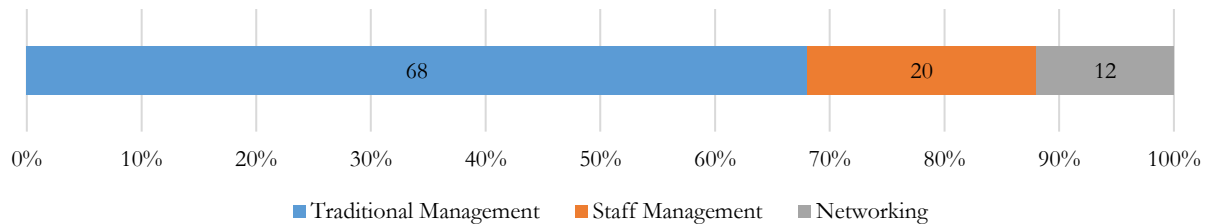
1.   Management Practices Construct: Traditional Practices

Planning, organizing, directing, and controlling are traditional management practices. In theory, managers apply these practices, often tactically, at the group-level in an organization.

Quotations about all four management functions were found. In a handful of text segments, more than one management function was implied. Numerous company managers, for example, attended Safety Committee Meetings, to plan and organize corrective actions.

Attendance
1)   (Plant Manager)
2)   (Plant Manager)
3)   (Casting Manager)
4)   (Installation Supervisor)
5)   (Director of Quality and Safety)
6)   (Maintenance Supervisor)
7)   (President)

                                                         (Document, Private, D35NL-17)

New Items (Safety Committee Meeting)
No Accidents in April J   As of May 1, 2015 [company] is 7 months accident free!
Crane Rail Tie Off – Cannot tie off to a moving piece. [Safety Manager] has some ideas for alternatives. Per [Safety Manager]
Overhead Crane Training – Sit down with [Plant Manager], [Safety Manager] & [Bonding-Material Handling Manager] for a training program for staff to operate the overhead crane. Per [Safety Manager]
                                                          (Document, Private, D32NL-7)

12) SHARP Form 33- [Safety Lead; Assistant Plant Manager; and Bonding Manager] were all assigned line items from the Form 33 to do list. They will find solutions to the problems, and give a small presentation to the committee next safety meeting
*[Assistant Plant Manager]- Change analysis is performed whenever a change in facilities, equipment, materials, or process occurs.
* [Bonding Manager] - Material Safety Data Sheets are being used to reveal potential hazards associated with chemical hazards in the work place.
*[Safety Lead]- Workplace injury/illness data are effectively analyzed.
                                                          (Document, Private, D6NL-13)

The majority of management practices quotations converged around safety planning and safety controlling.

a.   Planning

At the management level, planning is the process of defining a set of short-term goals and identifying methods to achieve them.

Under the former owner, according to two interview sources, safety planning was conducted by the safety-responsible person. Around 2000, one source stated that the company's first full-time Safety Manager planned improvements to fire policies and evacuation practices.

That was probably… geez, I want to say it was probably 2000, 2001 – somewhere around there. [First Safety Manager] was an older gentleman. He had a lot of experience out in the oil field – gas and oil safety. So, he came in and started working on a lot of things with policies, as far as fires and fire awareness and evacuation plan, and things like that, and PPE in certain departments. He was here for probably close to two years, I think. (Interview, Organization, I4OL-15)

In 2008, the Safety Representative planned the corrective approach for OSHA violations.

We had an OSHA compliance visit in 2008. … And at that point, they didn't have anybody to do the OSHA compliance piece, so [Safety Representative] got involved in that. (Interview, Group, I1GL-5)

Under the new owner, safety and operations managers planned the development of new

procedures, including procedures for emptying dumpsters and applying load ratings to material

handling carts.

11) Small Dumpsters- [Continuous Improvement Manager] to write procedure for using small dumpsters. [Plant Manager] to handle the training. (Document, Private, D15NL-12)

1) Load Ratings on Carts- [Engineering] supplied the committee with load ratings information on the 36 carts that they have identified, and assigned load ratings. Tooling can begin marking existing carts with this information, and engineering has requested that we set a priority for the remaining carts that need load ratings assigned. [Continuous Improvement Manager] to write a procedure to ensure that all new carts will have permanent load ratings marked on them going forward. –[Engineering, Maintenance and Tooling Manager, Continuous Improvement Manager] (Document, Private, D24NL-2)

In 2014, according to few sources, the Plant and Safety Managers planned a safety incentive program

around leading rather than lagging indicators.

During that time (2014), our previous Plant Manager had come to [Safety Manager] in a safety meeting, and said he heard the word "leading indicator." … So, he said, 'write me a safety incentive program that's based on leading indicators'. (Interview, Group, I1GL-66)

It was… We drove it to leading indicators, not lagging. So, are you doing JSAs? Are you doing your STOP™ cards? Are you doing your audits? Are your audit scores correct? Are you doing near misses? We wanted near miss reporting, because if we report a near miss, it means the accident didn't happen. That's the direction we drove it. (Interview, Organization, I9OL-90)

[Safety Manager] sat down in front of [his] computer and thought about what [he] need(ed) these guys to do. … So, [Safety Manager] wrote our incentive program, which actually now closely…. Our incentive program really is a reflection of our current safety management system, as far as employee participation goes. (Interview, Group, I1GL-67)

A second round of planning was performed to improve participation in and the effectiveness of the

incentive program.

10) Safety Incentive Revamp- [Safety Manager] and the safety revamp team have finalized details for the safety incentive revamp. [Safety Manager] sent presentation to supervisors (presentation attached to notes email for the safety committee). (Document, Private, D51NL-11)

Education and training initiatives, such as Toolbox Talks, were often planned by the Safety Manager.

> *The VP credits the Safety Manager with … designing and implementing safety initiatives, including Toolbox Talks and training. (Field Notre, Organization, F2OL-8)*

Multiple private documents showed the conduct of planning to mitigate safety issues and correct problems. All managers participated in corrective action planning when near misses occurred.

> *Now, we're starting to get buy-in from other areas. So, like when we have a problem – out in our tool prep area - working on those big tall tools, you know, we had a person almost fall. And we created the near miss. When we created the near miss, it got a lot of attention. (Interview, Organization, I9OL-216)*

> *13) Documentation Procedure for Near Miss- Supervisors will fill out a first report of incident report & a near miss investigation report. The first report of accident will be brought back to [Safety Lead] & the investigation report will be kept in the supervisors files- Closed (Document, Private, D15NL-14)*

The Safety Committee was the central forum for planning safety-sensitive work, repairs, and preventive maintenance.

> *11) Working platform for box tool- It was decided that we will use scaffolding as a temporary solution until we can locate a mobile working platform- [Maintenance and Tooling Manager; Finishing and Material Handling Manager] (Document, Private, D13NL-12)*

> *5) Wall Cleaning Fall Protection in Tool Prep Area- A brief meeting was held after the safety meeting to work out ideas with engineering. [Engineering] will create an initial drawing so [Tooling Manager] can get a manufacturing quote. [Casting Manager] to price buy prefabricated models so we can compare the price difference. (Document, Private, D60NL-6)*

> *3) Flooring on the Casting Mezzanine- The flooring on the casting mezzanine is scheduled to be repaired at the same time as the [oven] encapsulation. Encapsulation is scheduled for January 18th. [Plant Manager] will have Melco steel perform inspections on the [ovens] at time of encapsulation. This item will be tabled until January, but will remain on the agenda. (Document, Private, D39NL-4)*

> *1) Suction Cups- Still looking for swivel heads for suction cups at [company]. New suction cups are working great in Commercial. No alarms on new suction cups. [Plant Manager] has tasked [Maintenance and Tooling Manager] with making sure there are alarms on all suction cups. Also need to make sure that scheduled PM's are being done on all suction cups. Per [Plant Manager] & [Safety Manager] (Document, Private, D31NL-5)*

b. Controlling

Controlling is the management process of monitoring progress toward goal achievement.

Under prior owners, there was mixed evidence of safety control. Sources recalled managers'

presence on the shop floor to monitor work habits.

> *Ah, just being there – being present, and making sure they're wearing PPE. We had a lot of chemicals that we worked with back in the casting area, so we had to wear Solvex® gloves and respirators and safety glasses and things like that - just making sure that people were protecting themselves. (Interview, Organization, I4OL-9)*

> *The Plant Manager, specifically, did a lot with trying to get departments to manage their people and make sure they were doing the proper thing – working safely and following policies – the policies that we did have at the time. … But management jumped in a little bit and tried to correct a lot of that by being aware of certain departments – what they were doing – and then making the managers or supervisors take care of the issues. (Interview, Organization, I4OL-24)*

However, managers failed to track the progress of Safety Committee actions through recordkeeping.

> *Now, those safety meeting notes weren't documented until [Safety Manager] took over – until [Safety Manager] was given this role. So, as far as looking back on those, it's not going to be there. We were bad about documenting in the first place, but we were really bad about documenting safety and health, before [Safety Manager] took over and before [Director of Quality and Safety] came in. (Interview, Group, I1GL-186)*

During the safety transition, data from all sources and units of analysis showed that

controlling was prevalent and impactful. Early on, strong multi-source, multi-unit evidence showed

the Safety Manager's regular presence on the shop floor, checking for unsafe configurations, such as

missing guards and overridden interlocks, or simply passing through.

> *I remember [Safety Manager] running around like a chicken! The things that we changed...like, you would see a guard rail not always up, or there were electrical plates that needed to be put up. [Safety Manager] would actually come around and talk to you 'so if you start seeing this, because you work here,' or 'if you start seeing this, then we need to fix it.' So, that's the kind of the changes that we made – the things that we could see. We missed a lot. [Safety Manager] would come through and say, 'we're going to do this.' (Interview, Individual, I2IL-40)*

> *We had an accident in the [milling-cutting machine] where an employee was in the [milling-cutting machine] while it was running. … They had the door safety latch disabled, so they could open the door to the milling machine. So, stuff like that. And now, [Safety Manger] has done a good job at making sure all that stuff is in place. He does walk-throughs once a week and checks all of the equipment. (Interview, Organization, I4OL-53)*

Now you've got [Safety Manager] - full-time safety. I think just the presence of a person that has a safety title walking through, it's, like, 'well, you better get your harness on,' he's going to walk through. I think that means a lot. (Interview, Individual, I8IL-8)

The fact that safety is a major part of our job. We are always reminded by filling out JSA's every day and the safety guy, [Safety Manager] is always walking through the work area. (CIR, Individual, S11IL)

[Safety Manager's] presence and awareness on the shop floor keeps everyone honest and working safely. (CIR, Organization, S29OL)

Safety and operations managers also used formal walk-downs, such as Gemba walks, to monitor and control performance.

G-E-M-B-A, it's like Japanese for 'area' – 'this area', if I remember right. So, all the managers, and I don't remember if it was once or twice a day… I remember, specifically in the mornings, we'd all get together at 8:00 as a group, and we'd walk around the plant. We'd start in Bonding. That manager would … 'this is my board, these are the things we're working on, here is my safety cross that shows how many days this department has been accident-free.' You know, you'd mark it in green, yellow or red. Red was an accident or lost time accident. Yellow might have been a near miss or a no-lost time accident, and green was no accidents or injuries to report. You know, that's where I remember the beginning of daily reporting, and we have since… Then we'd go to Tooling, and to Shipping, and then we'd walk all the way to the end, and then we'd have this big long daily meeting every day. In some cases, it was time consuming and repetitious and, um…. (Interview, Group, II3GL-63)

Eventually, daily walk-downs were replaced by daily, face-to-face safety reporting meetings.

Over time, we got away from Gemba walks. Then, we'd have manager meetings, where we'd all get together in a room, twice a day once - in the morning and once in the afternoon. It's evolved now to just a big one every Monday morning to cover the week, and then every afternoon we get together. But at each one of these meetings, maybe not the Monday morning, everybody starts with their 5S score and their safety – no accidents or injuries. If there was… 'What happened?' Was there any near misses? So, it's a quick addressing of... And most of the times it's, 'well, Shipping, no accidents, no injuries and 5S score; and Bonding no accidents, no injuries, 5S score.' So, it's repetitive and redundant, but I think... I think, any more when something happens, people perk up and stop, because accidents are pretty few and far between. So, when it does its news – its news that something happened. (Interview, Group, I3GL-65)

When incidents occurred, operations managers participated in investigations; the Safety Manager oversaw the process. Private documents showed that, in 2016, for example, managers from Tool Prep-Process Control, Engineering, and Safety investigated an accident on an automated tool and used the data to inform future planning.

6. Accidents are investigated for root causes.	3

> *Comments: Employees fill out accident investigation forms. These forms are reviewed by their supervisors and then by [company's] [Safety Manager]. [Safety Manager] coaches the employees and supervisor if the investigation is not thorough enough. …*

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(Document, Private, D83NL-6)

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8) 12T Tool- [Safety Manager] will work with [Tool Prep-Process Control Manager] in the incident investigation that lead to this item, and then [Safety Manager] will schedule a follow up meeting for corrective action. [Safety Manager], and [Engineering] will audit the process of demolding this tool on July 5th. (Document, Private, D57NL-9)

To monitor safety improvement, managers began tracking safety data around 2013, according to documents and interview quotations.

> *[The safety group] started doing metrics. [They] were the first group in our whole organization to do metrics. [They] were the first group to start measuring things. Then [they] started reporting them out. It was important to report them out, even if people weren't reading them. [They] were still sending them out. And, if you walk by now, you'll see that all departments are measuring things. They've even started measuring their safety performance. (Interview, Group, I1GL-138)*

Managers tracked safety activities, such as completed JSAs.

> *I'm pretty sure [Safety Manager] does (review JSAs). I don't know that he reads them all, because there's a lot, but I'm pretty sure – I think he keeps track of individual quantities. (Interview, Individual, I2IL-77)*

Hazard correction, too, was documented to determine the need for additional interventions, such as Toolbox Talks or informal audits, and to determine the timing of interventions.

19. An effective procedure for tracking hazard correction is in place.	*3*
Comments: Hazards are tracked by [Safety Manager] using Excel.	

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(Document, Private, D82NL-19)

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> *[Safety Manager] had written [Toolbox Talk] called downward trending leading indicators, and all of [his] leading indicators were trending downward. … [Safety Manager] wrote a long Toolbox Talk, and [Safety Manager] told them, 'if we ...' - and the good thing is these are leading indicators, so we still have time, but the bad thing is that 'if we don't do this, something is going to happen.' '[Safety Manager] can't tell you where, but [Safety Manager is] going to tell you something's going to happen.' … (Interview, Group, I1GL-139)*

By 2015, the Safety Manager monitored and analyzed intermediate and outcome performance – near misses, injuries and illnesses.

> *What we started doing from there is now we've got all these metrics. We're already measuring all these things, and now that we're measuring departmentally, we can see where the good departments are and the bad departments are as far as performance in safety and health. It's not that they're bad people – their*

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217

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performance in safety and health. And, now we have tools and measurements to hold them accountable for safety and health. So, if your employees aren't driving you, then management is driving you. (Interview, Group, I1GL-81)

20. Workplace injury/illness data are effectively analyzed.	3
Comments: [Safety Manager] does trend analysis on accident and incident data.	
21. Hazard incident data are effectively analyzed.	3
Comments: See above.	

(Document, Private, D82NL-20)

Leading indicator data was used to guide the Safety Manager's presence on the shop floor.

… All of [Safety Manager's] leading indicators were trending downward. [Safety Manager] was starting to see more near misses, but they were not being reported. [Safety Manager] was walking by supervisors and telling their employees, 'hey, tie off' or 'hey, where are your safety glasses.' [Safety Manager was] looking at the supervisor and saying, 'I shouldn't be doing this at this point, you should be doing this.' 'What are you doing?' (Interview, Group, I1GL-139)

Sometimes when those (leading indicators) start to trend down, [Safety Manager] is on the shop floor a lot more. They start to realize – oh, they're watching us, and we need to pick it back up. (Interview, Group, I1GL-141)

According to a good amount of evidence, audits measured adherence to company

procedures and OSHA regulations. Each year, even as far back as 2013, the Safety Manager audited

the company's written OSHA programs in the Safety Manual.

24. A review of in-place OSHA-mandated programs is conducted at least annually.	3
Comments: [Safety Manager] audits programs throughout the year to evaluate the operational effectiveness of [company's] written programs.	

(Document, Private, D6NL-24)

11) Written Programs- Hazard Communication, Respirator Protection
Please see attached documents [company] Hazard Communication Program, and [company] Respiratory Protection Program. [Safety Manager] in the process of auditing all of our programs with the sample documents that you guys have sent me. (Document, Private, D33NL-45)

At least annually, the overarching safety management system was evaluated, too.

25. *A review of the overall safety and health management system is conducted at least annually.	3
Comments: On an annual basis [Safety Manager] audits the overall safety program, including the employee manual and safety handbook.	

(Document, Private, D83NL-25)

On going work from our safety mangment [sic] to inprove [sic] safety standards … continual improvements and constant change to better the work place. (CIR, Individual, S12IL)

By 2018, monthly audits were documented, and safety performance was posted on visual SQDC

Boards.

We had all the procedures in place, all the tools in place, and now we started auditing. … Once we started the audits, you know, the first one really was terrible, but they got better rather quick. Because they saw the effort that [Plant Manager] was there, [Director of Quality and Safety] was there, [Safety Manager] was there, and one of our other supervisors, [Plant Manager], and we were holding them to it. (Interview, Organization, I9OL-62)

I viewed the Safety Audit results for March 2018 for 14 departments. The company's 10-question audit checklist asks generally about PPE, chemicals, safety training, fire extinguishers, and engineering controls. Each item is scored from 0 to 4. The latter score means that no violations were found, and the former means that seven or more violations were identified. (Field Note, F18NL-12)

The Safety Manager prepares monthly safety metrics for the SQDC (Safety, Quality, Delivery, Cost) Report. The 2018 SQDC Report to Supervisors is an Excel spreadsheet that compares safety performance for 13 departments. Performance is graded for STOP™ cards, monthly safety training, actual and expected JSA counts, number of JSAs per employee, and audit score. (Field Note, F18NL-13)

Regarding safety recordkeeping to document control, sources offered mixed perspectives.

Most sources indicated that the Safety Manager maintained records for training, audits, Safety

Meeting Notes, and so forth.

"[Safety Manager] is very good at keeping records, so that's a plus." (Interview, Group, I6GL-93)

Definitely all the stuff that [Safety Manager] has got – MSDS sheets, JSAs, our weekly meetings. He's got all the documentation on all of that...all the classes that he gives us. (Interview, Individual, I2IL-161)

A couple quotations, though, showed doubt about the completion or retention of safety records,

such as STOP™ cards and JSAs.

All I'm going to be able to say is Toolbox topics, your JSAs – I don't even know if they keep those – or STOP™ cards. (Interview, Individual, I8IL-123)

The JSA that I viewed was completed March 21, 2018 by a subject interviewed for this research. … However, no one had reviewed or approved the document. (Field Note, F18NL-11)

2.   Management Practices Construct: Summary

Three themes were part of the management practices construct. The traditional practices theme was cited almost 70% of the time. The vast majority of quotations were found in Safety Meeting Notes.

Safety planning, organizing, directing and controlling were carried out by managers in all departments, but mostly by the Safety Manager, Plant Managers, and the Tooling Manager. Examples of planning and controlling practices were most cited. Historically, safety planning and controlling were conducted intermittently. After the company prioritized safety, multiple sources conveyed the planning of new policies, work procedures, reward programs and training. Numerous corrections to broken flooring or unguarded equipment, for example, were also planned. Even more prominent than management planning was controlling. Managers monitored safety in multiple ways. They observed shop floor behavior; investigated accidents; audited safety activities, conditions, and programs; and measured leading indicators of performance. The Safety Manager used measurement data to make management decisions (TABLE XXIX).

TABLE XXIX: MANAGEMENT PRACTICES CONSTRUCT SUMMARY

	Primary Sources	Private Documents
	Primary Units of Analysis	No-Level
	Prominent Themes	Traditional Practices
Summary of Prominent Themes	Traditional Practices	• All managers carried out traditional management practices, but most were performed by the Safety Manager, Plant and Assistant Plant Managers, and the Maintenance and Tooling Manager. • Managers carried out customary safety planning for new policies, work procedures, incentive rewards, and training; and corrective planning for safety problems. • The Safety Committee was the hub for most planning. • Safety controlling varied under the former owner. Under the new owner, controlling was prevalent and impactful. • Managers monitored behavior on the shop floor (i.e., Gemba Walks); investigated accidents; tracked the conduct of safety activities (i.e., JSAs) and corrective actions; conducted audits; and used performance data for decision-making.

G.   Core Processes Construct

As an *a priori* construct, core processes were the standardized, organization-wide policies and methods that facilitated the conduct of work. This major code was assigned to more than 800 quotations, and when sub-coded into five themes, 1,065 text segments were apparent. An overwhelming number of quotations were found in private documents, especially Safety Meeting Notes. Of the interview sources, group-level subjects offered twice the information that organization- and individual-level subjects offered (Table XXX).

TABLE XXX: CORE PROCESSES CONSTRUCT, NUMBER OF SUB-CODED SEGMENTS BY SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	5	6	20	
Interviews	76	120	57	
Field Notes	2	5	1	28
Documents, Private				725
Documents, Public				20
Subtotal	*83*	*131*	*78*	*773*
Total	*1,065*			

Theoretically, core processes referred to human resources, information systems, technology, marketing, safety, and so forth. In this study, the following five safety-centric themes were identified: hazard controls, safety activities, policies-programs, training, and reward-discipline. Nearly 60% of quotations were split between hazard controls and safety activities (Figure 19). Both dominant themes are discussed here. In addition, because incentives played a prominent role in the company's achievement of safety excellence, the reward-discipline theme will also be presented.

Figure 19: : Core Processes Construct, Percent of Quotations by Theme
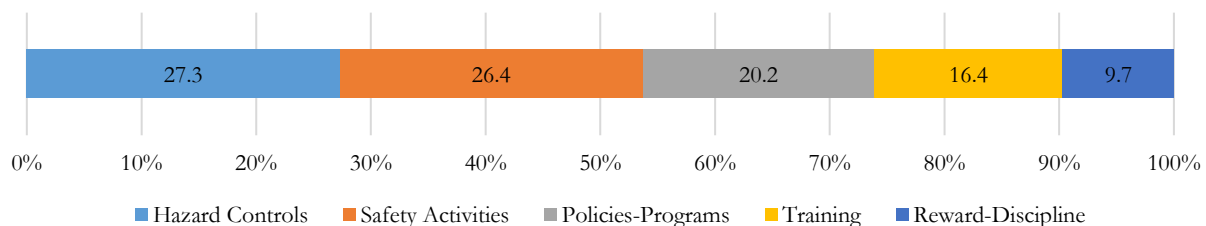
5.   Core Processes Construct: Hazard Controls

The hazard controls theme was applied to text segments that mentioned the control of

workplace hazards. Hazard controls differed under former and new leadership.

a.   Former Owner

Under the former owner, evidence showed the availability of some controls and absence of

others. One source, for instance, commented on the existence of chemical hazard information and

personal protective equipment following the 2008 OSHA inspection.

> *[Safety Representative] wrote our hazard communication program at the time. [He] did our respiratory protection program at the time. Um, [he] redid our material safety data sheet books at that time, and then put the indexes in them and things like that...hazard communication pieces, as far as labeling; PPE; risk assessment – [Safety Representative] had a huge hand in that. Pretty much everything to try to get us into compliance. (Interview, Group, I1GL-5)*

More interview subjects and documents, though, stated that controls were historically less utilized.

Most simply, employees did not have basic protective gear.

> *Safety has not – not - been a focus. I mean, people didn't even have safety glasses…. (Interview, Organization, I9OL-58)*

> *Ok, when we weren't guarding those hazards back in 2006 when I came on board, it was a lot scarier. It's scary to look at it now and say, 'this is how we guard this, and this is how we take care of that.' But back then, there was none of that. It was just like 'well these hazards exist,' and 'be careful.' So, for an employee to come in and realize that 'hey I'm going to leave with all my fingers and toes today,' the morale is huge. (Interview, Group, 1GL-174)*

OSHA cited the lack of other controls as compliance violations. Specifically, in 2012, the company

failed to meet OSHA's General Duty Clause – to control recognized hazards, and to sufficiently

control hazardous energy, moving equipment, wall and floor openings, and flammable chemicals,

and more.

> *Section 5(a)(1) of the Occupational Safety and Health Act of 1970: The employer did not furnish employment and a place of employment which were free from recognized hazards that were causing or likely to cause death or serious physical harm to employees in that employees were exposed to flammable hazards: a)*

223

[company] at [street address], [city, state, zip code]: On and before 3/5/12, the employer did not ensure that flammable chemicals such as [plastic] syrup were stored in a laboratory-safe or flammable material refrigerator/freezer. This condition exposed employees to fire and burn hazards. Abatement Note: Among other methods, one feasible and acceptable abatement method to correct the hazard is to adopt NFPA 45, 12.2.2.1 Standard on Fire Protection for Laboratories Using Chemicals that states the following. Each refrigerator, freezer, or cooler shall be prominently marked to indicate whether it meets the requirements for safe storage of flammable liquids. A Laboratory-safe or flammable material refrigerator/freezers should be used for the storage of flammable chemicals. The refrigerators must be U.L. Listed as Flammable Material Storage Refrigerators. (Document, Public, D73NL-6)

b.   New Owner

Under new leadership, the company showed increased interest in controls as needs were

identified, according to multiple sources.

I think the big change was when the company was sold to a corporate investment firm. We really started to get support for what we needed to get the shop safer – new equipment or whatever we need. (Interview, Organization, I4OL-85)

Another example is that they became more strict regarding footwear, the use of head protection – helmets, and the use of eye protection. In addition, [subject] is commenting about how people who were wearing…who typically wore contact lenses were less likely to wear safety goggles. But, [company] began to require them to get eye protection with a prescription, so that they had to wear eye protection. They couldn't...there wouldn't be kind of a conflict between the contact lenses and the goggles. (Interview, Individual, I7IL-30)

… And the second hard part was probably having to put stock into the issues that were raised. 'Fine, if you're going to tell us that we have to stop work, I'm not going to work on this unsafe forklift. I want a new forklift.' And, so then it became a segue to get things. (Interview, Group, I3GL-70)

Evidence converged around the company's implementation of traditional hazard control

measures – engineering, administrative, and personal protective equipment – to prevent injuries and

accidents.

1.   Engineering Controls

There was very strong multi-source evidence that the company implemented engineering

controls. These devices, such as enclosures, barriers, guards, ambient lighting, and ventilation

devices, intend to sequester hazards or hazardous conditions at their source.   Considered the most

effective workplace safety and health controls, engineering controls contributed to the company's

safety and health success.

11. Feasible engineering controls are in place.	3
Comments: Engineering controls from a health and safety perspective were present and effective.	

(Document, Private, D82NL-11)

Several health and safety practices contributed to [company] success, these include the company's STOP program, OSHA 10 and 30 hour training, and their commitment to engineering controls. (Document, Public, D85NL-15)

Many sources commented about the installation of an expensive chemical control ventilation system around 2013.

They made a big step in, probably 2013, with the ventilation in the casting area to turn the air over back there, because they didn't have proper ventilation. They've done a lot to getting the ppm (parts per million refers to an airborne concentration of chemicals) levels down to a safe level. (Interview, Organization, I4OL-51)

One of the things that [new owner] actually did do was... We have a very...we have a phenomenal air handling system in our casting department – it was about $300,000 dollars. That was one of the first things that [investment company] did was they purchased that and had it installed, because we couldn't operate without it due to that 2012 inspection. Because we were over-exposing employees to [chemical] over the permissible exposure limit. (Interview, Group, I1GL-27)

Throughout the day, the Safety Manager raised several relevant safety and health topics:
- *the 2013 installation of a local exhaust ventilation system in the polymer lab (Field Note, F1NL-27)*

There were several references to fall prevention controls, both for workers and product. The company implemented arrest systems and work platforms to prevent workers from falling.

The time I recall when we made the choice to create the new safety tie off system. The guys seemed to be invested more in the safety system. (CIR, Organization, S2OL)

A lot of the tie-off bars or restraints for the [plastic] are ideas from the employees to make their job safer. (Interview, Organization, I4OL-83)

So, like when we have a problem – out in our Tool Prep area - working on those big tall tools, you know, we had a person almost fall. … We got buy-in from engineering to help us design or purchase something - a tool - that's going to help them work the height of the tool and create a safe work environment. So, we've got engineering buy-in working with us… (Interview, Organization, I9OL-216)

8) Working Platform for Box Tool- No progress on this item. Possible Capital Expenditure item. (Document, Private, D16NL-9)

6) Wall Cleaning Fall Protection in Tool Prep Area- Production is working with everyone involved with the cleaning of the walls to find an efficient safe solution. The first meeting was held on 1/20/2017. This item is ongoing. [Employee] provided cost estimates on Genie Lifts. (Document, Private, D55NL-7)

9) Tie-off points on Ovens- Engineering, the safety team, and maintenance are working on a tie-off system for employees when they are performing work on top of the ovens (Document, Private, D39NL-10)

Restraint devices prevented heavy panels from falling, too.

We've made a lot of restraint devices to hold the [plastic] in place, so it can't fall over when fabrication or packaging is working on it. (Interview, Organization, I4OL-67)

Two sources nicely described the rationale and conditions for controlling projectile hazards around a

tensile strength testing machine.

This wall... When they moved the office in here, they had a cage around the machine. So, when they build the lab right here, which it wasn't here before - it used to be across the way - then this was something that had to go in along with the door, and it was because the guy that was here, before I took over the position. You know, when he'd break things, they'd fly. They didn't incorporate that [points to the metal grate above the blast or shielding wall] until after he voiced that, because they'd still come over (pieces of plastic would fly over the top of the shielding wall during testing). (Interview, Individual, I2IL-108)

This wall [points to the plastic panel wall in QC lab] ... This wall with the grate up there, that's huge safety, because that machine right there [points to the Instron Tensile Tester] ... I don't know If you see all the pieces [points to plastic shards on the floor and machine]. Well, I either pull it apart or bend it in half or whatever, but I break the plastic, so this is what normally happens [points to plastic shards on the floor and machine]. This door closes, so all this is safety. (Interview, Individual, I2IL-81)

… In a very small QC lab – large enough for one occupant. The room contained one benchtop workstation with a long counter, and the Instron testing machine. The Instron was positioned on one end of the room, and a roughly 10-foot, transparent, floor-to-ceiling wall separated the machine and the employee. The wall contained a transparent inswing door, and above the door, where there was no wall, a fabricated metal grate further enclosed the Instron. Inside the enclosure, I saw shards of [plastic] on the floor around the machine. Outside the enclosure, though, where the employee was seated, the floor was clean and free of debris. The enclosure appeared to serve as an effective safety engineering control. (Field Note, Individual, F4IL-6)

A variety of additional engineering controls was used, including ground fault circuit interrupters,

welding curtains, ambient lighting, radiation shields, machine guards, lift-assist tools, and speed-

control devices.

A good example is that machine out there – a QUV (an accelerated weathering tester). It's ultraviolet light, and obviously it's out in the middle of everything [points to new machine in a high bay area where others can walk by], so we had to make sure that we came up with the best way to keep that safe so that people just wouldn't go and be glaring into the lights. (Interview, Individual, I2IL-11)

4) Install guard on 36" auto polish lathe in Commercial Building - Guard installed (Document, Private, D33NL-31)

11. Feasible engineering controls are in place.	2
Comments: The company had great machine guarding throughout the facility.	

(Document, Private, D81NL-11)

In the lab, workers measured and sifted large amounts of powdered material. Lift-assist devices and local exhaust ventilation were used to minimize ergonomic injury and airborne dust. Another worker mixed liquid polymer with a paddle in a large, open caldron. (Field Note, F1NL-14)

9) Air Regulators on Staple Guns- Air regulators have been installed. - Closed (Document, Private, D19NL-10)

7) Soft Starts on Cranes- VFDs installed on the North crane, and they work great. Maintenance scheduling installation for South crane (Document, Private, D51NL-8)

The company even designed fabricated controls and equipment with safety in mind.

Because of the unique nature of their work, [company] fabricates many of their production tools and equipment in-house. Safety is always included in the design of these tools and equipment, effectively engineering out potential hazards. (Document, Public, D85NL-18)

2.   Administrative Controls

Administrative controls, such as signs, labels, procedures, written policies, and training, are

work practice modifications that intend to lessen risk. For this study, policies and training, which

are types of administrative controls, were designated as separate themes given the large number of

quotations about each topic. Even so, documents revealed an array of administrative controls for

heat stress, traffic safety, international travelling, and escorting visitors.

…The company's production floor is not cooled … shop managers make Gatorade available throughout the shift and encourage workers to stay hydrated. (Field Note, Group, F3GL-8)

6) Parking Lot Work Heat Issue- Employees have been making good use of provided Gatorade jugs & water bottles to stay hydrated, and the committee has opted to close this issue on the agenda- Closed (Document, Private, D23NL-7)

5) Parking Safety Issue- Managers have instructed employees to park further down the street where the road is wider to help with the visibility issue. … [The Maintenance and Tooling Manager] is getting quotes for additional parking to get employee cars out of the street. – [Safety Manager, Maintenance and Tooling Manager] (Document, Private, D21NL-6)

5) Vaccinations- [VP of Human Resources] is already scheduling traveling employees for vaccination. The policy will be complete in quarter one of 2016. (Document, Private, D35NL-6)

14. Personal protective equipment is effectively used.	3
Comments: [Company] is going above and beyond OSHA regulations and performing pulmonary function tests on all employees who wear respirators.	

(Document, Private, D82NL-14)

There were employee work procedures for chemical labeling, material handling, use of seatbelts and warning alarms, and housekeeping,

> *So, another thing is that chemicals weren't labeled as thoroughly before. For example, we used alcohols, but we also used stronger chemicals. And, now the labeling is more systematic. We know what is inside the containers – what chemicals are inside the containers. (Interview, Individual, I7IL-130)*

> *1)   Load Ratings on Carts- …Engineering has submitted a list of tools that have already been load rated, and is awaiting production to finish the restructure & additional load rating needs. (Document, Private, D28NL-2)*

> *7) Man in [Oven] Alarms- Man in [Oven] alarms will be wired to estop switches that will stop the heating & pressurization of the [ovens]. Conduit has been run, and the project is on schedule to be completed during the [oven] encapsulation. (Document, Private, D38NL-9)*

> *In this warehouse, storage was neat, and aisles were generous and clean. (Field Note, F1NL-16)*

3.   Personal Protective Equipment

Data strongly converged around the provision of and use of personal protective equipment

(PPE) controls. Employees were pleased with the high-quality and availability of PPE.

> *Another huge factor that has helped to make work safer is that [the company] buys the best most comfortable PPE that money can buy. Also by making all types available at all times in a vending machine. … The biggest or most important factor I believe is that they make sure that all PPE is comfortable and easily assesiable [sic]. (CIR, Individual, S14IL)*

> *Any PPE I need is provided. They give us a $100 boot allowance, because we have to have steel toe shoes. My safety glasses - they give me $100 a year to replace my safety glasses. So, I think for them, putting that effort forth to take care of us means that they're going to… They want to take care of us. (Interview, Individual, I2IL-140)*

> *I believe that proper PPE such as steel toe boots & full body harness are high up there on importance because I've been in an instance where we were lifting an object with a crane & one of the straps came loose causing the object to fall on my toes. I was not injured because of the steel toes. (CIR, Individual, S23IL)*

A number of quotations, especially from documents, attested to the variety of available PPE – hard hats, hearing protectors, safety glasses, respirators, hand protection, impervious clothing, lab coats, knee pads, safety boots, fall protection harnesses.

> *Next, I saw the finishing area for large pieces. About 4 workers, some dressed head-to-toe in yellow rubber suits and boots, were wet-buffing [plastic] panels. On hands and knees and tethered to an overhead rack to prevent falling, workers reached back and forth with their powered buffers; water sprayed everywhere and streamed across the floor. (Field Note, F1NL-10)*

> *On the second floor above the Tool Prep area was the Polymer Lab. To enter the lab, bouffant caps and white lab coats were needed. Workers wore the same attire and were issued half-face air purifying respirators. (Field Note, F1NL-14)*

> *We had a lot of chemicals that we worked with back in the casting area, so we had to wear Solvex® gloves and respirators and safety glasses and things like that - just making sure that people were protecting themselves. (Interview, Organization I4OL-9)*

> *… And, safety-wise, we have harnesses now for being up on top of tools, and we have respirators. They're a different kind than the company had. The guys out there took it upon their selves to get those. Then the company had to certify it, so that's how that happened. We've got burn-proof shirts. (Interview, Individual, I8IL-40)*

> *12) Nitrile Gloves for Latex Allergy- [Safety Lead] working cost with Healthcare Specialties. Min/ Max has been set up in Tool Crib & we will begin stocking item when a cost if agreed upon. (Document, Private, D14NL-13)*

> *5) Hearing Conservation Program- The results of the 2015 hearing tests showed possible hearing threshold shifts on two employees. Employees were scheduled for follow up hearing tests and the findings were repealed. [Safety Manager] is currently conducting noise surveys to ensure that hearing protection is adequate & supervisors are monitoring employees to ensure they are wearing their assigned hearing protection. (Document, Private, D38NL-6)*

Protective gear was prescribed for visitors and for travelling installation personnel.

> *Upon entering the reception area, the Safety Manager welcomed me, issued a visitor badge, and added my name to the Visitor Sign-In Log. The company uses this log to account for occupants, in the event of an emergency evacuation. The Safety Manager also pointed out the exterior muster area and provided me with safety glasses. (Field Note, F1NL-7)*

> *So, when a bid package is sent out, most of the time, we're signing saying that we are verifying that this information is correct. When it goes to contract – I'm trying to think of any example – they will require safety On-Site, as far as crane usage, hard hats, those items. They'll say that you need to have the PPE, as far as what is required On-Site; they'll usually list that out, but it's not necessarily putting our information into the contract. (Interview, Group, I6GL-32)*

6.   Core Processes Construct: Safety Activities

Safety activities are daily, weekly, monthly or other periodically conducted occupational

safety and health efforts. As the company transitioned from less safe to safety-excellent, the

company implemented multiple safety activities, including Job Safety Analysis (JSA), STOP™ cards,

Safety Committee meetings, near miss reporting, accident investigation, and audits and evaluations.

Data heavily converged around the conduct of safety activities; there was no contrary data.

And, as has been the case for other constructs, the extent of safety activity conduct varied by

company ownership.

a.   Former Owner

Evidence from multiple sources and units of analysis showed that the company conducted

some safety activities prior to 2013, under the former owner. As far back as 2008, following the

OSHA audit, one group-level source recounted chemical safety activities.

> *Um, I redid our material safety data sheet books at that time, and then put the indexes in them and things like that...hazard communication pieces, as far as labeling; PPE; risk assessment – I had a huge hand in that. (Interview, Group, I1GL-5)*

Around 2010, the company initiated the DuPont STOP™ safety program, which centered on the

concepts of peer observation and hazard assessment.

> *So, in 2012, we had our human resources department kind of oversaw safety. It wasn't very preventative, it was very reactive. They handled the claims and all that stuff. We'd started the STOP™ safety program in 2010, but it hadn't gained a lot of tr...it wasn't working. … It is more behavior-based – it doesn't really tell you the rules. (Interview, Group, I1GL-25 and 33)*

> *So then, our HR Director at the time, [redacted name], she started the STOP™ Safety Program – DuPont STOP™ Safety, and we started that with training all the employees. I think it was like a 5 or 6-week course for 1 or 2 days per week. They broke up into teams, and we each got in here and went through the STOP™ Safety Program and watched all the videos and did all the pamphlets and everything. (Interview, Organization, I4OL-37)*

> *The first step that I specifically remember was the STOP™ safety program. Enrollment in that. You know, created by DuPont; I think it was DuPont. And, it was just... That's the kick-off that I really remember. … Everybody was going to be brought in - you're in charge of safety, you're in charge of safety, you see something... Every individual was capable of and expected to coach every other employee. … My guess would be around 2009. … Yeah, it is an acronym. It really had a lot to do with, that I can recall specifically, is*

observation. I'm going to stop and take time out of my day to observe somebody else doing their job, and I'm going to critique it from an observation point of view. What are they doing right? What are they doing wrong? I'm going to ask questions and go from there. That is almost like a task-based approach to it, but it also allows and creates a culture and an atmosphere of, you know, we're all responsible for each other's safety, and I should be comfortable going up to anybody, in any department, and saying, 'I saw what you did there, and maybe I can recommend a safer approach.' Or, even if I couldn't do that, I could stop work; it gives you a stop work option, because we need to stop work, if what's going on here is not safe and we need to rethink what we're doing. There should be no retaliation or anything else. So, it was a freeing concept. (Interview, Group, I3GL-23, 32, 34)

According to one interview source, who used the STOP™ program as a temporal benchmark, the

Safety Committee, too, was operating prior to 2010.

Yeah, I think there's been a committee here as long as I've worked here. You know, we go back to those early days, it had its effectiveness in addressing problems, but obviously not strong enough, because their opinions of safety issues versus OSHA's opinions of safety issues were very, very different. (Interview, Group, I3GL-25)

Well, we have a Safety Committee. Yes. Yeah, we've always had a Safety Committee. (Interview, Individual, I1GL-86)

A couple of years later, according to uncorroborated interview sources, the company implemented a

safety checklist for new hires and may have implemented the Job Safety Analysis (JSA) process.

JSAs – job safety analysis - had come into the mix, and it seems that those were a couple of years behind the STOP™ program - 2011, 2012. (Interview, Group, I3GL-44)

Well, back up, [HR Director] started it. You had the STOP™ safety card. That was one of the first things they did was the STOP™ safety card. That was... [HR Director] was still here. And then after that, you started doing Job Safety Analysis every morning. … (Interview, Individual, I8IL-36)

So, they developed a safety checklist. Whenever we had a new hire, we'd walk them through the shop and point out all the things that they need to look out and watch for when they're out working in the shop. And then they would go through the STOP™ Safety training course. … Probably 2012. (Interview, Organization, I4OL-47)

b.   New Owner

After 2013, the company continued the STOP™ program, Safety Committee meetings, and

JSAs. Large amounts of multi-source and multi-unit evidence support the existence and nature of

these programs.

1.   STOP™ Program

The STOP™ program became a monthly hazard-analysis exercise for shop floor workers.

Peer observation gave employees a voice for safety.

> *Use of STOP™ cards… (enabled) Steady focus on safety with analysis of active activities (CIR, Group, S3GL)*

> *[Company] uses their Safety Training Observation Program or STOP™, to detect hazards, track their correction, involve employees in the safety program, and increase safety knowledge and awareness. Each employee fills out a STOP™ card on a monthly basis. This activity requires an employee to watch a task being performed and convey what positive and negative safety behaviors they observe. The STOP™ card allows the employee to praise positive safety behavior of a co-worker and offer suggestions on ways a job could be modified to improve its safety. Employees receive feedback on their STOP™ cards and are recognized when they make suggestions that improve employee safety. … The JHAs and STOP™ cards help to keep safety on the forefront for all [company] employees. (Document, Public, D85NL-16)*

> *Then, everybody does a formal safety observation, which is the STOP™ safety card, which is monthly. So, we're saying that if we raise the awareness, and we get people to think about it every day, then accidents should go down by themselves. (Interview, Group, I1GL-73)*

> *I think the STOP™ Safety training we receive when we start working has made safety better. Manufacturing is new to a lot of people so the training helps employees Be able to identify and correct or at least voice safety concerns. (CIR, Individual, S20IL)*

> | *2. Effective safety and health self-inspections are performed regularly.* | *3* |
> | --- | --- |
> | *Comments: STOP (Safety Training Observation Program) cards are filled out by each employee monthly, and employees perform a daily JHA (job hazard analysis). Additionally, [Safety Manager] performs documented detailed audits.* | |

> *(Document, Private, D82NL-2)*

> *I observed one completed STOP™ Card. The two-sided card lists unsafe actions on one side and unsafe conditions on the other. To spur thinking about unsafe actions, the card lists example procedures, orderliness, tools and equipment, personal protective equipment, physical positions of people, and reactions of people. To prompt the identification of unsafe conditions, the card lists example tools and equipment, structures and work area, environment, and orderliness. According to the card that I observed, on March 1, 2018, a named shop floor worker spent 10 minutes observing two coworkers using a large saw. This worker neither noted unsafe actions nor conditions during saw use. The person completing the STOP™ card added observation-based comments – "waited for saw to stop before entering OMAG," and "moved sawblade out of way to measure panel." (Field Note, F18NL-10)*

This program also enabled workers to pause production when hazardous conditions were identified.

> *…From what I see now, they've changed their processes; again, I don't know what their processes were before, but they've changed they're processes around safety. It's the same thing about changing around quality. They have quality stop checks, and you have safety stop checks. I think it's just the way we do business. Again, that probably wasn't the case ten years ago, and they didn't have those processes, but from everything that I*

see, I never hear 'you need to stop work on that panel, because of this.' It's never brought up. (Interview, Group, I6GL-79)

I have seen people use the safety class to ID and stop safety issues from happening. (CIR, Organization, S20IL)

…And, if there's a serious safety concern, we just stop. We're going to shut everything down, and we're going to make sure it's done right before we do it. A lot of companies don't do that. (Interview, Group, I1GL-130)

However, despite the company's requirement to complete a monthly STOP™ card, audit evidence

shows that some employees failed to complete this task.

All but three departments – Machining, Fabrication, and Bonding - completed 100% of STOP™ cards and training requirements. (Field Note, F18NL-13)

2.   Safety Committee Meetings

Beginning in August 2013, according to documents, Safety Committee Meetings occurred

monthly.

The company conducted Safety Committee meetings every month from August 2013 through January 2018. Each month throughout this period, a meeting agenda was prepared, and meeting notes were recorded. Documents show that six to ten safety-related issues were addressed each month along with a discussion of near misses, hazardous conditions, unsafe behaviors, and new items. (Field Note, F18NL-15)

Safety Committee:
- *Will meet a minimum of once per month (Document, Private, D1NL-103)*

Meetings were agenda-driven and used to surface safety issues and to make decisions to correct

hazards.

As far as having those groups in there and making those decisions, if you look at our Safety Committee meetings or the agenda, a lot of it is employee-brought up stuff. (Interview, Group, I1GL-100)

51. Employees are involved in organizational decision making in regard to safety and health policy.	*2*
Comments: Items 51-53 all occur though (sic) the safety committee.	
52. Employees are involved in organizational decision making in regard to the allocation of safety and health resources.	*2*
Comments:	
53. Employees are involved in organizational decision making in regard to safety and health training.	*2*
Comments:	

Attendance was taken at Safety Committee meetings, and only managers and executives participated.

> *There's also safety meetings – what they've discussed, what they've gone through, who was involved, who was there. They have, like, the sign-in sheets. (Interview, Group, I6GL-89)*

> *Safety Committee members were managers and executives. (Field Note, F18NL-15)*

> *And, there's things that are bigger than me and my bosses, things that are bigger than the safety group, and that's when you take it to the (Safety) Committee, because you have decision-makers there that are a little higher up. You have vice presidents and CEOs and the president sitting in there saying, 'this is what we have to do, and how we've got to do it, and that's where we can actually get,' by looking at trends and near misses and speaking about incidents. (Interview, Group, I1GL-100)*

Meeting notes were also recorded.

19. An effective procedure for tracking hazard correction is in place.	2
Comments: Hazard correction tracking is done though (sic) safety committee meeting minutes.	

Even though participation by organization and group-level subjects, individual-level employees were

uncertain about the conduct of Safety Committee meetings.

> *I'm pretty sure they do (have an active Safety Committee). Used to hear about the minutes of it, but I haven't heard for a while, but I'm sure they do. They take it pretty serious. (Interview, Individual, I8IL-22)*

> *We don't really have committees, and if we do have committee, I don't know about them. (Interview, Individual, I2IL-54)*

3.   Job Safety Analysis

The conduct of Job Safety Analysis (JSA) continued under the company's new ownership,

and in 2015, a uniform JSA process was established.

> *In addition to monthly STOP™ cards, employees also fill out a daily job hazard analysis (JHA) card on a task of their choosing. The JHAs and STOP™ cards help to keep safety on the forefront for all [company] employees. (Document, Public, D85NL-16)*

> *And [Safety Manager] really came up with the JSA thing, because the JSA really ties in to our weekly safety tailgate meetings. So, everybody's doing much better on those – I've seen that. (Interview, Individual, I2IL-54)*

> *It is also planned to standardize JSAs, toolbox talks, and STOP™ cards the way we perform them in the shop. Completion is scheduled for September 30th, 2015 (Document, Private, D35NL-7)*

Multiple sources stated that shop floor employees were required to perform a 5-minute Job Safety

Analysis to examine the hazards of a work task and to identify controls.

> *Another thing in addition to that is a daily – I don't know if you could call it a memo or information sheet called Job Safety Analysis. So, basically what that does is it looks at the task that is about to be undertaken – that they're about to do, and they analyze it and look at what could go wrong and do preemptive analysis that would allow them to avoid anything that could go wrong by planning it in advance. (Interview, Individual, I7IL-77)*

> *Basically, it's to fill out. If you do one type of activity, then you list the steps that it takes to achieve that activity regardless of what it is. If I do a color test, I have to go get the sample, I've got to set the sample up for the test, then test it, and then I record it, things like that. So, then you take those steps, and go through and assign your potential hazards. Like when I go get the sample, trips and falls are the biggest hazards. Every-everything - most things that I do with color, I use the hot glue gun, and I've burned myself pretty good a couple of times with the hot glue gun. Like those are the types of hazards that we put on. And then, ah, the last column is what you would do individually to make sure that you try to avoid those hazards. (Interview, Individual, I2IL-21)*

JSAs were completed each morning to get workers thinking about safety.

> *So, with the JSAs, you got to think about it at least once a day. You can't just put your blinders on. You got to think about safety at least once a day, even if you're writing down the same old thing that you do day-in and day-out. Now you're focusing on what could happen, how we're going to prevent it, blah, blah, blah, blah, blah. (Interview, Group, I1GL-71)*

> *The fact that safety is a major part of our job. We are always reminded by filling out JSA's every day … (CIR, Individual, S11IL)*

> *I think safety awareness was enhanced when we began to fill out JSA's, for projects … It created awareness of hazards before a specific task was performed. (CIR, Individual, S22IL)*

3. Effective surveillance of establishment hazard controls is confidential.	*3*
Comments: In addition to safety audits each employee fills out a STOP (Safety Training Observation Program) card on a monthly basis. Each employee is also returned to fill out a JHA on a task of their choosing on a daily basis.	

(Document, Private, D6NL-3)

4.   Near Miss Reporting

According to multiple sources, near miss reporting was valued as an early indicator of

potential accidents.

So, like when we have a problem – out in our tool prep area - working on those big tall tools, you know, we had a person almost fall. And we created the near miss. When we created the near miss, it got a lot of attention. (Interview, Organization, I9OL-216)

We wanted near miss reporting, because if we report a near miss, it means the accident didn't happen. (Interview, Organization, I9OL-90)

If anybody reports a near miss, we do near misses here kind of different, because we report anything. I've talked to [Safety Manager] about what exactly is a near miss. We report anything that we see that is unsafe. So, I don't know if that really is a near miss. (Interview, Individual, I2IL-58)

Near miss reporting is another big thing. Now that we're talking, it's coming to the front of my mind. Encouraging near miss reports, and it doesn't mean somebody had to get hurt, and it doesn't mean that there was almost an accident, it means that there was an observation made. And, it was brought to everybody's attention that 'hey, something could have happened.' One person saw it - nobody else saw it, but it still is... 'hey, we're going to report this to the group'. We're going to report this to the Safety Manager and he'll address it. Maybe it spurs an even deeper change. It spurs new equipment purchases or discussion of new PPE, things like that. (Interview, Group, I3GL-56)

Near miss occurrences were shared at monthly Safety Committee Meetings, and near misses were

listed in the Safety Meeting notes.

NEAR MISS
1) *Maintenance employee failed to lock out circuit breaker in Tool Prep almost resulting in electrocution while working on OMAG area shop light.*
2) *Crane wire snagged tie off bars over tunnel placed in the Finishing Area & almost flipped tie off bar.*
3) *Visitor with open toed shoes on [the company] shop floor*
4) *Finishing employee fainted near tunnel placed in gantry #2 area. Rushed to ER*

(Document, Private, D13NL-18)

Near Miss
1) *Bonding Employee running planner with no face shield*
2) *CNC Employees inside Omag enclosure while spindle was turning*
3) *Forklift carrying wooden tool almost lost load & hit car in street between buildings*
4) *Forklift carrying steel tool lost load after hitting holes in [company] parking lot*

(Document, Private, D25NL-10)

5.   Accident and Incident Investigation

In 2013, one document from OSHA Onsite consultants identified an improvement

opportunity related to incident investigation.

10. *Incidents are investigated for root causes.*	*1*
Comments: Adding incident investigations has become a new focus for the safety committee.	

(Document, Private, D81NL-10)

One year later, sources stated that accident and incident investigations had become an important

safety activity – an activity codified in the company's Safety Manual and addressed through the

Safety Committee.

> *New Items*
> 1) *Ensure that responsible personnel are collecting MSDS for records.*
> 2) *Air regulators for staple guns*
> 3) *Casting Mezzanine Floor*
> 4) *SHARP Form 33-*
>   · *Accidents are being investigated for root cause- [Maintenance Supervisor]*
>   · *Incidents are investigated for root cause- [Maintenance Supervisor]*
>   · *Supervisors receive training that covers the supervisory aspects of their safety & health*
>   *responsibilities- All*
>
> <div align="right">(Document, Private, D17NL-16)</div>

After accidents occurred, employees and managers collected information about the event to identify

causative factors.

> *So, they investigated the accidents - things like people getting cut or having things fall in their eyes. What they*
> *did was they investigated these events in order to prevent – figure out ways to prevent - other accidents.*
> *(Interview, Individual, I7IL-28)*

6. *Accidents are investigated for root causes.*	3
Comments: Employees fill out accident investigation forms. These forms are reviewed by their supervisors and then by [company's] Safety Director [redacted name]. [Safety Director] coaches the employees and supervisor if the investigation is not thorough enough. Employees and supervisors receive training on how to conduct root cause investigations. Results from accident investigations are reviewed at Monday Morning Tool Box Talks.	

<div align="right">(Document, Private, D6NL-6)</div>

Incidents, too, were investigated in a similar manner.

10. **Incidents are investigated for root causes.*	3
Comments: Incidents are investigated in the same manner as accidents.	

<div align="right">(Document, Private, D6NL-10)</div>

> *Anyhow, [Safety Manager] was gone for three days, and they had an incident. Like I said, nobody was hurt,*
> *but there was $10,000 in property damage. Ten thousand dollars in [product] was damaged due to a forklift*
> *accident. The guy dropped a load of [product]. So, when [Safety Manager] got back there was the natural,*
> *like obviously, we've got to investigate it. Even though there's not an injury we're still going to investigate it,*
> *because [Safety Manager] strongly believe(s) that every accident or every incident, whether it results in*
> *accident, near miss or anything is a flaw in the system. (Interview, Group, I1GL-141)*

6.   Other Safety Activities

After 2013, the company also implemented an increasing variety of safety activities, including

the 6S procedure, weekly meetings, wellness initiatives, and industrial hygiene monitoring. The 6S

procedure was used to maintain housekeeping and OSHA code compliance.

> *…and they go through an introduction to 6S, because 6S is how we sustain our walking and working surfaces, our shop cleanliness, how we don't' block electrical panels or fire extinguishers, or things like that. (Interview, Group, I1GL-156)*

> *We try to keep everything as clean as possible, picking up our things—for example, hoses—so we don't trip on them. This way we protect ourselves from accidents. (CIR, Individual, S9IL)*

15. Housekeeping is properly maintained.	3
Comments: Housekeeping throughout the facility was excellent. Overall housekeeping is often a covariant of safety and health because many of the organizational factors that determine good housekeeping are the same factors that results in safety and health performance.	

(Document, Private, D82NL-15)

Each department conducted weekly safety meetings to discuss safety topics.

> *And, we do a weekly talk; I can't think of what it's titled, but they go around to the different departments, and each one is different, depending on what [Safety Manager] has seen, or what he thinks needs to be discussed. He also follows… But it's like a one-sheet, and you read through it, and it basically talks about different safety items, whether it's PPE, or reaching for something on a top shelf, or just things that you're seeing. So, you read through that, and then you sign it. So, there's paperwork behind it that shows that we're doing those weekly trainings for each department. … Yes, I believe at the shop level - they do a mixture. I'm not quite sure on that one. Some of them are just shop floor talks, and then they do, like, the papers. I know it goes through the whole front office. (Interview, Group, I6GL-89)*

> *At [company], efforts to promote safety occur on an ongoing basis and include daily reminders designed to increase hazard awareness and weekly meetings to go over safety topics. That's not to mention additional meetings, presentations and training courses, [Safety Manager] says. (Document, Public, D80NL-21)*

In 2016 and 2017, according to one interview subject, the company pursued workplace wellness.

> *We do a health week. We did a health week in 2017, and we're planning one in 2018. That was one of great things we did in 2016 and in 2017, and we're planning 2018 - it was a great success. We've made a little competition out of it. We've gotten things from local vendors. You know, we got one of the athletic clubs to come here and give us a great deal. And, we'll sign employees up, and we'll do it through payroll, and they can attend. And, then they can get into programs, and as a company, we can get into the programs. We're looking into different things along those lines. That's helping tremendously. (Interview, Organization, I9OL-190)*

Documents show that the company measured the presence of health hazards, such as chemical

vapors and noise, as early as 2013.

> *(The company made) use of the worker's compensation carrier, Pinnacle, for noise and chemical monitoring, and use of their incident investigation form for post-accident data collection (Field Note, F1NL-35)*

> *Air Monitoring: All parties involved agree that [named chemical] air monitoring has been handled successfully. This brings us to the issue of CO monitoring. It was agreed that we will look into a CO monitoring sensor for casting & begin monitoring with the hand held monitor on the shop floor to get a baseline measurement. We will proceed or not based on these readings on the shop floor- [Process Control Manager, Maintenance and Tooling Manager] (Document, Private, D12NL-13)*

> *[Safety Manager] is also bringing in an Industrial Hygienist on Wednesday at 7am to test MMA levels in the casting department due to high passive sampler readings. Per [Safety Manager] (Document, Private, D31NL-4)*

By 2017, OSHA Onsite consultants considered the company's monitoring to be thorough and

effective.

9. Expert hazard analysis is performed.	*3*
Comments: [Company] has an extensive air and noise monitoring program. The company has purchased IH monitoring equipment to use in-house and also tracks employee exposure to [named chemical] with badge monitoring. Monitoring results show that the engineering controls in place are effective at keeping employee exposure levels below the Permissible Exposure Level (PELs).	

(Document, Private, D6NL-9)

7.   Core Processes Construct: Reward-Discipline

The company's reward and discipline programs were mentioned less frequently than other

core processes; however, according to multiple sources, both, especially the reward program, played

pivotal roles in the company's achievement of safety excellence. While most quotations highlighted

the influential role of reward and discipline, a few quotations diverged.

a.   Reward Program

According to a host of multi-source and multi-unit data, the company celebrated safety

successes. Incentives led employees to pay attention to safety and rewarded workers for acting

safely.

Incentives for safe practices 2014? Many employees care about safety but do not actively think of safe practices without the incentive (what's in it for me). (CIR, Group, S4GL-4)

The revamped Safety Program and the incentives that gave employees something to work for. 2014 It gives employees something to work for and a reward for being safe. … (CIR, Individual, S24IL)

One interview subject credited incentive with sustaining safety excellence.

Well, I probably mentioned [specific actions that the company has taken to sustain or maintain safety and health improvements] already – the safety lunches, the incentive program. I'm not sure, I know they're not… You know, something else that I didn't mention is safety audits. [Safety Manager] does safety audits, and we do see those scores, and we're notified when there are problems in an area or department. Sustain and maintain – those all come from audits and daily discussions and incentive programs. (Interview, Group, I3GL-118)

1.   Safety Lunches

Under former leadership, safety lunches were used to incentivize safe work habits. Lunches

were held, either monthly or quarterly, if no accidents occurred.

Our old safety incentive program was -and I know those are bad words too, especially if you're basing them off of your lagging indicators, they're definitely bad in the eyes of OSHA - and ours was basically, 'if nobody gets hurt this month, we're having pizza at the end of the month,' which wasn't great, because when somebody got hurt, someone said 'oh, there goes our pizza.' Then, the accidents would pile up on top of that, you know after somebody got hurt. (Interview, Group, I1GL-66)

Um, we do quarterly lunches, for… If we have no incidents that quarter, we do that. … this is for everyone. This is companywide. Yeah, so if we do a quarter with no incidents or accidents, then [company] does a lunch for the company. They do that every quarter. Every year, right before Christmas, we get safety bonuses. (Interview, Individual, I2IL-130)

They do have safety lunches. We go a month without safety (problems) - they buy lunch for the whole company, and I think a lot of people like it. A lot of people don't care, because they don't eat; they'll smoke their lunch. (Interview, Group, I3GL-91)

Lunches continued under the company's new owner, and they were contingent on the absences of

accidents and injuries. The first documented safety lunches occurred in August 2013.

Near Miss:
One near miss incident involving a walking cylinder & a QC employee was identified. A review if the procedure & training given to new QC employees on this procedure is advised.
If we make it through Saturday with no reportable accidents then we are eligible for a safety lunch. [Safety Lead] will evaluate upon our return on Tuesday, and give [named employee] the go ahead to order said safety lunch. (Document, Private, D12NL-16)

Accidents

No reportable accidents for the month of December. [Safety Lead] & [Purchasing Manager] will schedule Safety Lunch. (Document, Private, D16NL-22)

Evidence shows that safety lunches were held in 2015 and on special occasions, such as the

company's receipt of OSHA SHARP certification.

2) Safety Incentive Program- STOP Safety cards are up. Safety Lunch was a success. [President] suggested calling the lunch an Employee Appreciation Lunch next time. (Document, Private, D32NL-3)

We have the SHARPS (OSHA SHARP certification), which is huge for us. We had a celebratory lunch for that, too. I think that just goes along with the bonuses and everything to recognize us. I think that's the major impact that we feel as employees, to put it that way. ...fewer people hurt. (Interview, Individual I2IL-144)

By 2017, when incentive funding had been significantly reduced and there were fewer opportunities

to reward workers, safety lunches were revived. Celebrations, though, were not tied to the absence

of accidents; they were tied to intermediate performance.

Yeah, you know, we kind of pushed back into the executive group, too. We went from here to down there - we need something. We fought back for certain things, and then we reinstituted the lunches. Now they're not...they're not 'let's buy pizzas.' [Safety Manager] and [Director of Quality and Safety] both agreed that pizzas are not a good avenue anymore. So, we do something very different when we have lunches. It's either barbeque, or we have a lot of Hispanic group out here, and they love to cook. They love to do things, so we buy all the meats and the foods, and they do all the cooking for a burrito day or a taco day. You know, I mean, we get some pretty extensive tacos! But, so we're driving their involvement with it, as well. 'You earned this, so now you get a day off to cook, and do all this stuff, and serve the meal.' There's so many that sign up and jump onto that. It's not that they're getting out of work, it's that they're doing something that they like. We use that as another mechanism, and we keep moving forward from there. (Interview, Organization, II9OL-124, 128)

When we do these lunches, [Director of Quality and Safety] make(s) sure they get the recognition. So, [he] make(s) sure it's like '[redacted name] and his guys did all this cooking,' you guys come down. And, we make the posters, and we post them up, and we say, '[redacted name's] cooking.' I think that's part of it. The other part is it's something they like to do - I mean they really do. The Hispanic community here just loves cooking. I think that's probably equal in a lot of places, but these guys really get into it. I mean they really get into it! … Because we do have everybody sit together. It's not take your lunch and go somewhere. 'No, here's what we're serving, here's where we're eating, sit down,' you know. Forced team work, but it is a team environment, so I think that's another part of it. … Usually, [executives] do come down. [Director of Quality and Safety] try to make sure they get there. [Safety Manager] - either [Safety Manager] or [Director of Quality and Safety] will make rounds upstairs to tell them 'hey, the food's ready downstairs.' So, they come down. They're typically there. (Interview, Organization, I9OL-128)

2.   Safety Incentive Program

In 2014, the company began building a more comprehensive Safety Incentive Program aside from safety lunches. One interview subject recalled that the Plant Manager's interest in incentives.

> *During that time, our previous Plant Manager had come to [Safety Manager] in a safety meeting, and said he heard the word "leading indicator." It's a buzz word in the industry, as you are aware. That was about the time when the Campbell Institute [a faction of the National Safety Council that published information about leading indicators] put out the first White Paper. They didn't know what one was, but they said 'well, it should follow this.' So, as he heard that, he said, 'I want you to write me a safety incentive program.' … So, he said, 'write me a safety incentive program that's based on leading indicators'. (Interview, Group, I1GL-66)*

Another recalled the instrumental role of the Safety Committee and executives.

> *… After the first Safety Committee (meeting), it took us probably another five months – four or five months. So, about a year's worth of time now, to even get to a point where we want a safety incentive system, because, we would have safety lunches. It was, like, just a purpose where we're going to spend money and go have dinner – go have lunch. Neither [Safety Manager] nor [Director of Quality and Safety] liked that, so [they] adjusted that. Then, that was the next step that the executive group had to get over, because it was all or nothing. They couldn't put it in perspective. You had a safety injury, no safety lunch. You had no injuries, safety lunch. It's like, 'no, that's not how it works.' That was when it really became evident that they really started getting involved, ok, and, we built the incentive system. (Interview, Organization, I9OL-69)*

In mid-2014, according to several sources, the Safety Manager and a safety sub-committee began crafting a proactive, points-based program that was grounded in the conduct of already-implemented safety activities.

> *3) Safety Incentive Programs- … [Safety Manager] is looking into criteria for an approved safety incentive program focused on reporting, and industrial hygiene instead of result driven safety programs that are being targeted by government auditors. (Document, Private, D21NL-7)*

> *4) Safety Incentive Program- [Safety Manager] explained to the committee that we can move ahead with a safety incentive program, but it must take the place of an existing incentive program instead of being in addition to our existing program because of the cost of maintaining it. A sub-committee has been formed & will meet on September 16th to discuss the incentives, and will report back to the committee at the next safety Meeting. – [Safety Manager, Plant Manager, Director of Human Resources, Director of Quality and Safety] (Document, Private, D24NL-5)*

> *[Safety Manager] sat down in front of [his] computer and thought about what [he] need(ed) these guys to do. At that time, we had just started introducing JSAs. The tail-gate meetings were in progress. The STOP™ cards were in progress. We were introducing the JSAs, and [Safety Manager] really kind of sat down and thought, what do(es) [Safety Manager] need these guys to do. So, [we] want them to fill out STOP™ cards. [We] want them to do JSAs. [We] want them to do a weekly Toolbox Talks. [We] need them reporting near misses...things like that. So, [Safety Manager] wrote our incentive program, which actually now closely…. Our incentive program really is a reflection of our current safety management system, as far as employee participation goes. … So, what we're focusing on is putting the work in upfront. It was decided that*

every employee has to do at least one JSA a day in every department. Every employee has to participate in the Toolbox Talks weekly; we'd like them to be done on Monday. I'll tell you the reason behind that in a minute. And, they've got to do one STOP™ card a month. So, now they have a daily, weekly, and monthly responsibility. What we're trying to do is put safety in front of them at least once a day, every day. All we are doing is raising hazard awareness. (Interview, Group, I1GL-67, 69)

We wanted to take a proactive approach, not reactive; it had to be proactive. So, if you are doing JSAs, and if you are doing near misses, and if you doing STOP™ cards, we know that you're paying attention to it. If you are reporting something happened, or you identified a safety concern in another area - how, JSAs or STOP™ cards - we knew you were focused on it … We drove it a whole different direction, and then we broke it into functional areas. Instead of as a company, 'you do this, you get a lunch,' we broke it up into functional areas. And, we broke it up by quarter, so any department had four chances a year to try and win the incentive. … So, we put a point value to it, so we could make it objective not subjective. Because we didn't want us going 'yeah, we like this, no we don't.' No - it's a point system, so we built a point system for it. So, you got points for certain things, right. The group with the most points at the end of the quarter is the winner. You were able to lose points too. (Interview, Organization, I9OL-94)

For the remainder of 2014, company leaders and managers finalized the details of the reward

program, including emphasis on results, not paperwork.

3) Safety Incentive Program- A subcommittee made up of [Director of Human Resources, Plant Manager, Director of Quality and Safety] and [Safety Manager] met twice in the month of September to complete the criteria for the new safety incentive program. [Safety Manager] has provided training materials to the supervisors for JSAs which will be the final piece of the criteria for the safety incentive program. JSAs will be implemented on November 1st, and the new safety incentive program will take effect January 1st of 2015. There will be an all employee meeting to kick off the safety incentive program in January. (Document, Private, D25NL-4)

3) Safety Incentive Program- The subcommittee for the safety incentive program met in October. The guidelines, and tracking system for the safety incentive program are almost complete, but there are a few more details that need to be addressed before it is presented to the committee. The subcommittee will meet on December 2nd, and will present the incentive program to the committee at the next safety meeting- [Safety Manager, Director of Quality and Safety, Plant Manager, Director of Human Resources] (Document, Private, D26NL-4)

… We fought [incentive program] out in the Safety Committee for months – most of 2014, because it was change. They didn't want to create a reward system based on safety paperwork. They really wanted it off results; they didn't want people getting hurt. You know, they were still looking at lagging indicators, because there's that old way of thinking. So, there was a lot of salesmanship, 'well, if we're doing these up front, we're taking care of the accidents up front – we're being proactive.' So, we tried it. As the safety team tried to take a more proactive stance, some of the management followed along. You know we kind of had to sell it all the way up the line, to where finally, I think it was November...December...early December of 2014, we rolled it out to the executive managers. We told them this is what we're going to do, is that OK? (Interview, Group, I1GL-67)

The incentive program was implemented in January 2015.

2) Safety Incentive Program- The program is underway. [Safety Manager] held an all employee meeting on Friday, January 9th to roll out the program to the employees, and continues to track its progress. (Document, Private, D28NL-4)

32. Organizational policies promote the performance of safety and health responsibilities.	3
Comments: [Company] has an incentive program in place tied to positive indicators for H&S performance.	

(Document, Private, D82NL-32)

The program encouraged inter-departmental competition.

> *…. we broke [incentive program] up into functional areas (specific departments). And, we broke it up by quarter, so any department had four chances a year to try and win the incentive. We had accounting. We had engineering. We had operations broken into all the different departments, so finishing, quality was in there. So, we broke them into those functional areas. I think we had twelve – twelve or fourteen, something like that – functional areas, and they were scored on all these things. (Interview, Organization, I9OL-94)*

> *The next piece of the puzzle we did is we pitted every department against each other. So, now your middle management has safety responsibility, because they are the hardest sell when you're trying to sell safety and health. (Interview, Group, I1GL-74)*

Even though the incentive program largely centered on the objective conduct of safety activities

each quarter, accidents mattered, according to one source.

> *So, you got points for certain things, right. The group with the most points at the end of the quarter is the winner. You were able to lose points too. So, if you had an accident, yeah, you lost points. If you had a certain level of accident, you're out of the running all together - you don't even get a lunch or nothing now. And, we'll make sure you sit over there, while everybody else is here. So, we went that route as well. (Interview, Organization, I9OL-90, 94)*

Another source, in a diverging view, mentioned that the absence of injuries was not rewarded.

32. Organizational policies promote the performance of safety and health responsibilities.	3
Comments: Safety is included in employee annual reviews. Employees are also given positive feedback for participation in the STOP safety program, near miss reporting, and the completion of JHAs. Employees are NOT rewarded for the absence of injuries or illnesses. [Safety Manager] is very aware of the potential negative consequences associated with incentive projects tied to injury and illness rates.	

(Document, Private, D6NL-32)

Participation in safety activities earned points, and points earned prizes.

> *I think it was motivating. I mean, the first month we had a problem; it was, like, 'I don't want to do all that.' 'Why not?' 'It takes too long.' 'It takes you 20 seconds – you have breaks, you have start time, you have punch in time.' 'You're given this amount of time at different levels, it takes you 20 seconds to fill this report out.' 'Fill it out, turn it in -that's it.' 'You don't do it, you lose points.' 'You lose points, you don't get*

included.' 'If you want something, go for it.' So, we made it a competition. I mean we - 2015 – we had a $12,000 budget for the incentive awards. It was very hefty. [Director of Quality and Safety] made use of it. [He] made things that… We did things that people wanted. You know, the first quarter, we actually had a tie – a three-way tie, so we had to come up with a tie-breaker. Second quarter was a two-way tie. One of them was the guys who won the first quarter, but they didn't win the second quarter, and it was different third and fourth. (Interview, Organization, I9OL-98)

Early on, significant prizes, such as trips for all department workers, were awarded to winners, who

sustained quarterly safety performance.

You know, we were giving away trips to like…it only came quarterly, but one department… One quarter, we gave away a trip to [redacted city] – two tickets to the hot springs, a gas card to get up there, $100.00 to spend on a meal when you were there, and it was for everybody in the department. (Interview, Group, I1GL-77)

Following mixed participation in 2015 and incentive funding cuts, the continuance of the 2016

incentive program was in question. Eventually, a revamped program continued with lesser awards,

such as gift cards and clothing.

2) Safety Incentive Program- the Safety Incentive Program Sub-Committee met in July (2015), and chose Loki hoodies as a prize. The dollar amount of the prize was reduced to accommodate a lunch for the employees during the 3rd quarter give away as there has been a lowered moral due to the fact the only one department can win each quarter. A restructure of the of the safety incentive program is underway for 2016. (Document, Private, D35NL-3)

2) Safety Incentive Program- [Safety Manager] proposed that we suspend the safety incentive program for due to the recent financial situation. The committee decided not to suspend the program due to its financial benefits on insurance rates & medical expenses. [Safety Manager] to schedule a meeting to determine 2016 Q1 prize. (Document, Private, D41NL-3)

So, if this wasn't quite working right, we adjusted it, and it went new in 2016. When we went from 2016 to 2017, we didn't make any changes; we kept it the same way it was. No, that's not true. 2016 to 2017 we made changes - 2017 to 2018 we did not make changes. (Interview, Organization, I9OL-98)

2) Safety Incentive Program- The safety incentive program will be altered slightly with a monthly traveling trophy that will be awarded to the department that wins each month. The criteria of the incentive program will remain unchanged. The Q4 prize will be a trip to [redacted city] that includes lodging, [redacted city] hot springs pool passes, and a gift card for the trip. (Document, Private, D39NL-3)

Adjustments were also made to deter repeat winning.

2) Safety Incentive Program- Quarter 1 Winner: Tooling. There was a tie between Tooling and Commercial, which was solved through a department test as the tie breaker. Per [Safety Manager] All staff should take the test was suggested by [President]. Per [President] (Document, Private, D31NL-3)

Then, when we got to 2016, we adjusted a little, because we didn't want the tie-breakers, and we didn't want one group winning quarter after quarter. We wanted to make sure we could spread it out, you know, so we did different things to try and adjust it. We adjusted the point levels, and we made a once-a-year adjustment. So, if this wasn't quite working right, we adjusted it, and it went new in 2016. (Interview, Organization, I9OL-98)

Again, in 2017, one executive source reported significant cuts to incentive funding, which led to lesser prizes. In a contradictory opinion, a group-level interview subject, perceived the company's strong incentive funding to sustain safety excellence.

So, the first year was $12,000, and then it went to $10,000, and we were good. And every year, I came in under. I only used 80% of the budget, and we had phenomenal things, and our growth was exponential. And then it was like, 'your budget is a $1,000 next year.' I'm kind of, like, '$1,000?' Right. Yeah. So, 2015 was $12,000, 2016 was $10,000, 2017 was $1,000. It's a very big shift. Um. We saw a little bit of a downturn. We still do hear from people, you know, 'why would I do all this for $35 gas?' – type of thing. But, fortunately, it was engrained, and it was a habit, so it wasn't a dramatic hit that the process took. I mean, you know, there was grumbling – rightfully so. I understand. (Interview, Organization, I9OL-114)

I think it's the incentive - the bonus structure. Knowing that that's there – that they haven't tried to cut it or get rid of it. Not only those being in place, but it's coming to the meeting and cheering on those employees. We have the safety meetings, and having an executive team member there, and backing that, and showing the support that goes into those. (Interview, Group, I6GL-59)

3.   Annual Safety Bonus

The company offered an annual safety bonus as a third reward. At the end of the calendar year, a financial safety bonus was awarded to qualifying workers.

And another thing, there's safety awards handed out at the end of the year, so people can get $100 or a couple hundred dollars in incentives for being well-behaved. (Interview, Organization, I5OL-65)

We have programs, like, if we go a quarter without safety problems, they get a bonus – or is it a year? I'm not part of that program, so... But, I think that was something they started, almost like bribing people to become part of that culture – to be part of that thing. And now they pride themselves on people that have been years and years and years without an accident. They get these bonuses. It's exciting and it's fun, and it's something that incorporates everyone in. (Interview, Group, I6GL-45)

The bonus was based on years of service and the absence of lost-time injuries.

Every year, right before Christmas, we get safety bonuses. … It – I think – it is for your years of service, and then that changes, if you have an incident. So, if you have something happen to you, and you got hurt, then you're reduced down in your years of service starting with that incident. So, maybe its years without an

accident. … I think it varies from year to year, not so much person to person. (Interview, Individual, I2IL-130)

Safety – well, they've got their safety bonus at the end of the year. You get - it was more, it went down for some reason, but for 24 years you get $650. Twenty-four, I think, is the same as twenty. They had it at $750, I think they lowered it to $650. I'm the only one now that gets it. It was me and [redacted name] every year, and finally somebody did something where he got cut – wasn't necessarily his fault. They left a razor blade out, and he was coming down, and he didn't know it, and he lost his safety bonus. (Interview, Individual, I8IL-93)

32. Organizational policies promote the performance of safety and health responsibilities.	*2*
Comments: Safety is included in annual reviews and has the potential to affect end of year bonus.	

(Document, Private, D81NL-32)

b.   Discipline Program

Two dozen quotations about the company's disciplinary process were mentioned by documents and organization- and group-level sources. There were no historic references to safety-related discipline; the earliest evidence appeared in the company's 2014 Safety Manual.

Eventually, you just make [progressive discipline] something you have to do. At that point, it's like having an unguarded machine. Having an unsafe employee or uncooperative employee is just like having an unguarded machine. You own that hazard. And, eventually you have to take steps to correct that employee, because they are causing an unsafe condition or known hazard to everyone around them…. (Interview, Group, I1GL-116)

Disciplinary Procedures
Employees who fail to comply with safety rules will be subject to disciplinary action up to and including dismissal. Disciplinary procedures for safety violations are per the [company] Employee Handbook. (Document, Private, D1NL-145)

There were no details of the disciplinary program – just comments of its existence.

33. Organizational policies result in correction of non-performance of safety and health responsibilities.	*3*
Comments: A progressive disciplinary policy is in place.	

(Document, Private, D6NL-47)

Discipline ranged from verbal reprimand to written reprimand to dismissal.

You know, I'm sure there was some discipline. I was involved in one of them. I didn't, per se, do anything wrong, but an accident occurred, and part of looking at that accident and not repeating it was documenting it.

… Because, I've been written up two times, I think I gave you two, three examples. (Interview, Group, I3GL-89, 91)

We're very fortunate. We do have our nay-sayers; I'm not going to say we don't. In the beginning, to get them on board, it was tough. They weren't all on board right away. You really just had to educate them, and at a point you have to start looking at… At a point you have to start looking at progressive discipline. You just have to. I don't like the stick approach. (Individual, Group, I1GL-112)

Fortunately, we didn't have to [use progressive discipline] a lot. I mean, we've done that a couple of times in the past couple of years – more managers than employees. We've lost a couple of managers, because they wouldn't come in, and there's not a lot of companies that do that. (Interview, Group, I1GL-116)

4.   Core Processes Construct: Summary

More quotations pertained to core processes than any other construct. The majority were found in private documents followed by group-level interview transcripts. Of the five identified themes, three, specifically hazard controls, safety activities, and the reward-discipline program, played large roles in the company's achievement of low injury rates. TABLE XXXI summarizes the core processes construct.

Historically, hazards were reactively or poorly controlled. Multiple quotations conveyed new owners' and leaders' efforts to mitigate production and installation hazards using the control hierarchy – engineering (i.e., barriers, ventilation), administrative (i.e., signs, housekeeping, work practices) and personal protective (i.e., safety glasses, gloves, footwear) controls.

Numerous cross-source and cross-unit quotations also mentioned safety activities. Even though impactful activities, like the STOP™ Program and Safety Committee Meetings, began under the former owner, the variety and purpose of safety activities exponentially increased after the ownership transition; preventive safety initiatives were augmented by evaluative initiatives, such as accident investigation and near miss reporting.

In addition, rewards were used by former and new owners. However, in the past, safety lunches were tied to the absence of injuries and illnesses. The 2015 incentive system linked rewards to proactive safety behavior. Intermittent celebratory lunches continued. Despite the company's

shift toward positive behavior-based rewards, the annual safety bonus program was tied to injuries and illness. Those who sustained an OSHA recordable event were not rewarded. Very few quotations spoke of the use of discipline to entice safe behavior.

TABLE XXXI: CORE PROCESSES CONSTRUCT SUMMARY

Primary Sources	Private Documents, Interviews
Primary Units of Analysis	No Level, Group-Level
Prominent Themes	Hazard Controls, Safety Activities, Reward-Discipline

Summary of Prominent Themes	Hazard Controls	• All types of hazard controls were lacking under the former owner. Some uncontrolled hazards were cited as OSHA violations. • Engineering, work practice, and personal protective controls became abundant under the new owner. • Engineering devices, such as enclosures, barriers, guards, ambient lighting, and ventilation devices, stopped hazards at their source. • Signs, labels, housekeeping procedures, and alarms are examples of administrative or work practice modifications that rely on worker cooperation. • High-quality personal protective equipment was provided to all workers. Commonly used were hard hats, hearing protection, safety glasses, respirators, hand protectors, impervious clothing, lab coats, knee pads, safety boots, and fall protection harnesses.
	Safety Activities	• Safety activities were conducted under former and new owners; however, activities exponentially increased under new owners. • The STOP™ Program, Safety Committee Meetings, JSAs, near miss reporting, and accident/incident investigations,
	Reward-Discipline	• Safety incentives were used by former and new owners to encourage safe habits. • Historically, safety lunches were contingent on the absence of accidents. After 2014, safety lunches were intermittent. • Under new owners, a competitive, incentive program based on proactive conduct of safety activities was implemented in 2015. Generous rewards, such as trips and clothing, were replaced by lower-cost awards. The incentive program was modified to deter repeat winning and spur participation. • New owners awarded annual safety bonuses to injury-free workers. • A disciplinary process was used to reprimand, even terminate, workers who did not follow safety requirements.

H.	Work Unit Climate Construct

Defined for this study, work unit climate referred to the perceptions that employees in local work units had about occupational safety and health. Both quantitative and qualitative data characterized this construct.

A six-question, cross-sectional survey garnered categorical data about six work unit climate themes. Each question corresponded to one theme – 1) prioritizing safety and health, 2) taking safety shortcuts, 3) working together for safety, 4) informing unsafe employees, 5) feeling free to report safety concerns, and 6) learning safety. Four of 25 qualified respondents worked at the organization-level, seven at the group-level, and fourteen were employed in production.

Qualitatively, 83 major-coded quotations were extracted from narrative sources. These text segments, when sub-coded into seven themes, yielded 114 minor-coded quotations. Six qualitative themes directly aligned with the six quantitative themes. The seventh theme, peer competence, emerged from narrative. The largest number of quotations were in the *working together for safety* and *taking safety shortcuts* categories. The fewest quotations regarded learning safety and peer competence (Figure 20).

Figure 20: Work Unit Climate Construct, Percent of Quotations by Theme

| Priority | Shortcuts | Work Together | Told Unsafe | Report Concerns | New Learn | Competence |
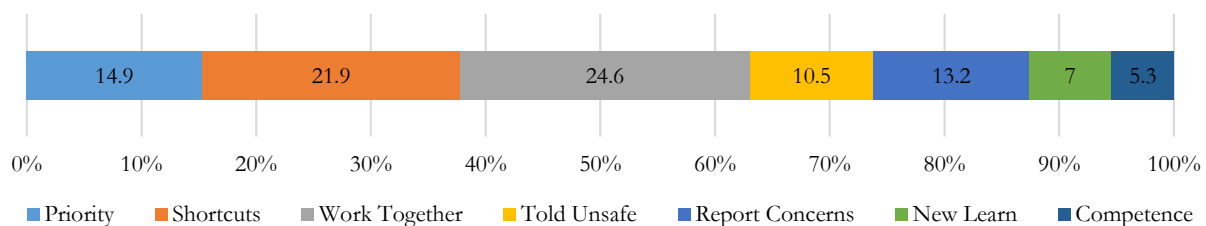
Qualitative work unit climate data were largely offered by individual- and group-level interview subjects. Very few quotations came from documents or organization-level workers (TABLE XXXII). Discussed next are the six themes that share qualitative and quantitative data.

TABLE XXXII: WORK UNIT CLIMATE CONSTRUCT, NUMBER OF SUB-CODED SEGMENTS BY SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	0	1	1	
Interviews	16	36	41	
Field Notes	0	0	0	3
Documents, Private				16
Documents, Public				0
Subtotal	16	37	42	19
Total	114			

1.   Work Unit Climate Construct: Management Priority of Safety and Health

a.   Quantitative Data

The first Work Unit Climate questionnaire item inquired about management's priority of safety and health. All organization-level subjects and 86% of group- and individual-level participants' perceived health and safety to *always* be a high management priority (Figure 21). *Always* was the mode response for all units of analysis. Conversely, one group-level subject, who perceived health and safety to *rarely* be a management propriety, noted his or her employment in an office.

252

One individual-level worker, for unknown reason, also believed safety and health to *rarely* be a high

management priority.

Figure 21: Percent Response, Management Priority of Safety and Health by Unit of Analysis
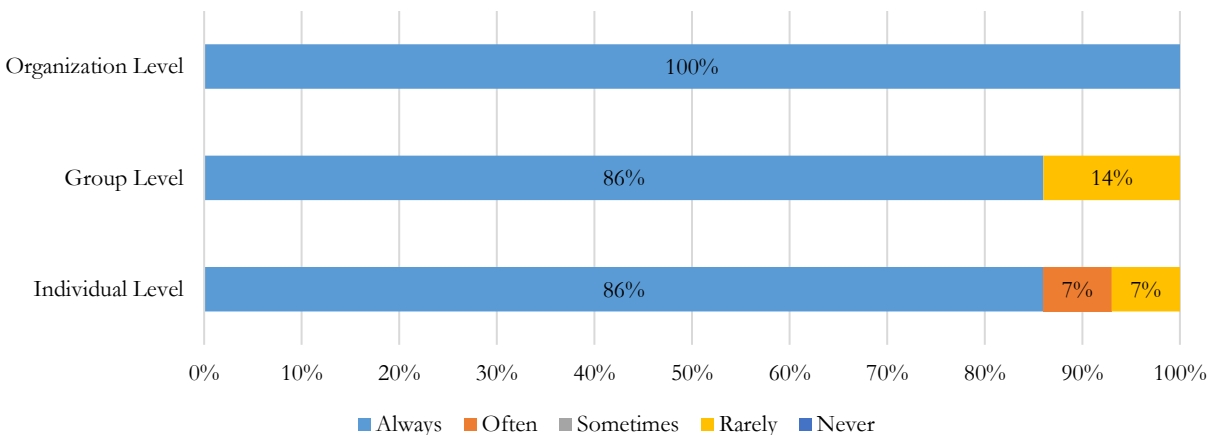
The independence of responses and units of analysis was tested with the Freeman-Halton

Extension of Fisher's Exact Test. This test is appropriate for categorical data, small sample sizes,

cells with zero counts, and R x C contingency tables (Freeman and Halton, 1951). The null

hypothesis postulated that there were no differences between the population proportions of

responses for each level. The alternate hypothesis posited that the level-specific population

proportions were different.

> H_O: There are no differences in the population proportion of responses at the organization-, group-, and individual-levels.

> H_A: There are differences in the population proportion of responses at the organization-, group-, and individual-levels.

When Freeman-Halton was applied to the 3x5 table of categorical responses for Question 1

(TABLE XXXIII), the null hypothesis failed to be rejected (P=1.0000. Fisher's exact test).

TABLE XXXIII: RESPONSE COUNT, MANAGEMENT PRIORITY OF SAFETY AND HEALTH BY UNIT OF ANALYSIS

Level	Count					
	Always	Often	Sometimes	Rarely	Never	Totals
Organization	4	0	0	0	0	4
Group	6	0	0	1	0	7
Individual	12	1	0	1	0	14
Total	*22*	*1*	*0*	*2*	*0*	*25*

b.   Qualitative Data

Organization-, group- and individual-level subjects offered quotations about management's priority of safety and health; no documents mentioned this theme.

As far back as 2006, employees, who felt coaxed to work unsafely, perceived that safety was either not a management priority or a shifting priority.

> *When I started here in 2006, it was scary. I want to say, my second day here, I watched my supervisor at the time break somebody's middle two fingers on his hand, and then told me – demanded - that I did the same thing that this guy was doing after they sent him off to the hospital, so we could get his job done. I told them 'no' and left the premises. I was called the next day. They asked me why I left premises – if I had quit, and I told them the story and asked them to look at my co-worker's hand. And I said, 'well, he wanted me to do exactly what the other guy was doing, and he told me if I didn't, I was fired, and so I left. (Interview, Group, I1GL-43)*

> *I think [new ownership] was a big part of it. It just took people out from under this microscope of one man picking the way things were being done. When on Monday it was this, but by Friday it was something totally different – safety is out the window – I'm more concerned about this. And the next week, safety's back on the table. The week after that, it's not on the table anymore. So, it's the whims of one person. (Interview, Group, I3GL-77)*

After the capital investment firm assumed ownership, safety and health became an increasing

priority for management. Early in the safety transition, though, production and safety were

conflicting priorities.

> *… Your middle management, until you've integrated everything and made it all a priority, then they have conflicting priorities. So, if you say 'well, you've got to do safety, but you've also got to get the [plastic] out of the door, then safety will lose out every time, because getting the [plastic] out the door is where the money comes from. Let's face it, money is the driver of business. It always will be. (Interview, Group, I1GL-77)*

> *Yeah, well they had to be sold. That's what we were fighting through when I said that we were fighting to… That was more just [Safety Manager], [Director of Quality and Safety], the quality manager at the time, the continuous improvement manager at the time – everybody that fell under what we call the quality group. We were selling these (safety) changes to the Safety Committee and using the Safety Committee as an outlet to disperse it through the rest of the employee body. (Interview, Group, I1GL-92)*

According to several sources, the Safety Manager's hire and actions embodied management's high

regard for safety and health.

> *We're in the welding shop, and we're like totally… That's our world out there - it's outside. There's always been safety. I think when it really took off was when [Safety Manager] stepped in. (Interview, Individual, I8IL-32)*

> *Um…only Human Resources (had safety oversight) ... The depth of their priority could change from day to week to month. But the creation of [Safety Manager] position... I don't know when that was, but I feel like it was in the 2012 – late 2011, 2012 era. Because then there was a couple of years … where it was a lot - a lot of safety, a lot of safety. So, 2013, 2014, 2015 was tons and tons of safety. (Interview, Group, I3GL-86)*

Employees quickly internalized the importance of safety, because managers talked about safety and

reminded workers to work safely.

> *So, they're always talking about safety. They are always telling us and reminding us about safety. Those of us who had been here longer, well we're just like 'yeah, didn't you tell us this two months ago?' 'We've heard this before.' But, the fact is there are new employees who need to hear this, and there are other employees that have been there long but need to be reminded. So, that's one thing that is done. (Interview, Individual, I7IL-95)*

> *[Manager's role was] … with keeping things safe, and making sure employees were working safe when I was on floor. Ah, just being there – being present, and making sure they're wearing PPE. We had a lot of chemicals that we worked with back in the casting area, so we had to wear Solvex® gloves and respirators and safety glasses and things like that - just making sure that people were protecting themselves. (Interview, Organization, I4OL-9)*

When hazardous work situations were identified, management made sure that corrections were

implemented, even when correction was challenging.

> *A good example is that machine out there – a QUV (an accelerated weathering tester). It's ultraviolet light, and obviously it's out in the middle of everything [points to new machine in a high bay area where others can walk by], so we had to make sure that we came up with the best way to keep that safe so that people just wouldn't go and be glaring into the lights. (Interview, Individual, I2IL-11)*

> *So, yeah, so the harness is an important example. That sort of in-house building talent or innovation is really important. It saves the company effort and time and money. For example, the bar that we use for the tunnel. Before, the bar was very small, and it didn't reach both sides. So, what happened is that a larger one was built, and it was adjustable to us; we could adjust it to meet our needs and requirements. (Interview, Individual, I7IL-83)*

> *I think back in the beginning, there was probably smoke in the welding shop, and they put in another fan and another vent. I think we started with® one, and we have three now, or we started with two and we ended up with three. (Interview, Individual, I8IL-61)*

In addition, management educated work unit staff about relevant safety topics, and ensured that

personal protective equipment was available.

> *We have welding curtains – a bunch of welding curtains that we take with us when we move around. … You always had them, but not like you do now. We've got a bunch now, and they're readily available. Before, we had one, and we were expected to make it work everywhere you went. (Interview, Individual, I8IL-61)*

> In work units, employees perceived safety to be a high priority when management walked

the shop floor, observed, and constructively reminded others to be safe.

> *… You know, [Safety Manager] is walking around. [Director of Quality and Safety] is walking around. The supervisors and managers are walking around. It's not necessarily… Here, there isn't that fear. Every time I've seen, I've actually been impressed, because there isn't that fear that comes around when talking about safety and what you're supposed to do. It's more of 'this is what you need to do, and if you don't know, then you ask' – it's questioning. The managers and supervisors, every time I've seen something, like, you wear glasses and you put them on top of your head – they say 'hey, your glasses are on top of your head and not on your face.' It's calling that out, and it's more of the culture than the fear. (Interview, Group, I6GL-40).*

Even the existence of disciplinary procedures was interpreted as evidence of safety's importance.

> *My only other thought would be manager participation – manager and supervisor participation and expectation through threats. You know, 'if you guys don't participate, if you don't do your STOP™ cards…'… JSAs – job safety analysis - had come into the mix … These were part of these repetitious, daily*

exercises that had to be done, and if they weren't done, there was penalties for it. (Interview, Group, I3GL-44)

However, amidst the apparent safety priority, more than one subject noted circumstances to the contrary. For example, during times of heightened production pressure or when safety was costly, safety seemed secondary.

Um…we've seen different things (challenges to the integrity of the safety program), and people have said, 'no, I'm not doing it that way.' You know, 'we're not going to do that.' 'You have two hours to…' 'Fine, I'll get it, but I'm not doing it that way.' So, I think they will get tremendous pushback, if it goes the wrong direction. If it goes...if it touches on people's ethics and morals, they're going to get a lot of pushback. (Interview, Organization, I9OL-146)

One of our garage doors - the spring broke, and the garage door was up. Have you ever seen a garage door fall when the spring breaks? It loses all tension, and then an 1800-pound garage door is going to fall 18 – 19 feet that we have in there, and it happened. … The pushback from the shop floor about that got them fixed. It wasn't what [Safety Manager] did, what [Director of Quality and Safety] did, what [Plant Manager] did. It was the guys on the shop floor standing down there on the truck wall when that thing came down – that were scrambling to get the hell out of the way.… We put a cost structure in place. We put a schedule in place. Here's what we've got to do. We have PMs that get done on them, but they're pretty spread out, so we adjusted all the PMs. We can't do them, because we have to have qualified people, so we have to have a third party do it. And, when the cost came in for that, 'no, we're not doing it.' (Interview, Organization, I9OL-146, 156)

The incentive program, too, highlighted differing degrees of safety priority among managers and work units. To increase their likelihood of winning rewards, some departments ensured that safety activities were performed, but others did not.

Well, there was an incentive...safety incentive program. … The same departments always won, because maybe they had a good manager that had a different stress on it. They had a greater volume of people in that department, and therefore were able to play the percentages and the odds and get higher participation versus departments with two people and three people. (Interview, Group, I3GL-91)

And eventually, (regarding safety incentive competition) some employees didn't care; obviously, they're not going to play along. So, what we had to do from that aspect, when we realized that some departments were killing it – you know they were winning quarter after quarter after quarter, and some department didn't want to play, (Interview, Group, I1GL-81)

c.   Work Unit Climate Construct: Management Priority of Safety and Health Summary

Quantitative data from employees at the organization-, group-, and individual-levels largely agreed that management placed high priority on workplace safety and health. From a qualitative

perspective, subjects from these three levels strongly supported this notion. Even though

quantitative responses by level were not statistically different, a small fraction of group- and

individual-level participants considered management priority of safety to be rare. A couple similar

quotations were voiced. Overall, qualitative and qualitative data aligned around the notion that

management usually, but not always, placed a high priority of workplace safety and health.

2.   Work Unit Climate Construct: Major Safety and Health Shortcuts

a.   Quantitative Data

The second survey question inquired about the frequency of major safety and health

shortcuts. Responses to this question were more diverse than responses to other questions. Three-

quarters of all organization-level respondents and 86% of group- and individual-level subjects stated

that major shortcuts were *rarely* or *never* taken. A portion of respondents at all levels – 14% to 25%,

though, acknowledged that major shortcuts had occurred. Some safety shortcuts were perceived by

one quarter of executive subjects, 14% of group- and individual-level subjects reported major

shortcutting *often* and *always*, respectively (Figure 22).

Figure 22: Percent Response, Major Safety and Health Shortcuts by Unit of Analysis
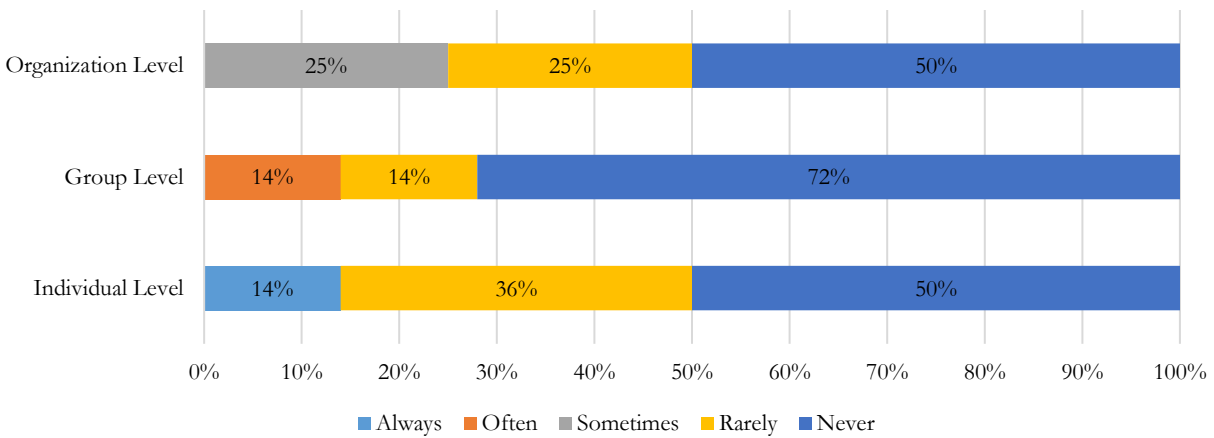
Survey responses for Question 2 are tabulated and displayed in TABLE XXXIV. The application of the Freeman-Halton Extension to categorical responses resulted in failure to reject the null hypothesis (P=0.3801, Fisher's exact test). This means that there were no detectable differences in the population proportions of responses between units of analysis.

TABLE XXXIV: MAJOR SAFETY AND HEALTH SHORTCUTS, RESPONSE COUNT BY UNIT OF ANALYSIS

Level	Count					
	Always	Often	Sometimes	Rarely	Never	Totals
Organization	0	0	1	1	2	4
Group	0	1	0	1	5	7
Individual	2	0	0	5	7	14
Total	*2*	*1*	*1*	*7*	*14*	*25*

b.   Qualitative Data

Quotations about shortcuts were apparent in all four units of analysis. Unlike other work

unit climate themes, though, 13 of 25 quotations appeared in documents. The majority of segments

portrayed a consistent picture of historic and current safety shortcutting.

Long ago, safety shortcuts were commonplace and rather acceptable.

You know, it's tough to break old habits, and change a culture where you had a single owner and the evolution into an investment group and board members and a changing of organizational structure. It's difficult to put on the staff – the production line workers - and also expect them to change their behaviors and change their perceptions and be willing and able to report - and stop cutting corners. I think back in those earlier days, it was just get the job done and get it done on time and get it done quickly. There was a lot of short-cuts, and it was easy to do them. It was,' well we know we can do this, because it's tribal knowledge,' and whether it was safe or not was 'ah, we probably won't get hurt.' (Interview, Group, I3GL-70)

For example, there are certain things that we are unable to finish, or were unable to finish, because we didn't have the tools, because we had to improvise. Sometimes improvising was not always safe to get the job done. (Interview, Individual, I7IL-54)

Early in the safety transition, despite leaders' and managers' attempt to promote safety, workers

perceived production to be more important.

The Plant Manager, specifically, did a lot with trying to get departments to manage their people and make sure they were doing the proper thing – working safely and following policies – the policies that we did have at the time. A lot of things back in the early days was 'get it done no matter what it takes.' So, people were taking shortcuts and skirting around this to get this done. But management jumped in a little bit and tried to correct a lot of that by being aware of certain departments – what they were doing – and then making the managers or supervisors take care of the issues. (Interview, Organization, I4OL-24)

Veteran workers, in particular, were accustomed to former work patterns.

I think one of the big challenges is some of the long-tenured employees that we've had that did things a certain way for a number of years.   And then we've come to the point where we're trying to make things safer, and trying to get people to work safe. And trying to get that mentality across to the older employees has been kind of difficult. [Safety Manager] is just out there a lot pushing it to them. Making sure - 'no you can't do it that way.' 'I know you did it that way for years, but this is how you have to do it now.' Just constantly driving it home to them. 'This is how it's going to be done from now on'. (Interview, Organization, I4OL-77)

Even amidst their safety improvement journey, employees took shortcuts. Failure to wear

protective gear was a common shortcut. Even as peers looked on, workers and work groups side-

stepped the use of protective equipment. For example, employees from the same work unit, failed

to wear head protection near suspended loads or failed to wear respirators when working around

volatile chemicals.

> 1) Two employees walked within 5 feet of a suspended load without hard hats. Third employee also walked within 5 feet of load without hard hat in attempt to yell at previous two employees without hard hats. (Document, Private, D16NL-19)

> 2) 3 casting employees within 36" of mixing pot with no respirator
> 3) Fabrication employees carrying [plastic] drop with no hand protection
>
> (Document, Private, D49NL-13)

> The tool prep zone was in the next high bay. There, molds were assembled and disassembled and [plastic] panels were cast. At least two large [ovens] lined the rear wall. Metal tracks in the floor were also present. The chemical odor was very strong and all workers were issued half-face air purifying respirators. At least one worker, though, had pulled his mask off and positioned it below his chin. (Field Note, F1NL-13)

Other times, administrative controls were cut short – a machine guard or safety interlock was

compromised, or airborne chemical concentrations were not measured.

> It's our big 5-axis CNC machine, and they can do milling and saw cutting of [plastic]. Well, he was in there with it, and they were moving something out of the way, but the machine was still running, and he backed into it, and it cut him all across his back. I think then they really, really started to focus on safe practices on the shop floor, making sure all the employees were trained, and safety measures are in place on all the equipment, and they're not overridden. Because they had the door safety latch disabled, so they could open the door to the milling machine. So, stuff like that. (Interview, Organization, I4OL-53)

> 7) Fabrication employees cutting dogbones on table saw with no guard covering blade (Document, Private, D19NL-15)

> 17) Casting employees operating forklift in enclose space with no CO sensors (Document, Private, D51NL-15)

In some departments, work units side-stepped other safety requirements, such as attending safety

meetings and completing JSAs.

> We've always been supposed to… We have always supposed to have done weekly safety meetings, but when I first started, we didn't really do them. (Interview, Individual, I2IL-54)

> JSAs were very hard to get over, because none of us wanted to do them. We still don't really want to do them. … It only takes five minutes to do, so this is going to sound like a bad excuse, but sometimes I don't have five minutes. A lot of people on the floor don't have five minutes. … So, you got to hurry up and do them. In the long run, we have time to do them. Again, it's just an excuse. (Interview, Individual, I2IL-70)

According to a handful of quotations, safety shortcutting did not occur. For example, in 2015, on an installation site, the general contractor applauded workers for their attention to safety – their lack of shortcutting.

> *You've been out there, you've seen… I think everybody acted the same way when you saw them as they do when they didn't know you were watching them. Everybody's safe. (Interview, Individual, I8IL-121)*

> *…we were working on the [city] aquarium, and they wanted a site-specific safety program, and we didn't have any of that in place. This was early 2015…. My guys were down there doing the finishing work. You know, they were polishing up the [plastic] and getting ready to fill up exhibits – put the water in and all that stuff, and the same general contractor that wasn't going to let us on site, because we didn't have a site-specific plan, sent an e-mail directly back to our sales team, our executive management, and myself, praising our team for being out there and for their safety consciousness. They said that the sub-contractor that was working next to them had nine safety incidents in a month, and our guys had zero. They had no violations! Everybody was always following the safety program that we had set out. So, to go from down here to up here [interviewee moves his hands from low to high position] in the eyes of the same contractor, that was a big boost to our executives and our sales team. (Interview, Group, I1GL-165)*

In other instances, workers refused to work unsafely when coaxed to do so, or refused to work near an uncontrolled hazard, such as an unstable overhead garage door.

> *Um…we've seen different things (challenges to the integrity of the safety program), and people have said, 'no, I'm not doing it that way.' You know, 'we're not going to do that.' 'You have two hours to…' Fine, I'll get it, but I'm not doing it that way.' So, I think they will get tremendous pushback, if it goes the wrong direction. If it goes...if it touches on people's ethics and morals, they're going to get a lot of pushback. We've had it a couple of times already. One of our garage doors - the spring broke, and the garage door was up. Have you ever seen a garage door fall when the spring breaks? It loses all tension, and then an 1800-pound garage door is going to fall 18 – 19 feet that we have in there, and it happened. That's what happened to us. You know, why did that happen? Where did that happen? What does it look like? We've got other garage doors; what kind of shape are they all in? The pushback from the shop floor about that got them fixed. It wasn't what [Safety Manager] did, what [Director of Quality and Safety] did, what [Plant Manager] did. It was the guys on the shop floor standing down there on the truck wall when that thing came down – that were scrambling to get the hell out of the way. (Interview, Organization, I9OL-146)*

c.   Work Unit Climate Construct: Major Safety and Health Shortcuts Summary

Survey subjects offered diverse responses about the taking of major safety and health shortcuts. Even though half of organization- and individual-level subjects and nearly three-quarters of group-level participants denied shortcutting, a sizeable fraction – one-quarter to one-half – at all levels, acknowledged that major shortcuts did happen. The perceived frequency of shortcutting, though, differed by unit of analysis. Executives perceived occasional shortcutting. One in seven

group- and individual-level respondents, though, who work in production, perceived shortcutting to often or always occur.

Qualitative data showed the presence of safety shortcutting, too. There were more quotations about shortcutting than lack of shortcutting. In narrative data, this difference may be explained by measurement; safety shortcuts (i.e., near misses, unsafe conditions) were tracked, but the absence of shortcuts was not. Even though quotations did not distinguish major and minor shortcuts, the difference may relate to the risk of injury imposed by the shortcut. Missing gloves are likely to produce less injury than working inside a moving machine.

When considered together, quantitative and qualitative data indicate that safety shortcuts were taken, and as evidenced by narrative examples, some shortcuts were likely to be major. Survey data, though, better conveyed the frequency of shortcutting.

3.   Work Unit Climate Construct: Working Together for Safety

a.   Quantitative Data

Survey subjects were asked to how frequently employees and management worked together to achieve safety. All twenty-five subjects reported that employees *always* or *often* worked together. Whereas 71% of group- and individual-level subjects *always* perceived partnership, only one-fourth of organization-level subjects answered *always* (Figure 23).

Figure 23: Percent Response, Working Together for Safety by Unit of Analysis
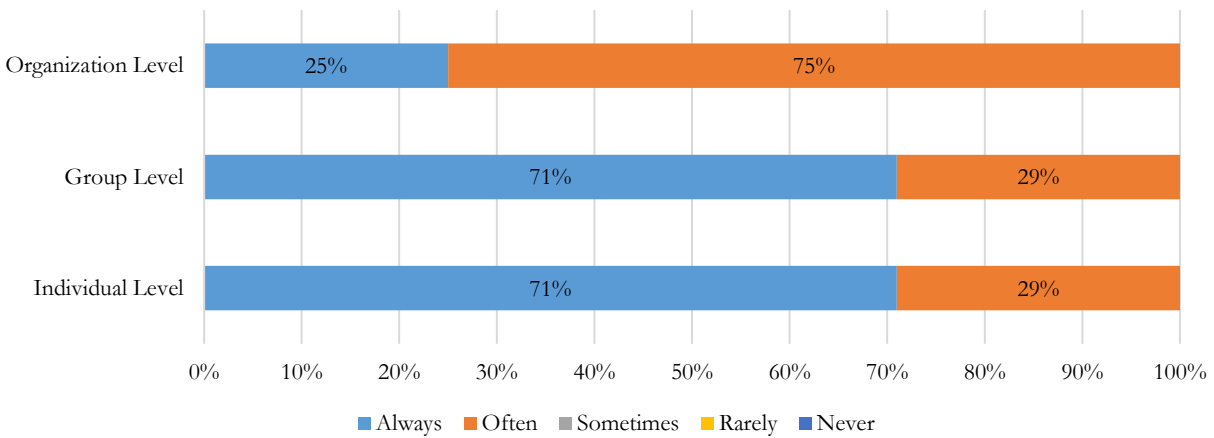
The response counts for organization-, group-, and individual-level subjects were statistically tested to detect population proportion differences (TABLE XXXV). Application of the Freeman-Halton extension of Fisher's Test failed to reject the null hypothesis (P=0.2842, Fisher's exact test). Therefore, differences were not statistically detected.

TABLE XXXV: RESPONSE COUNT, WORKING TOGETHER FOR SAFETY BY UNIT OF ANALYSIS

Level	Count					
	Always	Often	Sometimes	Rarely	Never	Totals
Organization	1	3	0	0	0	4
Group	5	2	0	0	0	7
Individual	10	4	0	0	0	14
Total	*16*	*9*	*0*	*0*	*0*	*25*

b.   Qualitative Data

Of the seven qualitative work unit climate themes, more quotations were offered about working together for safety. Text segments were apparent in all units of analysis, but group- and individual-level interview subjects spoke most about this theme.

In the past, according to one interview subject, the management-worker safety partnership was, at times, absent or conditional.

> *When I started here in 2006, it was scary. I want to say, my second day here, I watched my supervisor at the time break somebody's middle two fingers on his hand, and then told me – demanded - that I did the same thing that this guy was doing after they sent him off to the hospital, so we could get his job done. I told them 'no' and left the premises. I was called the next day. They asked me why I left premises – if I had quit, and I told them the story and asked them to look at my co-worker's hand. And I said, 'well, he wanted me to do exactly what the other guy was doing, and he told me if I didn't, I was fired, and so I left. (Interview, Group, I1GL-43)*

> *Our old safety incentive program was … basically, 'if nobody gets hurt this month, we're having pizza at the end of the month,' which wasn't great, because when somebody got hurt, someone said 'oh, there goes our pizza.' Then, the accidents would pile up on top of that, you know after somebody got hurt. (Interview, Group, I1GL-66)*

Throughout the safety transition, though, managers and workers partnered in numerous ways to achieve safe conditions and to optimize safe behaviors. One executive-level subject described the evolution of safety partnership at the company.

> *When you first try something, you're unconsciously incompetent, and you move to consciously incompetent, then to consciously competent, and unconsciously competent. The best example I've ever heard, if you've ever driven a stick, the first time you drove a stick, it was everything... (demonstrates multiple fumbling movements of hands and feet). And now if you drive a stick, you're changing the radio, talking on your phone, eating a hamburger, maybe even putting make-up on. I mean, that's the level that the workforce is – they do the right thing. … That's what we're trying to enforce, and the fact that, when you do that, you need less bureaucracy, because you have faith in your co-workers that they're going to do the right thing. (Interview, Organization, I5OL-54)*

As evidenced by multiple examples from all sources and units of analysis, working together was most apparent on the shop floor. One of the first partnerships occurred between the safety team and shop managers.

265

[The safety team] started with the shop floor, because we had issues with the shop floor. …. We had a really good Plant Manager at the time. He was an ex-marine. He was very... When you got him convinced of something, he was very focused. And, it didn't take long, you know, when [safety team] could show him, 'take this up, take this up, take this up, here's what you're going to be able to get.' Yeah, it took about a month, and he was on-board, and things changed…. (Interview, Organization, I9OL-60)

I think that the way and the rapport that [Safety Manager] and [Director of Quality and Safety] have with [Plant Manager] and [Assistant Plant Manager] and the other supervisors and how [they're] driving them, and how [they're] reporting, and how [they're] working with them to keep the environment safe, they're driving it to a different sustainability level than the executives are ever going to get it to. (Interview, Organization, I9OL-142)

The Safety Manager and employees worked together to identify and correct shop floor hazards.

The things that we changed...like, you would see a guard rail not always up, or there were electrical plates that needed to be put up. [Safety Manager] would actually come around and talk to you 'so if you start seeing this, because you work here,' or 'if you start seeing this, then we need to fix it.' So, that's the kind of the changes that we made – the things that we could see. We missed a lot. [Safety Manager] would come through and say, 'we're going to do this.' (Interview, Individual, I2IL-40)

Managers and employees partnered to identify controls for newly-identified risks and new

equipment.

I do get with [Safety Manager] a lot on how to maintain new safety procedures for new equipment or new testing, things like that. A good example is that machine out there – a QUV (an accelerated weathering tester). It's ultraviolet light, and obviously it's out in the middle of everything (points to new machine in a high bay area where others can walk by), so we had to make sure that we came up with the best way to keep that safe so that people just wouldn't go and be glaring into the lights. (Interview, Individual, I2IL-11)

Managers listened to workers' concerns and needs.

Some of it, they just listened. A lot of those things (i.e., welding ventilation, harnesses, welding curtains) have been bought over years; they finally just listened, and people had to do it. Back then, it was the manager at the time (that listened). And, I think the guy that's running it now - at the tooling shop, he listened. I'm sure [Finishing and Material Handling Manager] listens to what the guys want out in the pit. You have to work together. Like for us, I've got a little bit of say about what goes on out there. It's like, 'can you do this, or see about it', and a lot of times they will, if they can. (Interview, Individual, I8IL-67)

Concerns and needs were met with education, such as safety discussions at Tailgate Meetings, and

equipment, for example.

Ah, depending on what the (Tailgate Meeting) subject is that week, [redacted name] gets a paper, he'll read it or have us read it as a group. We'll discuss certain things on it – it depends on how in-depth it is. So, it would be a group talk, and then at the end, we'll all sign it. (Interview, Individual, I2IL-58)

266

Certain issues that would come up on the shop floor, [Safety Manager] would make it a topic for the next week to discuss with the employees. So, each department has a 5-10-minute meeting in the morning where they would talk and discuss these topics in the mornings. (Interview, Organization, I4OL-34)

And, safety-wise, we have harnesses now for being up on top of tools, and we have respirators - they're a different kind than the company had. The guys out there took it upon their selves to get those, then the company had to certify it, so that's how that happened. (Interview, Individual, I8IL-40)

Peers worked together and prompted each other to follow safety practices, wear protective equipment, report near misses, maintain order and cleanliness, and cooperate to win safety incentive prizes.

Near miss reporting is another big thing. Now that we're talking, it's coming to the front of my mind. Encouraging near miss reports, and it doesn't mean somebody had to get hurt, and it doesn't mean that there was almost an accident, it means that there was an observation made. And, it was brought to everybody's attention that 'hey, something could have happened.' One person saw it - nobody else saw it, but it still is... 'Hey, we're going to report this to the group'. We're going to report this to the Safety Manager and he'll address it. Maybe it spurs an even deeper change. It spurs new equipment purchases or discussion of new PPE, things like that. (Interview, Group, I3GL-56)

(With the safety incentive program) ...managers have skin in the game. Now the employees are looking to them saying 'hey we want to win these prizes.' You know, we were giving away trips to like...it only came quarterly, but one department... One quarter, we gave away a trip to [redacted city] – two tickets to the hot springs, a gas card to get up there, $100.00 to spend on a meal when you were there, and it was for everybody in the department. (Interview, Group, I1GL-77)

Working together for safety was evident off of the shop floor, too. Leaders and managers, for instance, worked with each other to fulfill safety requirements for bid packages.

[The Director of Sales and Marketing Operations] work(s) a lot with [Safety Manager] and [Director of Quality and Safety] in the aspect of bid packages for large projects, for safety information, quality information.... any of that that [Director of Sales and Marketing Operations] need(s) to put together. They are basically assisting [her] in getting that correct information and making sure that goes through. (Interview, Group, I6GL-3)

Despite the mass of data supporting this theme, employees at all levels reported exceptions. Even as safety improved, there were times when managers and workers were not working together for safety. This breach was evident during daily activities (i.e., use of protective equipment) and special circumstances, such as unexpected safety purchases.

So, [Plant Manager] and [Director of Quality and Safety] and [Safety Manager] … put a cost structure in place … a schedule in place (to preventively maintain overhead garage doors following the catastrophic fall of one door on the shop floor). … We have PMs that get done on them, but they're pretty spread out, so we adjusted all the PMs. We can't do them, because we have to have qualified people, so we have to have a third party do it. And, when the cost came in for that, 'no, we're not doing it.' 'Want to bet?' And, the shop floor guys got into it, and that's when they pushed it back. They said, 'you know what, then we're not going to open and close those doors.' 'We're not doing this, and we won't do that.' 'What are you going to do then?' 'Well, I'll fire you.' 'Well then fire me now.' One guy actually told them that, and he said, 'come on.' 'No, I'm not going to be standing there when that 1800-pound door comes down, because I won't survive it.' 'I don't care where it hits me, I will not survive it, and I'm not doing that.' 'So, you want to do something to me, go right ahead.' (Interview, Organization, I9OL-156)

[Safety Manager] was walking by supervisors and telling their employees, 'hey, tie off' or 'hey, where are your safety glasses.' [Safety Manager was] looking at the supervisor and saying, 'I shouldn't be doing this at this point, you should be doing this.' 'What are you doing?' (Interview, Group, I1GL-139)

c.   Work Unit Climate Construct: Working Together for Safety Summary

Quantitative data from organization-, group-, and individual-level subjects unanimously agreed that employees and management worked together in pursuit of safety. These levels, though not statistically different, were not exactly aligned. More group- and individual-level participants perceived cooperation to always occur. This suggests that executives perceived instances of less-than-perfect partnering.   One qualitative example about lack of partnering was offered by an organization-level employee. That example highlighted a rift between executive and shop floor workers. In most quotations, though, workers and managers agreed that safety was a cooperative effort. By and large, qualitative and quantitative data concurred.

4.   Work Unit Climate Construct: Informing Unsafe Employees

a.   Quantitative Data

Another aspect of work unit climate regarded unsafe actions by employees. Individual-level survey participants offered a greater variety of responses for this theme than for other themes. Between fifty and seventy-five percent of organization- and group-level respondents believed that employees were *often* informed when they acted unsafely; the remainder perceived that unsafe acts were *always* pointed out. While 79% of individual-level subjects agreed that unsafe acts were *always*

or *often* noted, 3 of 14 participants perceived that employees were either *sometimes*, *rarely,* or *never* told of their unsafe behavior. Only individual-level subjects offered unfavorable responses. Figure 24 displays responses to this survey question.

Figure 24: Percent Response, Informing Unsafe Employees by Unit of Analysis
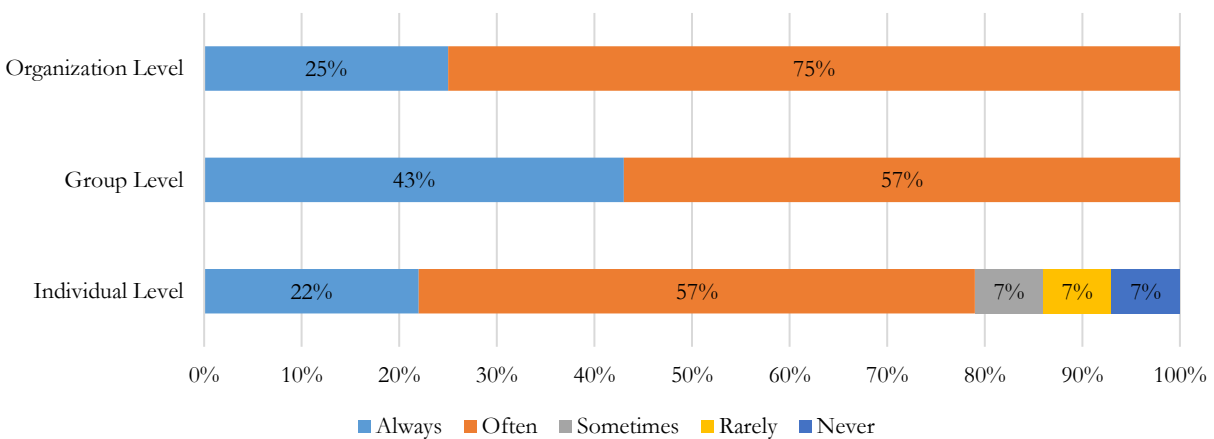
In Freeman-Halton testing of the counts in TABLE XXXVI, the null hypothesis was not rejected (P=0.9743; Fisher's exact test). There were no detectable differences in the population proportion of responses at the organization-, group, or individual-levels.

TABLE XXXVI: RESPONSE COUNT, INFORMING UNSAFE EMPLOYEES BY UNIT OF ANALYSIS

Level	Count					
	Always	Often	Sometimes	Rarely	Never	Totals
Organization	1	3	0	0	0	4
Group	3	4	0	0	0	7
Individual	3	8	1	1	1	14
Total	*7*	*15*	*1*	*1*	*1*	*25*

b.   Qualitative Data

Even though very few quotations referred to the theme of informing unsafe employees, text segments were identified in all units of analysis, including documents. All twelve quotations converged around the notion that workers were told when they did not follow safety rules. During the safety transition, workers informed each other in supportive ways and without fear of reprisal.

> *[Safety Manager] is just out there a lot pushing it to them. Making sure - 'no you can't do it that way.' 'I know you did it that way for years, but this is how you have to do it now.' Just constantly driving it home to them. 'This is how it's going to be done from now on'. (Interview, Organization, I4OL-77)*

> *You see somebody that's, like... I'm 5'2", so if I'm stretching or basically crawling on the counter to try to get something, somebody comes up behind and says, 'you shouldn't be doing that,' and they'll grab it and pull it down, or whatever it ends up being. (Interview, Group, I6GL-22)*

> *The way that I look at it, it's not necessarily, like, 'you shouldn't be doing that.' It's more of like, 'hey, I saw you doing this, and you shouldn't be doing it.' It's like giving like a friendly nudge. I just think that it's engrained. (Interview, Group, I6GL-70)*

> *So, they were told – people who had that attitude were told 'no, these are the rules, and they have to be followed.' (Interview, Individual, I7IL-71)*

> *I know that [redacted name] back in [redacted department], safety is a big thing for him. He'll talk about somebody doing something unsafe, and he'll say something about what he did to them or said to them. Quite a bit out here, I think it's instilled in people here now. (Interview, Individual, I8IL-113)*

> *Near Miss*
> *1)   Two employees walked within 5 feet of a suspended load without hard hats. Third employee also walked within 5 feet of load without hard hat in attempt to yell at previous two employees without hard hats. (Document, Private, D16NL-19)*

No divergent quotations were identified.

c.	Work Unit Climate Construct: Informing Unsafe Employees Summary

In a previous climate survey question, safety shortcutting was affirmed. This question probed whether employees were told of their unsafe acts. According to organization- and group-level survey subjects, employees are often, but not always, told. While nearly eighty percent of individuals agree, twenty percent reported that unsafe acts went uncorrected. These circumstances would most likely be noticed by individual-level workers. Qualitative data diverges somewhat. Even though very few quotations mentioned this theme, all implied that employees were informed of their unsafe actions; there were no examples of undisciplined, unsafe behavior. Consequently, while there is a good amount of agreement between qualitative and quantitative data, the latter did not capture examples of uncorrected unsafe behavior.

5.	Work Unit Climate Construct: Freely Reporting Safety Problems

a.	Quantitative Data

The fifth Work Unit Climate Survey question regarded freedom to report safety problems. All subjects responded favorably to this question (Figure 25). *Always* was the mode response. Subjects at the organization-level *always* felt free to report safety problems. At the group- and individual-levels, 86% and 71% chose the *always* response; the remainder *often* felt free to report safety concerns. Despite response favorability, more individuals perceived situations that precluded free reporting.

Figure 25: Percent Response, Freely Reporting Safety Problems by Unit of Analysis
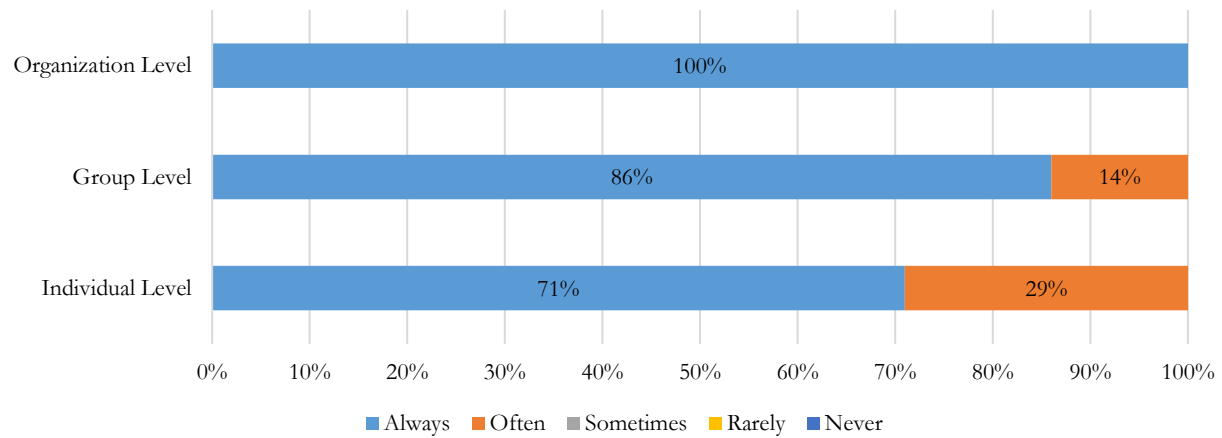
The null hypothesis was not rejected upon Freeman-Halton testing of the counts in TABLE XXXVII (P=0.5204; Fisher's exact test). Consequently, there were no detectable differences in the population proportion of responses at the organization-, group, and individual-levels.

TABLE XXXVII: RESPONSE COUNT, INFORMING UNSAFE EMPLOYEES BY UNIT OF ANALYSIS

Level	Count					
	Always	Often	Sometimes	Rarely	Never	Totals
Organization	4	0	0	0	0	4
Group	6	1	0	0	0	7
Individual	10	4	0	0	0	14
Total	*20*	*5*	*0*	*0*	*0*	*25*

b.   Qualitative Data

Only 15 quotations from group- and individual-level subjects regarded feeling free to report

safety problems. Neither organization-level sources nor documents mentioned this theme.

Workers expressed safety concerns in multiple ways, including speaking to managers,

contacting suppliers, and participating in safety surveys, or better yet, finding solutions. Regarding

the latter, one subject felt free to purchase safety equipment, and later, request for approval to use it.

> *For example, there are certain things that we are unable to finish, or were unable to finish, because we didn't have the tools, because we had to improvise. Sometimes improvising was not always safe to get the job done. So, basically, one thing that was done was that, in the case that we had to improvise, the company either made, on-location, the proper tools or purchased them. This was not cheap. And the other thing is that we do comment to the person who's in charge of safety. We consult that person - 'is this adequate?' 'Is this safe?' And that person has to say yes or no. Departing from that, or because of that, people are made aware of what could cause accidents. (Interview, Individual, I7IL-54)*

> *Like for us, I've got a little bit of say about what goes on out there. It's like, 'can you do this, or see about it', and a lot of times they will, if they can. (Interview, Individual, I8IL-48)*

> *And, safety-wise, we have harnesses now for being up on top of tools, and we have respirators - they're a different kind than the company had. The guys out there took it upon their selves to get those, then the company had to certify it, so that's how that happened. (Interview, Individual, I8IL-40)*

Most evidence showed that employees felt free to call out and correct the unsafe behaviors

of peers. For example, when an office employee unsafely used the stairs, another worker assisted to

prevent an accident.

> *Important things about safety is that everybody on the floor – everybody I work with - is aware of it. I think, not only do they need to be aware of what they're doing, I think they need to participate in it 100%. [Inaudible] I think our group is good enough that it's OK for me to tell you 'you know, don't do this,' and I think that's important. And I think any company needs to support that and that needs to be allowed. I think [company] does that. (Interview, Individual, I2IL-150)*

> *You can't babysit somebody all the time, but if you see them doing something, like going to lean a big piece of steel against the wall, you say, 'no you can't do that.' There's things that you do and don't do. (Interview, Individual, I8IL-3)*

> *I'm [redacted height], so if I'm stretching or basically crawling on the counter to try to get something, somebody comes up behind and says, 'you shouldn't be doing that,' and they'll grab it and pull it down, or whatever it ends up being. (Interview, Group, I6GL-19)*

Whether the information was shared matter-of-factly or in a playful manner, employees believed it

was necessary and worthy to report safety concerns.

> *You know, one time I walked through - I wasn't working - and there's a path you can take (across the floor) if you're not dressed appropriately. So, I was wearing high boots, and the first thing out of their mouth was 'you got PPE and steel toe in there?' So, yeah, I don't think anyone around here worries about bringing any of that up. (Interview, Individual, I2IL-150)*

> *Like, I remember I was walking down stairs, and I was carrying a box. I was wearing heels and other stuff, and one of the other Directors is, like, 'is that really safe for you to be doing that?' And, he came and grabbed the box, because I'm in heels and it's not really safe to be doing that. And, it was a joke, but it's, like, stopping you, and it makes you think. I feel that's how everybody is – it's just part of our culture. (Interview, Group, I6GL-19)*

Most of the time, employees felt unafraid to report near misses, too.

> *Near miss reporting is another big thing. Now that we're talking, it's coming to the front of my mind. Encouraging near miss reports, and it doesn't mean somebody had to get hurt, and it doesn't mean that there was almost an accident, it means that there was an observation made. And, it was brought to everybody's attention that 'hey, something could have happened.' One person saw it - nobody else saw it, but it still is... 'Hey, we're going to report this to the group'. We're going to report this to the Safety Manager and he'll address it. Maybe it spurs an even deeper change. It spurs new equipment purchases or discussion of new PPE, things like that. (Interview, Group, I3GL-56)*

> *[Safety Manager] was starting to see more near misses, but they were not being reported. [Safety Manager] was walking by supervisors and telling their employees, 'hey, tie off' or 'hey, where are your safety glasses.' [Safety Manager was] looking at the supervisor and saying, 'I shouldn't be doing this at this point, you should be doing this.' 'What are you doing?'. (Interview, Group, I1GL-139)*

On at least one occasion, workers had a chance to express their safety concerns via safety perception

survey.

> *You know, the NSC (National Safety Council) wrote the employee perception surveys. [Safety Manager] took that and copied it onto an excel spreadsheet. [He] distribute(s) those every year at the end of the year. [He] do(es) them blindly; [Safety Manager doesn't] even want them handing it back to their supervisor, because [he doesn't] want them to have the fear of 'well, somebody's going to see what I said.' [He] want(s) a very honest answer. [He] just put(s) a box in the middle of the floor and say(s), 'put them in there.' (Interview, Group, I1GL-178)*

c.   Work Unit Climate Construct: Freely Reporting Safety Problems Summary

Quantitative and qualitative data converged around this theme. Survey subjects from all

levels *always* or *often* felt free to report safety problems. Nonetheless, a small fraction of group- and

individual-level workers perceived situations where they felt less free to report concerns. Qualitative data about this topic were offered by group- and individual-level subjects, who all felt free and unafraid to speak to managers, advocate for peers, contact suppliers.

6.   Work Unit Climate Construct: New Employees Learning Safety

a.   Quantitative Data

Survey participants were asked how quickly new employees learned to follow good health and safety practices. All subjects responded favorably to this question. Half of organization- and individual-level respondents indicated that new workers *always* learned quickly, and half said they *often* learned quickly. At the group-level, 86% and 14% chose the *always* and *often* response options, respectively (Figure 26).

Figure 26: Percent Response, New Employees' Learning Safety by Unit of Analysis
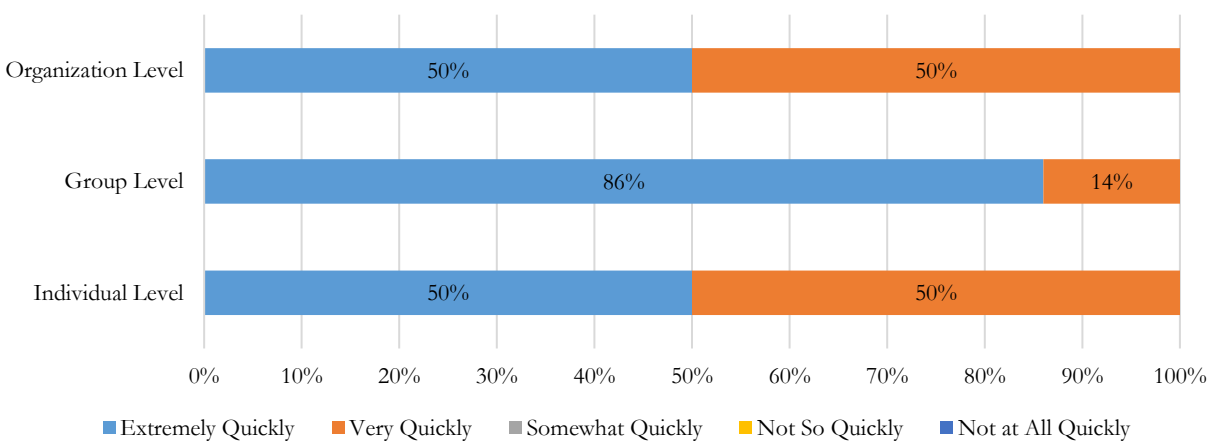
Freeman-Halton testing of the response counts in Table XXXVIII failed to reject the null

hypothesis (P=0.3373; Fisher's exact test). Consequently, there were no detectable differences in the

population proportion of responses at the organization-, group, and individual-levels.

TABLE XXXVIII: RESPONSE COUNT, NEW EMPLOYEES' LEARNING SAFETY BY UNIT OF ANALYSIS

Level	Count					
	Always	Often	Sometimes	Rarely	Never	Totals
Organization	2	2	0	0	0	4
Group	6	1	0	0	0	7
Individual	7	7	0	0	0	14
Total	15	10	0	0	0	25

b. Qualitative Data

Scant qualitative data addressed the rapidity by which new employees learned safety. Even

though only eight quotations were offered by organization-, group-, and individual-level subjects,

perspectives were consistent. No documents referenced this topic.

Historically, according to two interview subjects, there was a degree of new employee safety

training. At a high level, new workers were oriented to safety rules. Peers, though, provided on-the-

job training.

Part of that initial orientation that even I got in in 2005 was discussing certain safety rules. And, there are some that everybody knows from the day they walk in – you don't walk under a suspended panel and a few things like that. And, if you ask why, you'll be told why. (Interview, Group, I3GL-94)

We go through forklift training. God, you know way back, I remember when we'd get a new guy out there, we're the ones that would train them on what to do. (Interview, Individual, I8IL-48)

A few cross-level respondents stated that during the safety transition, new employees learned good safety habits right away.

> *And, a lot of training with the new hires that come in, so they know how it's supposed to be done; so, they're working that way. It's less work for [Safety Manager] when the new hires come in – they go straight into safety training the way that it should be done. That way they're working safe from the beginning, and they're not picking up the old habits from the other guys that have been out there 10-15 years doing it a certain way. (Interview, Organization, I4OL-77)*

> *The new employees, they don't know any other way. So, they come into the company, and those are the rules that are already in place. So, that's not a change for them – that's just how things are done. (Interview, Individual, I7IL-71)*

On their first day of work, new hires were exposed to safety requirements, via facility tour and discussion.

> *I think another strength is the program we have now, in place, with the training of the new hires. The first time they walk through the door, they're getting a safety walk-through with [Safety Manager]. He's going over all the hazards in the shop. We do the STOP™ Safety training. He does the forklift training, crane, and rigging training - all of that for new hires right when they come in. So, they know right up front what the expectation is for safety. (Interview, Organization, I4OL-114)*

> *… But the newer employees, you just start training them right off the bat. (Interview, Group, I6GL-22)*

Employees not only learned general safety rules, they learn about site-specific hazards and regulatory standards.

> *I haven't had an orientation in twelve years. … I don't know how much detail they go into now, but that was a long time ago. So, I honestly don't know what the orientation looks or sounds like to a new hire, but I do believe that…. Safety was part of my orientation, but now, I think maybe 80% of your orientation is safety. Part of that orientation... I mean, we never… Everybody as a whole went into STOP™ safety training, but now, [Safety Manager] is always conducting STOP™ safety training for the new staff – new employees. And then there's... What does he call it? ...OSHA 10 training and OSHA 30. (Interview, Group, I3GL-24)*

c.   Work Unit Climate Construct: New Employees Learning Safety Summary

Qualitative and quantitative data fully agreed about new employees' quick safety learning. All survey participants responded favorably to this question, and roughly half of respondents at each level stated that quick learning *always* and *often* happened. Even as there were no statistical differences, more group-level subjects – those who supervised shop floor operations, perceived a

greater extent of quick learning by new employees. From a qualitative perspective, subjects offered consistent stories of new hire orientation and on-the-job training.

7.   Work Unit Climate Construct: Summary

Both quantitative and qualitative data contributed to the work unit climate construct. Quantitative data were obtained from a 6-item Work Unit Climate Survey. Qualitative data were primarily obtained from group- and individual-level interviews. Six data themes were shared by both data sets. Mixed data converged around four themes – management priority of safety and health, working together for safety, freely reporting safety problems, and new employees' learning safety. For two themes – major safety and health shortcuts and informing employees of their unsafe habits, qualitative and quantitative data differed to a small degree (TABLE XXXIX).

TABLE XXXIX: WORK UNIT CLIMATE CONSTRUCT SUMMARY

	Primary Sources	Work Unit Climate Survey, Interviews
	Primary Units of Analysis	Group-Level, Individual-Level
	Prominent Themes	Management Priority of Safety and Health, Major Safety and Health Shortcuts, Working Together for Safety, Informing Unsafe Employees, Freely Reporting Safety Problems, New Employees' Learning Safety
Summary of Prominent Themes	Management Priority of Safety and Health	• Quantitative data from all levels largely agreed that workplace safety and health were a high management priority, even though a few believed priority to be rare. • Qualitative data supported this notion; a small fraction of group- and individual-level participants considered high priority rare. • Qualitative and quantitative data aligned around the notion that, during the safety transition, management usually, but not always, prioritized workplace safety and health.
	Major Safety and Health Shortcuts	• Surveys offered diverse responses about major safety and health shortcuts. Fifty to seventy-five percent of subjects denied shortcutting, but a sizeable fraction acknowledged major shortcutting. While some executives perceived occasional shortcutting, one in seven group and individual respondents perceived shortcutting to often or always occur. • More quotations regarded shortcutting than lack of shortcutting. This difference may be explained by measurement; safety shortcuts (i.e., near misses, unsafe conditions) were tracked, but the absence of shortcuts was not. • Considered together, quantitative and qualitative data indicated that safety shortcuts were taken. Survey data better conveyed the frequency of shortcutting.
	Working Together for Safety	• Quantitative data unanimously agreed that employees and management worked together in pursuit of safety. Even so, more group- and individual-level participants perceived cooperation to always occur. • In most quotations, workers and managers agreed that safety was a cooperative effort. One qualitative example about lack of partnering was offered by an organization-level employee. • Qualitative and quantitative data converged on this theme.
	Informing Unsafe Employees	• Survey subjects at the organization- and group-levels believed that employees were often, but not always, told of their unsafe

		actions. Twenty percent of individual said that unsafe acts went uncorrected.
		• All qualitative quotations implied that employees were consistently informed of their unsafe behaviors.
		• Qualitative and quantitative data slightly disagree as to whether employees were informed of unsafe behaviors.
	Freely Reporting Safety Problems	• Survey subjects *always* or *often* felt free to report safety problems.
		• Qualitative data concurred that group- and individual-level subjects felt free and unafraid to report safety problems.
		• Quantitative and qualitative data converged around this theme.
	New Employees' Learning Safety	• Quantitatively, all participants responded favorably that quick learning *always* or *often* happened.
		• From a qualitative perspective, subjects offered consistent stories of new hire orientation and on-the-job training.
		• Qualitative and quantitative data fully agreed about new employees' quick safety learning.

I.   Individual Tasks and Skills Construct

This construct about person-job fit applied to quotations that mentioned job tasks, job requirements, supplied training and equipment, and employees' skills and needs. The individual tasks and skills major code was assigned to 344 text segments. Sub-coding yielded 430 quotations. Fifty-five percent of coded text was found in documents, especially private documents. Of the interview subjects, group-level participants provided the more insight about the construct (TABLE XL)

TABLE XL: INDIVIDUAL TASKS AND SKILLS CONSTRUCT: NUMBER OF SUB-CODED SEGMENTS BY SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	3	4	19	
Interviews	43	58	37	
Field Notes	0	0	0	18
Documents, Private				239
Documents, Public				9
Subtotal	*46*	*62*	*56*	*266*
Total	*430*			

Two complementary themes emerged. The demands-abilities theme highlighted the employer's perspective of person-job fit, specifically employer's requirements for performing the job and employees' knowledge and skills to accomplish the job. The needs-supplies theme views fit from the employees' perspective – employees' job-related needs and the supplies (i.e., training, benefits, protective gear) offered by the employer. Just over 60% of text segments spoke of the demands-abilities theme, which will be discussed here (Figure 27).

Figure 27: Individual Tasks and Skills Construct, Percent of Quotations by Theme
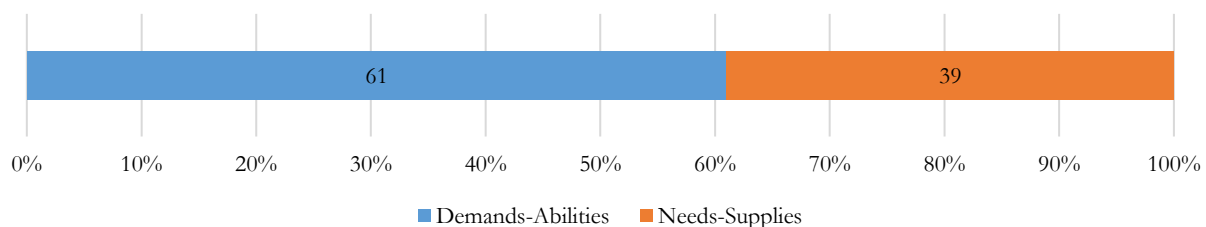
1.	Individual Tasks and Skills Construct: Demands-Abilities

Like two sides of the same coin, the demands-abilities theme regarded, on one side,

company-specified safety requirements, and on the other side, employees' safety knowledge, skills,

abilities, and traits.

a.	Demands

Safety demands shifted from rather slim under the former owner to abundant under the new

owner.

1.	Former Owner

Historically, limited data suggested that there were very few safety requirements at the

company – production overshadowed safety demands. For example, there was little compulsion to

wear PPE or to follow safe practices when handling materials.

> *You know, it's tough to break old habits, and change a culture where you had a single owner and the evolution into an investment group and board members and a changing of organizational structure. It's difficult to put on the staff – the production line workers - and also expect them to change their behaviors and change their perceptions and be willing and able to report - and stop cutting corners. I think back in those earlier days, it was just get the job done and get it done on time and get it done quickly. There was a lot of short-cuts, and it was easy to do them. It was,' well we know we can do this, because it's tribal knowledge,' and whether it was safe or not was 'ah, we probably won't get hurt.' (Interview, Group, I3GL-70)*

> *Ok. Safety has not – not - been a focus. I mean, people didn't even have safety glasses. We had people with spider bites, because they weren't wearing gloves. We had splinters, because they weren't wearing gloves. We had people, as they were walking by, grabbing the edge of the [plastic], and we had a lot of things going on like that. (Individual, Organization, I9OL-58)*

2.	New Owner

Under the new owner, safety demands increased exponentially, and safety became a job

requirement for every worker, especially shop floor workers.

> *The fact that safety is a major part of our job. We are always reminded by filling out JSA's every day and the safety guy, [Safety Manager] is always walking through the work area. (CIR, Individual, S11IL)*

41. Top management considers safety and health to be a line rather than a staff function.	3
Comments: Employees of [company] recognize that H&S is the responsibility of everyone, and that [Safety Manager] is available to assist them not to assume the H&S responsibility for the entire company.	

(Document, Private, D82NL-41)

To acknowledge their safety responsibilities, employees were required to review and sign the

company's safety injury and illness policy, follow safety rules, and behave in a safe manner. Failure

to follow requirements would result in disciplinary action.

> *ACKNOWLEDGMENT OF RECEIPT AND REVIEW*
> **IMPORTANT *: This form must be signed and turned into your supervisor or the H.R. Director.*
> *As an employee of [company], I acknowledge that I have received the Injury and Illness Prevention Program's "Safety Manual" and that it is my responsibility to read, understand and comply with all safety rules and policies.*
> *I acknowledge that I have read, understand and will comply with the safety policies and procedures described in the Injury and Illness Prevention Program's "Safety Manual".*
> *I also acknowledge that this manual has been issued to me as a property of [company] and that it is my responsibility to keep it in good condition and to use it for training and other record keeping purposes.*
> *I understand that if my employment with [company] is terminated that I am required to turn this manual in to the H.R. Director or Plant Manager before compensation of pay will occur.*
> *(Document, Private, D1NL-48)*

> *The success of this injury and illness prevention program depends primarily upon the cooperation and active support of all employees. As part of our organization, each employee is expected to abide by these rules and follow safe work practices to help ensure his or her safety as well as that of fellow employees and our customers.*
> *We will be counting on you to do your part in making our program an effective one. The success of this program will benefit all of us.*
> *(Document, Private, D1NL-63)*

> *Disciplinary Procedures*
> *Employees who fail to comply with safety rules will be subject to disciplinary action up to and including dismissal. Disciplinary procedures for safety violations are per the [company] Employee Handbook.*
> *(Document, Private, D1NL-145)*

Numerous documents stated the company's demand to follow several safety procedures, including

the work instructions; the 5S/6S procedure for housekeeping; 2-person rule; lockout-tagout;

forklift checklists; parking instructions; fall protection procedures; and scaffolding certification,

training and tagging procedures.

Yep, we have work instructions. All the safety information for [a machine] is incorporated in our work instructions - like closing this door, things like that. If you were to come in and work this machine, you could go to the work instruction. And the way they're supposed to work is you open it up, and you go step by step. You should be able to do whatever you need to do with this machine. (Interview, Individual, I2IL-88)

New Items
At least two people in the shop at all times- This issue was discussed, but due to all the passionate opinions, and multiple scenarios that have been pointed out it was decided that we would not come to an agreement in the time allotted for the safety committee meeting. Everyone has been tasked to bring solutions to the table next meeting. - Everyone. (Document, Private, D19NL-13)

5) Forklift Check Sheets- These check lists have been completed. [The Maintenance and Tooling Manager & Safety Manager] will meet to for a plan for implementation and training in each department. The check list is to be done daily by each forklift operator to insure that the forklifts are in optimal condition for use. Per [Maintenance and Tooling Manager & Safety Manager] (Document, Private, D29NL-6)

7) Work on fall protection policy in Pour Room (Casting Department) Please see attached document Casting Room Fall Protection Training PDF. A note was added to close the gates before removing barrels from pallets, and [Safety Manager] spent some time with the Casting employees training them on the new procedure while bringing barrels up to be sifted. I will continue to monitor this procedure to be sure it is being followed. We also plan to bring this issue before the Safety Committee to explore other options of protecting our employees from falls during this operation. (Document, Private, D33NL-37)

The company demanded that workers use, store, and maintain hazard controls, especially PPE.

Another example is that they became more strict regarding footwear, the use of head protection – helmets, and the use of eye protection. In addition, [the subject] is commenting about how people who were wearing…who typically wore contact lenses were less likely to wear safety goggles. But, [company] began to require them to get eye protection with a prescription, so that they had to wear eye protection. They couldn't...there wouldn't be kind of a conflict between the contact lenses and the goggles. (Interview, Individual, I7IL-30)

14. Personal protective equipment is effectively used.	*3*
Comments: All PPE was being worn, stored properly, and in good condition. [Company] goes above and beyond and performs pulmonary function tests on any employee that wears a respirator.	

(Document, Private, D6NL-14)

Right. And, walk around, wear your safety glasses, lead by example. 'Wear your steel toes.' 'I don't have to wear steel toes.' 'Why not, I do.' I used that a lot of times. People looked at me and said, 'really?' I had one guy stomp on my foot, because he didn't believe me. I was, like, that's not the way I'd go about doing it, but 'you understand?' And he said, 'well, you do wear them,' and the next day he had them. (Interview, Organization, I9OL-65)

According to several multi-unit sources, the employer required education, like Toolbox Talks, and

formal training for general hazards, machinery, and chemical awareness.

So, another example is in the departments that use chemicals or special UV lighting. It used to be that anyone could step into those departments. And now that is not the case. Now, the company requires that people who go there have certifications, so they know if they need to use special eye protection for UV light or special – how do they call it – a respirator to keep from breathing in toxic chemicals. (Interview, Individual, I7IL-45)

9) Small Dumpsters- A training exercise will be conducted at 12:30 PM February 30th to complete the training portion of this item. [The Maintenance & Tooling Manager] will conduct exercise. Supervisors will collect signatures of forklift certified employees who attend training. [The Plant Manager] has completed training at CPD. (Document, Private, D17NL-10)

(Tailgate Meetings) …Ah, depending on what the subject is that week, [redacted name] gets a paper, he'll read it or have us read it as a group. We'll discuss certain things on it – it depends on how in-depth it is. So, it would be a group talk, and then at the end, we'll all sign it. (Interview, Individual, I2IL-58)

There were demands for the regular conduct of safety activities, specifically completing STOP™

cards, JHAs, and accident/incident investigation; and participating in audits.

The fact that safety is a major part of our job. We are always reminded by filling out JSA's every day and the safety guy, [Safety Manager] is always walking through the work area. (CIR, Individual, S11IL)

3. Effective surveillance of establishment hazard controls is conducted.	3
Comments: In addition to safety audits each employee fills out a STOP (Safety Training Observation Program) card on a monthly basis. Employees also fill out a JHA on a task of their choosing on a daily basis.	

(Document, Private, D83NL-3)

We want you to do the Toolbox Talks once a week. We want you to do them on the first day that you come back on your shift, because we realize that life happens on the weekend, and nobody's really focused on Monday morning. The first thing Monday morning, we want you to sit down and have a safety talk. After you've had your safety talk, then you write your JSA, and now you're really thinking about safety, even if you're just cursing the Safety Manager for making you do all this stuff. And, now we send you to work. (Interview, Group, I1GL-72)

The company also required proactive safety action – identifying and reporting near misses and

unsafe condition, pausing work as needed, and participating on the Safety Committee.

It's important that employees not only understand the necessity for safety procedures, but also have a role in promoting safety and voicing any concerns. Managers must not only promote safety, but also lead by example, he says. (Document, Public, D80NL-23)

As an employee, you should be constantly alert to the potential for accidents on your job. Your safety suggestions are welcome and should be submitted. (Document, Private, D1NL-62)

The company, though, did demand workers to be injury-free to qualify for an annual safety bonus.

That's the safety bonus. Then, every now and then, they'll do a company bonus. Yeah, if a guy has been here like a year accident-free, he gets $25 or $30 bucks. Then it goes up every year that you're accident-free. If you have an accident, and you end up lost time, then you start all over. (Interview, Individual, I8IL-93)

b.   Abilities

The abilities theme regarded the learned knowledge, skills and abilities and innate traits that employees possessed.

1.   Former Owner

A handful of uncorroborated quotations mentioned the safety skills and traits of historic employees. The former owner's personal traits and leadership style, as perceived by two interview subjects, were conducive to profit and production, not occupational safety and health.

> *Some of that is when they sold the company five years ago - it had to be professionalized. When you're owned by an owner-entrepreneur, and all the decisions have to go through them, then... And [CEO is] trying to push decision-making as deep into the organization as possible and broaden that and think that the collective brain power is going to be more important than the ego control with an owner-entrepreneur. … But I don't know that [safety advocacy] was really not the mindset. There's also a tinge of paranoia on that profile of person. (Interview, Organization, I5OL-9)*

> *Well, that kind of leads to the third one I think we're exceptionally good at, and that is taking credit for things. 'Look what I did.' We're …we are very good at that. Most of that, because of our history. You know, we came up as a privately-held organization owned by one man. The only way to get in good graces was to do something like that for him. So, we engrained it over twenty-five years of 'this is how you function.' That's why we're exceptionally good at it. That drives the fire-fighting, because, you know, why should we plan? (Interview, Organization, I9OL-164)*

Historically, workers did not possess adequate safety knowledge or skills. For example, people laid under suspended panels and were generally unaware of company safety policies.

> *When I first started here, I would see people laying under suspended panels painting them. You know, suspended from the frame – really, really dangerous acts.   The 'we've always done it that way' mentality. (Interview, Group, I1GL-103)*

> *So, the first thing was, where are we at with our safety policy and our safety procedures. That's where we started. We had some; they were in an employee handbook. And, we just started with a, like, a survey. People couldn't even tell us where the rules and policies were, ok. We're at step one. (Interview, Organization, I9OL-60)*

> *Before [Safety Manager] was in there, you could ask somebody what the 300 Log was, and they couldn't tell you, you know. So, I think a lot of it was definition-based – understanding those types of things. (Interview, Organization, I9OL-160)*

" I mean the self-realization that gosh, I've done a lot of stupid stuff over the years, and nobody called me on it. Now they are." (Interview, Group, I3GL-129)

However, the company's first Safety Manager, around 2000, did have safety knowledge and experience in the oil and gas industry.

That was probably... geez, I want to say it was probably 2000, 2001 – somewhere around there. [The first Safety Manager] was an older gentleman. He had a lot of experience out in the oil field – gas and oil safety. (Interview, Organization, I4OL-15)

2.   New Owner

Several quotations spoke of leaders' and managers' abilities under the new owner. The President, who was present early in the transition, was skilled at recognizing person-job fit.

[CEO's] predecessor here, who was the former CFO. The owner-founder brought him back, because he was transitioning the company, and [former CFO] recognized that there was a (safety) need. [Former CFO] was very good at identifying the right people in the place. (Interview, Organization, I5OL-16)

The executive consultant-turned-CEO offered a more democratic leadership style, which allowed others to make decisions.

... And [CEO is] trying to push decision-making as deep into the organization as possible and broaden that and think that the collective brain power is going to be more important than the ego control with an owner-entrepreneur. (Interview, Organization, I5OL-9)

A good number of multi-source, multi-unit quotations spoke positively of the Director of Quality and Safety's professional abilities and discipline. The Director of Quality and Safety, who was hired in 2013, was a trained engineer with quality systems and workplace safety experience.

When [Director of Quality and Safety] got here, they found out [he] had safety experience. They found out [he] had functioned from a safety environment before; they found out [he] had managed and ran them. The HR person said 'good,' so, [he] inherited it. (Interview, Organization, I9OL-9)

They hired [Director of Quality and Safety] with a... It's a highly paid Director level position to come in here and provide some good protocols and discipline into the organization. I think that's helped. (Interview, Organization, I5OL-22)

[Director of Quality and Safety] is very, um, management system driven – system driven. We're talking Lean Six Sigma, ISO, things like that. So, we started to integrate everything in under that kind of umbrella. (Interview, Group, I1GL-35)

Nonetheless, knowledge gaps had to be overcome.

> *You know, as [Director of Quality and Safety] dug in and did different things, well, our EMod was over 1; it's like,' that is unacceptable.' Truthfully, [Director] didn't even know what EMod was, because [he] never called it that in [a previous job]. I mean, [he] had to do a lot of work to find out what that even was to even understand it. Once [Director of Quality and Safety] got that, it was, OK, it's this, and away we went (Interview, Organization, I9OL-23)*

When searching for a Safety Manager candidate, the Director of Quality and Safety looked for

person job fit – experience with safety, production and operational knowledge, and personal

conscientiousness.

> *Yeah. I mean, finding out what we had was the first step. Getting somebody who could support [Director of Quality and Safety] and help with that was a very close second. That's where [Safety Manager] came from. … You know, [Director] watched [redacted name]. [Director] saw what he did. … Knew where he was at. … Knew how (safety) conscious he was. He was what [Director] was looking for. … He was hand-picked. … You know, 'he's working in the lab, he does this, he's got some safety identification.' … So, we got him running the focus (as Safety Representative). (Interview, Organization, I9OL-50)*

> *Ah, our R&D chemist at the time was working with [redacted name] back in the lab. And [Director of Safety and Quality] was looking at hiring somebody to manage safety. So [redacted name] recommended [redacted name], because he thought that [redacted name] would be a good fit for that type of work. That worked out for him, and he's been doing a great job at it. (Interview, Organization, I4OL-71)*

Similarly, a good number of text segments attested to the Safety Manager's personal character,

motivation, and management ability.

> *… And, [Director of Quality and Safety and executives] decided at the time they needed another Safety Manager, so [redacted name] was a pretty good candidate for that, because he's pretty driven. …. (Interview, Organization, I4OL-29)*

> *When the position was filled again in 2013, the new Safety Manager really took the lead in making [company] #1 in safety, and creating a safe work environment for all employees. His passion and drive is what makes every employee strive to work the safety way possible. His presence and awareness on the shop floor keeps everyone honest and working safely. (CIR, Organization, S29OL)*

> *Attention to detail & driven to succeed. These are the things that makes [Safety Manager] successful & drives the rest of us nuts. (CIR, Group, S6GL)*

Before becoming Safety Manager, he worked in almost every department of the company –

purchasing, polymer lab, material handling; he knew production and the company.

> *[Safety Manager] worked in just about every department in this company. [He] started as a night shift material handler and worked [his] way through just about every department, including purchasing. [He] ran*

our lab for like 6 years; [he] still kind of ha(s) a hand in the laboratory, just because of [his] previous roles and that, and the knowledge that [he] ha(s). (Interview, Group, I1GL-3)

As temporary Safety Representative around 2008, even without safety experience, he had the ability to successfully abate hazards in the lab; this was noted during the 2012 OSHA inspection.

During that compliance visit in 2012, it wasn't a pleasant experience for [company] just because there was a lot of citations. The only place they didn't find a citation was in the area that [Safety Representative] had control over, because [Safety Representative] had done all that work in 2008. …. At that time, it was a lady named [redacted] - I forget her last name, but she was one of the OSHA compliance officers. She actually turned around and shook [Safety Representative's] hand and said, "you're doing a really good job back here." That was the only positive thing that they really had to go back and tell executive management was "hey, the lab didn't get fined". (Interview, Group, I1GL-14)

The Safety Representative turned Safety Manager learned safety compliance from OSHA certificate courses, and safety management systems from On-Site auditors. Microsoft Excel classes proved useful for performance metrics.

So, anyway, we started the SHARP process. They came out in February of 2013 – late February of 2013. [Safety Representative] didn't have any training, really. [He] didn't even have an OSHA 10 (OSHA 10-hour training) card. So, [he] had very little safety and health training, and [he] didn't know much about the regulations. … So, anyway, [Safety Representative] got a lot of information from [OSHA Onsite Consultation auditors] when they came down from the SHARP office and inspected us. (Interview, Group, I1GL-33)

When [Safety Manager] first started, one of the first things that [Director of Quality and Safety] did was throw [him] in an Excel class, you know. And [he's] like, 'why am I doing this?' Eventually, it came to light. We started doing metrics. We were the first group in our whole organization to do metrics. (Interview, Group, I1GL-138)

29. Individuals with assigned safety and health responsibilities have the necessary knowledge, skills, and timely information to perform their duties.	3
Comments: [Company] has sent [Safety Manager] to several OSHA training courses. [Safety Manager] is very knowledgeable and is not afraid to reach out to others in the H&S community when he needs assistance.	

(Document, Private, D82NL-29)

The abilities and inabilities of shop floor workers were also touted by a handful of quotations. New and temporary workers, perhaps for obvious reasons, had minimal job-specific knowledge of hazards and safety.

I think the safety guy does a good job of keeping an eye on new employees, and temp workers who don't know a lot about the safety part of this job. … Some people just don't think it's a big deal to do the little things that keep this job safe. (CIR, Individual, S15IL)

Probably new people coming in where they're not familiar, especially with the things that we do here. That's probably a challenge. (Interview, Individual, I2IL-81)

Since at least 2014, employees have learned safety knowledge and skills on the job, including general safety awareness OSHA training, the STOP™ Program and JSAs; accident investigation; chemical safety; and material handling.

I think the STOP Safety training we receive when we start working has made safety better. Manufacturing is new to a lot of people so the training helps employees Be able to identify and correct or at least voice safety concerns. … I have seen people use the safety class to ID and stop safety issues from happening. (CIR, Individual, S20IL)

For me this is easy to answer. I have always known that if I feel something is unsafe I can stop production until it is safe. and we have done this. (CIR, Individual, S17IL)

6. Accidents are investigated for root causes.	3
Comments: Employees fill out accident investigation forms. These forms are reviewed by their supervisors and then by [company's] Safety Director, [redacted name]. [Safety Manager] coaches the employees and supervisor if the investigation is not thorough enough. Employees and supervisors receive training on how to conduct root cause investigations. Results from accident investigations are reviewed at Monday Morning Tool Box talks.	

(Document, Private, D6NL-6)

Well, there's a series of videos they took, because last week they had to take the panel out and flip it over, so they could polish the other side. You might find that interesting. You could observe the safety things that they're doing, to make sure that they flip an essentially 90,000-pound panel over. This one is 14 inches thick and 51 feet long. (Interview, Organization, I5OL-44)

I think safety awareness was enhanced when we began to fill out JSA's, for projects … 2015 … It created awareness of hazards before a specific task was performed. (CIR, Individual, S22IL)

One source mentioned that once workers attained safety knowledge and skill in a particular task, they had the ability to coach others. For example, a shop floor employee, who knew personal protective gear requirements, instructed the CEO to wear safety glasses.

56. *Employees participate in the safety and health training of co-workers.	3
Comments: Peer training is used, especially for those workers who have received their OSHA 30 hour card.	

(Document, Private, D6NL-56)

One hourly employee asked the CEO to kindly put his safety glass[es] on, covering his eyes not his forehead. … 2015 (CIR, Organization, S32OL)

c.   Demands-Abilities Fit

Under new ownership, the company recognized the importance of person-job fit– to have

the right people in the right jobs. This pertained to safety, too; talented and experienced people

contributed to the company's positive safety success.

And, then, having the right people in the right positions, like, [Director of Quality and Safety] and [Safety Manager]. I know that I've brought this up a few times, but they are… I mean, [Safety Manager], especially, is extremely passionate about what he does. And they want to make sure that everybody's safe and knows the guidelines and knows what's needed. It's having the right people in the right spots. (Interview, Group, I6GL-58)

Um. We're a pretty powerful team, and I think we've tapped into that. We have a lot of great talented people, and I think it's our people that we've tapped into to make this work. (Interview, Group, I1GL-128)

Ideally, when company demands and employees' abilities are in sync, work gets done –

safely.   Evidence showed that workers met safety demands by applying their knowledge and skill on

the shop floor. Material handlers followed ladder procedures, for instance, and workers used forklift

checklists.

But also, everyone on the shop floor, they're always aware…like where the crane is. It gets loud sometimes, because you have machines going. And, you have this happening over here, and this happening there (moves hands from side to side to indicate overall busyness of shop floor). You can almost see that everybody is looking around before they make their next move - making sure there's not a forklift behind them or making sure that the crane is in a certain spot or there's nobody behind them doing anything else. (Interview, Group, I6GL-40)

4) Crane Rail Tie-Off- Material Handlers are following a new procedure of using ladders, and adjusting straps & the spreader beams on tall stacks of panels alleviating the need to walk on tall stacks of panels. [Assistant Plant Manager] & the safety team will continue to monitor that this procedure is being followed. This item has been closed (Document, Private, D34NL-5)

4) Forklift Check Sheets- These are in place and being used – there still is some training and prompting needed to ensure they are being used on every use of the forklift, but it seems to being going well. Per [Maintenance and Tooling Manager & Safety Manager] (Document, Private, D30NL-5)

However, when demands and abilities are not, performance suffers. A host of evidence

from private documents showed that, between 2013 and 2018, several accidents resulted from an

apparent mismatch between safety requirements and worker knowledge and abilities, including a

back injury from improper lifting, eye burn form improper UV light use, and chin laceration from

absent machine guarding.

> *Accidents*
> 1) *Janitorial employee strained his back lifting metal sheeting incorrectly (Document, Private, D23NL-17)*

> *Accidents*
> *Bonding employee received UV flash burn to both eyes while using UV light improperly. This breaks our 16 month without a recordable incident streak. 16 months without a lost time injury record remains intact. (Document, Private, D42NL-14)*

More evidence cited the occurrence of near misses – at least ten times the number of accidents.

Examples include a ladder left on the crane rails, an employee walking on a dumpster, unsecured

wood, use of incorrect gas cylinder regulator, failure to follow electrical lockout-tagout, improper

forklift use, failure to wear protective equipment, failure to use fall protection, and improper

material placement creating a tripping hazard.

> *Near Miss*
> *5) Material handling employee did not use timbers when flipping thermoform panel with crane & almost dropped panel*
> *7) Fabrication employees cutting dogbones on table saw with no guard covering blade*
> *(Document, Private, D19NL-24)*

> *April 2015 Near Miss Report*
> *2) Bonding employees left ladder on crane rails*
> *5) Ladder fell while employee was using it improperly*
> *(Document, Private, D32NL-12)*

> *January 2015 Near miss reporting*
> *2)   Finishing employee walking on side rail of dumpster*
> *(Document, Private, D29NL-11)*

> *May Near Miss Report*
> *1)   Bonding employees using wrong regulator on Argon bottle*
> *(Document, Private, D33NL-11)*

Insufficient employee knowledge or ability led to numerous unsafe actions, such as using an

incorrect tool to cut banding, failing to wear a forklift seatbelt, failing to sound the forklift horn, and

working under a suspended load, and creating an uneven load.

> *Unsafe Actions*
> *1) Employee nearly injured hand cutting banding with wrong tool (Document, Private, D53NL-12)*
>
> *Unsafe Actions*
> *5) Material handling employee not wearing seatbelt on forklift*
> *6) Casting employee did not sound horn on forklift while traveling around blind corner*
> <div align="right">*(Document, Private, D55NL-11)*</div>

Finally, there were instances where protective gear was required, but not worn – lack of respiratory

protection in the polymer lab, eye protection during finishing, and face protection during planning.

> *Not Wearing PPE*
> *1) Casting employee not wearing respirator within 36 inches of mixing pot*
> <div align="right">*(Document, Private, D53NL-16)*</div>
>
> *Not Wearing PPE*
> *1) Fabrication employee planning without face protection*
> *2) Finishing employee not wearing eye protection*
> <div align="right">*(Document, Private, D56NL-21)*</div>

2.   Individual Tasks and Skills Construct: Summary

Quotations about the individual tasks and skills construct were found primarily in private

documents and group-level interview transcripts (TABLE XLI). More quotations pertained to the

demands-abilities theme than the needs-supplies theme. Former and new owners made fewer and

more safety demands, respectively.   Former and new leaders and managers displayed different

leadership styles and personal traits; the latter were described as more democratic, disciplined, and

driven toward safety. Workers, too, under former and new owners, possessed less and more

respective safety ability. The match or fit between corporate safety demands and workers' abilities

enabled the safe conduct of work. Mismatch led to accidents, near misses, unsafe conditions, and

unsafe behaviors.

TABLE XLI: INDIVIDUAL TASKS AND SKILLS CONSTRUCT SUMMARY

	Primary Sources	Private documents, interviews
	Primary Units of Analysis	No Level, Group-Level
	Prominent Themes	Demands-Abilities
Summary of Prominent Themes	Demands-Abilities	- The former owner made few safety demands of employees. - The owner's entrepreneurial traits and production-centered leadership style did not align with safety and health. Workers, historically, did not possess adequate safety knowledge and skills. - Under the new owner, safe behavior was a corporate requirement, codified by policy. The company expected workers to follow safety procedures (i.e., fall protection); maintain and wear PPE; participate in education and training; perform required safety activities, including JSAs and STOP™ cards; and to take proactive safety action (i.e., pause work, report near misses). - New leaders and managers brought new styles and traits of leadership and management. Workers, both new and veteran, learned safety abilities on the job. - When aligned, the company's safety demands and employees' safety abilities enabled the safe conduct of work. When misaligned, accidents, near misses, unsafe conditions, and unsafe behaviors occur.

J.   Individual Change Readiness Construct

For this study, individual change readiness or individual readiness pertained to workers'

thoughts, emotions, and behaviors surrounding specific workplace changes, such as safety and

health changes. One hundred eighty-nine quotations were assigned the individual readiness major

code. Of the 246 sub-coded quotations, nearly half were drawn from documents, especially from

private sources. In addition, group-level interview subjects, more-so than organization- and individual-level subjects, commented about individual change readiness (Table XLII).

TABLE XLII: INDIVIDUAL CHANGE READINESS CONSTRUCT, NUMBER OF SUB-CODED SEGMENTS BY SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	3	4	16	
Interviews	28	55	34	
Field Notes	0	1	0	6
Documents, Private				92
Documents, Public				7
Subtotal	*31*	*60*	*50*	*105*
Total	*246*			

Three individual tasks and skills themes were apparent – iterative readiness, context of readiness, and cognitive readiness. Of the quotations, 55% described iterative readiness, 27% mentioned the context of individual readiness, and almost 18% regarded cognitive readiness (Figure 28). Even though this construct regarded the readiness of any company employee, quotations about shop floor workers were most evident. The former two themes are discussed in this chapter.

Figure 28: Individual Change Readiness Construct, Percent of Quotations by Theme
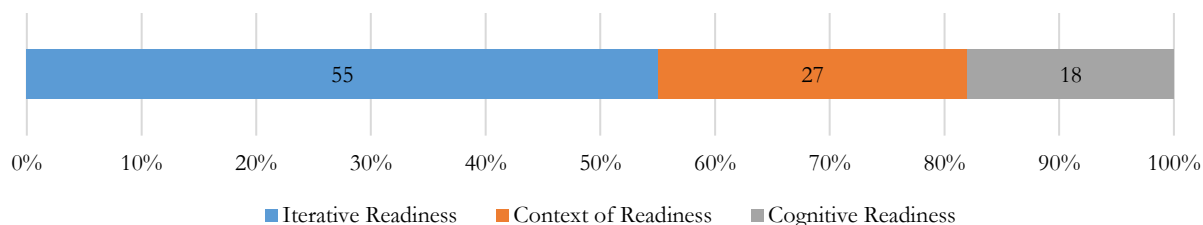
1.   Individual Change Readiness Construct: Iterative Readiness

Iterative readiness, as defined for this study, was a type of individual change readiness that extended beyond thoughts and feelings to actions. This theme was populated by a range of quotations that best converged around their positive or negative orientation. Surprisingly, about half of all text segments regarded lack of readiness.

a.   Insufficient Iterative Readiness

Lack of individual readiness was ever-present – historically and throughout the company's safety transition. Long ago, according to individual-, group-, and organization-level interview subjects, employees, who may have known better, worked unsafely to get the job done. Painters, for instance, laid under heavy suspended panels, and fabrication staff worked too closely to moving equipment.

> *I think back in those earlier days, it was just get the job done and get it done on time and get it done quickly. There was a lot of short-cuts, and it was easy to do them. It was,' well we know we can do this, because it's tribal knowledge,' and whether it was safe or not was 'ah, we probably won't get hurt.' You know, I don't know if there was a lot of not-reporting going on but employee buy-in was one of the hard parts. (Interview, Group, I3GL-70)*

> *The culture was hard to battle. When I first started here, I would see people laying under suspended panels painting them. You know, suspended from the frame – really, really dangerous acts.   The 'we've always done it that way' mentality. (Individual, Group, I1GL-103)*

For example, there are certain things that we are unable to finish, or were unable to finish, because we didn't have the tools, because we had to improvise. Sometimes improvising was not always safe to get the job done. (Interview, Individual, I7IL-54)

In late 2013 and 2014, when the company introduced safety initiatives to improve workplace safety and health, veteran workers had a difficult time embracing and following new rules, such as the use of personal protective equipment.

I think one of the big challenges is some of the long-tenured employees that we've had that did things a certain way for a number of years. And then we've come to the point where we're trying to make things safer, and trying to get people to work safe. And trying to get that mentality across to the older employees has been kind of difficult. (Interview, Organization, I4OL-77)

Right, and walk around, wear your safety glasses, lead by example. 'Wear your steel toes.' 'I don't have to wear steel toes.' 'Why not, I do.' I used that a lot of times. People looked at me and said, 'really?' I had one guy stomp on my foot, because he didn't believe me. I was, like, that's not the way I'd go about doing it, but 'you understand?' (Interview, Organization, I9OL-65)

… And there were some workers, for example those ones that we mentioned earlier who wore contacts, and who didn't wear safety goggles. When the prescription goggles were introduced, they were not pleased. They said they were too big or not comfortable, or something like that. There was some resistance to those as well. And another example is the respirators for the people working in departments requiring toxic chemicals, some of the men were not happy with those, because that meant that they had to shave completely. And that was inconvenient for some, and they didn't like that. (Interview, Individual, I7IL-66)

Consequently, as evidenced in near miss reports, lack of iterative readiness was very apparent between 2013 and 2015. All sorts of behavior-related safety mishaps occurred, including unsafe exposure to electrical and chemical hazards, failure to follow shop safety protocol, and failure to properly use equipment.

NEAR MISS (September 2013)
1) Maintenance employee failed to lock out circuit breaker in Tool Prep almost resulting in electrocution while working on OMAG area shop light.
2) Crane wire snagged tie off bars over tunnel placed in the Finishing Area & almost flipped tie off bar.
3) Visitor with open toed shoes on [company] shop floor
(Document, Private, D13NL-18)

Near Miss (June 2014)
3) Scheduling employee giving tour in sunglasses with two small children & a guest in shorts on [the company] shop floor
(Document, Private, D22NL-11)

Near Miss (October 2014)
1) *Bonding employee grinding metal with no face shield*
3) *Fabrication employees handling [plastic] without gloves*
7) *Tooling employee walked under suspended box pour spreader beam*
8) *Janitorial employee was trying to straighten up haphazardly stacked wood tool in dumpster was exposed to foot penetrations*

(Document, Private, D26NL-10)

April 2015 Near Miss Report
1) *Fabrication employees left 16" circular saw in tunnel section overnight*
2) *Bonding employees left ladder on crane rails*
5) *Ladder fell while employee was using it improperly*

(Document, Private, D32NL-12)

Some shop floor workers, especially new and temporary workers, didn't think safe work habits were

very important.

> *I think the safety guy does a good job of keeping an eye on new employees, and temp workers who don't know a lot about the safety part of this job. Some people just don't think it's a big deal to do the little things that keep this job safe. (CIR, Individual, S15IL)*

> *Still, [Safety Manager] get(s) it from some employees, especially from newer hires, and that's why they sit through 9 weeks of safety training. A lot of it was 'I don't have time for this.' It's kind of like 'well, actually you do, because we're paying you to do it.' And, 'repeat after me, you're hourly, it doesn't matter what you're doing as long as you're here, you're getting paid, you really shouldn't have a preference.' And, kind of selling it to them that way. So, 'get here in the morning, grab yourself a cup of coffee, take 10 minutes to fill out a JSA, and put a positive spin on it.' 'We're giving you a break the first thing when you walk in in the morning.' 'Yeah, you've got to fill out this safety paperwork, but you're getting paid to do it.' (Interview, Group, I1GL-103)*

Others were pressured for time or simply resistant to change.

> *Despite how hard they tried, they still have lapses, because people are busy, and you have employees that are difficult and defiant and resistant. (Interview, Group, I3GL-40)*

Even after mid-2016, after the company had been declared safety excellent through OSHA SHARP

certification – there were consistent lapses in individual readiness. The same types of lapses

continued to occur.

> *Near Miss (November 2016)*
> 1) *Strap cut while flipping panel because meniscus was not removed*
> 2) *Tool almost dropped on machining employee foot as it was released from holder too soon*
> 3) *Installation employee almost hit with headache ball of crane as material handling employee hit wrong button*
> 4) *Bonding employee using razorblade with no holder or PPE*

5) Fabrication employee handling scrap without leather gloves
6) Material handling employee did not follow LOTO procedures
7) Fabrication employee planning without face shield
11) Machining employee inside motion master enclosure while spindle was turning
12) Purchasing employee not wearing safety glasses
13) Logistics employee not wearing safety glasses
16) Casting employees working above 4 feet with no fall protection
17) Casting employees operating forklift in enclose space with no CO sensors
18) Material Handling employee working above 4 feet with no fall protection
19) Casting employee under mixer blade with cotter pin barely holding it up
20) Material handling employee operating forklift with no seatbelt

(Document, Private, D51NL-15)

Not Wearing PPE (February 2017)
1) Fabrication employee planning without face protection
2) Casting employee not wearing respirator while working with MMA

(Document, Private, D54NL-18)

Unsafe Actions (May 2017)
1) Finishing employee working above 4 feet with no fall protection
2) Material handling employee not wearing seatbelt on forklift
3) Casting employee overexerted himself

(Document, Private, D57NL-12)

Unsafe Actions (December 2017)
1) Pressurized air hose was disconnected causing uncontrolled release of high pressure air

(Document, Private, D64NL-10)

Through near miss reporting and auditing, the Safety Manager tracked lack of iterative readiness.

For example, even though some wore protective gear and appropriately handled chemicals, others

failed to do so.

> *[Safety Manager] was starting to see more near misses, but they were not being reported. [He] was walking by supervisors and telling their employees, 'hey, tie off' or 'hey, where are your safety glasses.' [He's] looking at the supervisor and saying, 'I shouldn't be doing this at this point, you should be doing this.' 'What are you doing?' (Interview, Group, I1GL-139)*

> *In March 2018, three departments – Maintenance, R&D Lab, and Tool Prep - received less than a perfect score. Findings included employees without safety glasses, blocked egress, blocked fire extinguisher, and improperly stored flammable chemicals. Tool Prep scored the worst – 2s and 3s for three items.... (Field Note, F18NL-12)*

b.   Sufficient Iterative Readiness

Just as insufficient iterative readiness was ever-present, so was iterative readiness.

Historically, when safety was a shifting company priority, at least one shop floor manager and one laborer acted in support of safety.

> *After the initial Safety Manager retired, management got a little bit more involved in managing departmental and shop safety. The Plant Manager, specifically, did a lot with trying to get departments to manage their people and make sure they were doing the proper thing – working safely and following policies – the policies that we did have at the time. (Interview, Organization, I4OL-24)*

> *When I started here in 2006, it was scary. I want to say, my second day here, I watched my supervisor at the time break somebody's middle two fingers on his hand, and then told me – demanded - that I did the same thing that this guy was doing after they sent him off to the hospital, so we could get his job done. I told them 'no' and left the premises. I was called the next day. They asked me why I left premises – if I had quit, and I told them the story and asked them to look at my co-worker's hand. And I said, 'well, he wanted me to do exactly what the other guy was doing, and he told me if I didn't, I was fired, and so I left. (Interview, Group, I1GL-43)*

Early in the safety transition, some workers followed safety requirements, albeit reluctantly, such as completion of JSAs and participation in Gemba Walks.

> *I can look back and perceive the value that came out of [Gemba Walks] was, it was… building a foundation and the initial parts were the culture change. Nobody liked to do it. It wasn't an important thing, but people were paying attention to what they were reporting. And, the notion of the continuous expectation of reporting is going to happen, and we're not going to get away from it, so embrace it. (Interview, Group, I3GL-65)*

> *I think the biggest part – JSAs were very hard to get over, because none of us wanted to do them. We still don't really want to do them. Um. Ah, I think it's mainly just doing them - having the time to stop. It only takes five minutes to do, so this is going to sound like a bad excuse, but sometimes I don't have five minutes. A lot of people on the floor don't have five minutes. … So, you're got to hurry up and do them. In the long run, we have time to do them. Again, it's just an excuse. (Interview, Individual, I2IL-70)*

Throughout the transition, sufficient readiness was inspired by the altruism of the Safety and Plant Managers.

> *When the position was filled again in 2013, the new Safety Manager really took the lead in making [company] #1 in safety, and creating a safe work environment for all employees. His passion and drive is what makes every employee strive to work the safety way possible. His presence and awareness on the shop floor keeps everyone honest and working safely. (CIR, Organization, S29OL)*

> *We had a really good Plant Manager at the time. He was an ex-marine. He was very... When you got him convinced of something, he was very focused. And, it didn't take long, you know, when we could show him, 'take this up, take this up, take this up, here's what you're going to be able to get.' Yeah, it took about a month, and he was on-board, and things changed. (Interview, Organization, I9OL-60, 65)*

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Multiple sources reported that, as the company's safety culture matured, there was increasing

evidence of iterative readiness. Most obviously, workers complied with safety requirements,

including completion of JSAs and STOP™ cards, participation in Toolbox Talks, use of new

checklists, and adherence with new procedures.

> *According to the card that I observed, on March 1, 2018, a named shop floor worker spent 10 minutes observing two coworkers using a large saw. This worker neither noted unsafe actions nor conditions during saw use. The person completing the STOP™ card added observation-based comments – "waited for saw to STOP™ before entering OMAG," and "moved sawblade out of way to measure panel." (Field Note, F18NL-10)*

> *5) Fork Lift Check Lists- Check sheets are being used by Tooling, Tool Prep, Casting, Commercial and Fab. Still need to get all departments in the habit of using these. Per [Safety Manager] (Document, Private, D32NL-6)*

> *4) Crane Rail Tie-Off- Material Handlers are following a new procedure of using ladders, and adjusting straps & the spreader beams on tall stacks of panels alleviating the need to walk on tall stacks of panels. [Assistant Plant Manager] & the safety team will continue to monitor that this procedure is being followed. This item has been closed (Document, Private, D34NL-5)*

> *6) Fall Protection on Casting Deck- [Onsite Consultation] auditors have accepted our procedure changes to our fall protection in the casting room, and audits by [Safety Manager] show the casting employees to be using the new procedure. [Safety Manager] will continue to monitor. This item is closed. (Document, Private, D34NL-7)*

Workers earned rewards for their sustained safety behavior.

> *… And another thing, there's safety awards handed out at the end of the year, so people can get $100 or a couple hundred dollars in incentives for being well-behaved. (Interview, Organization, I5OL-65)*

> *So, they weren't small prizes by any means. It was something that you had to work for – you had to sustain that over three months. So, it wasn't just you got lucky one month, you actually had to work the program for three months. In doing that, we drove the employees to force their managers to take the time for safety and health. (Interview, Group, I1GL-80)*

Evidence showed that employees freely reported hazards to managers, engineers, and safety

Committee members.

> *As far as having those groups in there and making those decisions, if you look at our Safety Committee meetings or the agenda, a lot of it is employee-brought up stuff. (Interview, Group, I1GL-100)*

I think our employees are one of our major assets. If they feel something isn't safe, they'll go up to engineering. They can go and talk to anybody about safety if they're not comfortable, and we'll work through it. (Individual, Organization, I4OL-104)

Around 2015, an employee may have acted in the name of safety and reported a heat stress concern to OSHA enforcement.

Following interview, the subject told the story of how adequate recordkeeping satisfied a 2015 OSHA inquiry. The inquiry may have been prompted by an employee complaint. Even though OSHA did not conduct an On-Site audit, the company was required to respond to OSHA's inquiry. (Field Note, Group, F3GL-8)

Workers acted to control hazards, too. Sources most mentioned their use of personal protective equipment.

One hourly employee asked the CEO to kindly put his safety glass[es] on, covering his eyes not his forehead. (CIR, Organization, S32OL)

Not Wearing PPE (May 2017)
1) No reports of employees not wearing proper PPE in May (Document, Private, D57NL-16)

Not Wearing PPE
1) None reported (Document, Private, D65NL-16)

Iterative readiness was apparent when shop floor employees sought safety assistance with new equipment and new chemicals, for example.

A lot of things I take to [Safety Manager]. I ask him what should be done. Um, like with chemicals. I deal with a lot of chemicals in here, but I don't have any place to dispose of chemicals in this room. I don't have a hood – I don't have things like that. That's kind of a challenge for me, depending on what chemicals I use, because I can't use certain chemicals in this room without a vented hood. So, I have to use them in our bonding room. I don't know if that's what you're looking for as far as challenges, but if there's anything, I go to [Safety Manager] with it. (Interview, Individual, I2IL-96)

And the other thing is that we do comment to the person who's in charge of safety. We consult that person - 'is this adequate?' 'Is this safe?' And that person has to say yes or no. (Interview, Individual, I7IL-54)

Workers also provided constructive safety assistance to peers on the shop floor and in the office.

I know, as far as the crane, at any given moment, you can hear somebody yelling across the room to someone else, or watching someone else, because the crane is coming through and maybe they're turned the opposite way. You'll always hear that on this floor. (Interview, Individual, I2IL-150)

You look out for yourself, and the guy you're with. If he's doing something, you say something. I've only really worked two places, [redacted industry] and here. [Redacted industry], if you got hurt out there, you were usually dead…. I'm set in my ways on safety. (Interview, Individual, I8IL-107)

As far as for me, I'm going to come in and do whatever I have to do, and we're going to be safe about it, and get it done. I think these guys out on the floor are the same way. (Interview, Individual, I8IL-113)

Eventually, workers willingly participated in voluntary safety initiatives, such as Health Week screenings.

They want to be involved with the Health Week type of stuff. They show up for the biometrics. I think we had 58% or 59% of our employment go through the biometrics thing last year, which is huge. (Interview, Organization, I9OL-196)

There was evidence that iterative readiness transformed safety in this mid-sized firm. Over time, safety awareness and employee commitment increased.

…We're becoming more aware. You know, I've been here four years, and when I first started – even now, I can tell the difference in how much people are more aware of what they're doing – of the cranes going by [points overhead], of the trip hazards on the floor. Well, you probably saw as we were walking through, when you see a panel with a corner sticking out, they all have things now covering them to try and keep you from hurting yourself. So, I think it's just...somehow, we've all become more aware. (Interview, Individual, II2IL-38)

These safety practices in combination with outstanding management support and employee commitment have led to the success of [company's] safety culture. The company has seen this hard work literally pay off. (Document, Public, D85NL-19)

We're a pretty powerful team, and I think we've tapped into that. We have a lot of great talented people, and I think it's our people that we've tapped into to make this work. It doesn't matter how much you sell it, how much you give away, how much of anything you do. I mean, you can stand there, and preach safety on the corner every day. It really comes down to the people and their willingness to do it and our management. (Interview, Group, I1GL-128)

2.   Individual Change Readiness Construct: Context of Readiness

The context of readiness sub-code was assigned to quotations that described the setting or conditions that either supported or failed to support readiness. This theme, then, regarded the context of cognitive and iterative readiness. Examples of this theme coalesced around four topics – the historic work environment, leadership and management practices, core processes, and individual tasks and skills.

a.   Historic Work Environment

The historic work environment did not always support individual safety readiness. The

company's production priority, workers' lack of safety knowledge, and owner's habits challenged

readiness.

> *The first thing that comes to mind is the employee buy-in. You know, it's tough to break old habits, and change a culture where you had a single owner and the evolution into an investment group and board members and a changing of organizational structure. It's difficult to put on the staff – the production line workers - and also expect them to change their behaviors and change their perceptions and be willing and able to report - and stop cutting corners. I think back in those earlier days, it was just get the job done and get it done on time and get it done quickly. (Interview, Group, I3GL-70)*

> *People couldn't even tell us where the rules and policies were, ok. We're at step one. So, we had to go through, and get the policies updated, and get the procedures updated, and get them into format, get them out in front of people, get them certified, get them signed off, get them trained to, get them… Now, here's what's expected. We started with the shop floor, because we had issues with the shop floor. We had even more issues with the office environment - they just didn't care. (Interview, Organization, I9OL-60)*

Even after the safety transition began, production pressure derailed safety decisions, such as

decisions to disable machine guards and interlocks.

> *It's our big 5-axis CNC machine, and they can do milling and saw cutting of [plastic]. Well, he was in there with it, and they were moving something out of the way, but the machine was still running, and he backed into it, and it cut him all across his back. … Because they had the door safety latch disabled, so they could open the door to the milling machine. (Interview, Organization, I4OL-53)*

b.   Leadership and Management Practices

According to a handful of multi-unit sources, executives and managers influenced individual

readiness. Under new company ownership, leaders and managers led by example and created

conditions that fostered safety buy-in.

> *Right, and walk around, wear your safety glasses, lead by example. 'Wear your steel toes.' 'I don't have to wear steel toes.' 'Why not, I do.' I used that a lot of times. People looked at me and said, 'really?' I had one guy stomp on my foot, because he didn't believe me. I was, like, that's not the way I'd go about doing it, but 'you understand?' And he said, 'well, you do wear them,' and the next day he had them. (Interview, Organization, I9OL-65)*

Sources agreed that the Safety Manager was the most influential. His vigilance and safety-oriented

behavior on the shop floor and his personal traits provoked cognitive readiness.

When the position was filled again in 2013, the new Safety Manager really took the lead in making [company] #1 in safety, and creating a safe work environment for all employees. His passion and drive is what makes every employee strive to work the safety way possible. His presence and awareness on the shop floor keeps everyone honest and working safely. (CIR, Organization, S29OL)

I personally first started to notice a positive change in safety mindset when [Safety Manager] was put in charge of safety. [Safety Manager] is the face that we all see when it comes to safety implementation and someone above him created this position. … Attention to detail & driven to succeed - these are the things that makes [Safety Manager] successful & drives the rest of us nuts. (CIR, Group, S6GL)

I think the safety guy does a good job of keeping an eye on new employees, and temp workers who don't know a lot about the safety part of this job. Some people just don't think it's a big deal to do the little things that keep this job safe. (CIR, Individual, S15IL)

c.   Core Processes

According to a multitude of quotations, corporate safety programs and activities were

designed to enhance health and safety cognition and behavior.

So, we're saying that if we raise the awareness, and we get people to think about it every day, then accidents should go down by themselves. (Interview, Group, I1GL-73)

Individual readiness was undergirded by the company's general injury and illness prevention policy,

which required employees to understand and comply with safety rules.

ACKNOWLEDGMENT OF RECEIPT AND REVIEW

*IMPORTANT *: This form must be signed and turned into your supervisor or the H.R. Director.
As an employee of [company], I acknowledge that I have received the Injury and Illness Prevention Program's "Safety Manual" and that it is my responsibility to read, understand and comply with all safety rules and policies.
I acknowledge that I have read, understand and will comply with the safety policies and procedures described in the Injury and Illness Prevention Program's "Safety Manual".
I also acknowledge that this manual has been issued to me as a property of [company] and that it is my responsibility to keep it in good condition and to use it for training and other record keeping purposes.
I understand that if my employment with [company] is terminated that I am required to turn this manual in to the H.R. Director or Plant Manager before compensation of pay will occur. (Document, Private, D1NL-48)

The success of this injury and illness prevention program depends primarily upon the cooperation and active support of all employees. As part of our organization, each employee is expected to abide by these rules and follow safe work practices to help ensure his or her safety as well as that of fellow employees and our customers.
We will be counting on you to do your part in making our program an effective one. The success of this program will benefit all of us. (Document, Private, D1NL-63)

305

Multiple document and group- and individual-level sources agreed that the STOP™ program

best prompted individual readiness, because the process required application of safety knowledge

through peer observation, behavior analysis, and conveyance of constructive feedback.

You had the STOP™ safety card. That was one of the first things they did was the STOP™ safety card. That was... [HR Director] was still here. And then after that, you started doing Job Safety Analysis every morning. Yeah, doing those things just gets you thinking throughout the day. (Interview, Individual, I8IL-36)

The first step that I specifically remember was the STOP™ safety program. Enrollment in that. You know, created by DuPont; I think it was DuPont. … Everybody was going to be brought in - you're in charge of safety, you're in charge of safety, you see something... Every individual was capable of and expected to coach every other employee. (Interview, Group, I3GL-23)

I think the STOP™ Safety training we receive when we start working has made safety better. Manufacturing is new to a lot of people so the training helps employees Be able to identify and correct or at least voice safety concerns. (CIR, Individual, S20IL)

For me this is easy to answer. I have always known that if I feel something is unsafe I can stop production until it is safe. and we have done this. the company started using stop (STOP™) cards and tool box topics. (CIR, Individual, S17IL)

We also have STOP™ cards, so if you see somebody… The way that I look at it, it's not necessarily, like, 'you shouldn't be doing that.' It's more of like, 'hey, I saw you doing this, and you shouldn't be doing it.' It's like giving like a friendly nudge. I just think that it's engrained. (Interview, Group, I6GL-70)

Employees were recognized for STOP™ contributions.

Employees receive feedback on their STOP™ cards and are recognized when they make suggestions that improve employee safety. In addition to monthly STOP™ cards, employees also fill out a daily job hazard analysis (JHA) card on a task of their choosing. The JHAs and STOP™ cards help to keep safety on the forefront for all [company] employees. (Document, Public, D85NL-16)

Job Safety Analysis or Job Hazard Analysis, too, prompted workers to think about safety

every day. However, some workers harbored negative thoughts and feelings about JSAs.

I think safety awareness was enhanced when we began to fill out JSA's, for projects It created awareness of hazards before a specific task was performed. (CIR, Individual, S22IL)

JSA's have also helped to keep employees thinking about the hazards they may encounter on a day to day basis. (CIR, Individual, S24IL)

It's basically what [JSA] is….to make everybody stop and think about what you're doing and the potential things that could harm you. (Interview, Individual, I2IL-21)

So, with the JSAs, you got to think about it at least once a day. You can't just put your blinders on. You got to think about safety at least once a day, even if you're writing down the same old thing that you do day-in and day-out. Now you're focusing on what could happen, how we're going to prevent it, blah, blah, blah, blah, blah. (Interview, Group, I1GL-71)

There was very strong cross-source, multi-unit evidence that training, both formal and informal, provoked readiness by instilling safety knowledge and setting common behavioral expectations. Education was especially useful early in the transition, and new employee training perpetuated safety awareness.

We do have our nay-sayers; I'm not going to say we don't. In the beginning, to get them on board, it was tough. They weren't all on board right away. You really just had to educate them. (Interview, Group, I1GL-112)

[Safety Manager] tell(s) a lot of our new guys when [he] cut(s) them loose after nine weeks of safety training, 'now you have more education than I did when I started doing this.' 'Go forth and do good things.' (Interview, Group, I1GL-107)

Continued safety training such as new employee indoctrination training, and OSHA training … Awareness Accountability Training (CIR, Individual, S21IL)

The company provided annual and optional training. Voluntary first aid and CPR classes, for example, gave interested workers a new opportunity for involvement.

53. Employees are involved in organizational decision making in regard to safety and health training.	*3*
Comments: Employees are allowed and encouraged to sign up for additional health and safety training, i.e. continuing on to an OSHA 30 hour after receiving their OSHA 10 hour.	

(Document, Private, D83NL-53)

Training fostered safe behavior on installation sites, especially sites that had few safety requirements.

(At some international installation sites) or, where it's easy to get on, as far as safety and health – those are the ones [Safety Manager] have to worry about. And that's why all of our installation leads or managers are OSHA 30 trained. [Safety Manager's] OSHA 30 was built with them in mind, because [he] can't be there. 'You have to be the safety and health manager there,' on top of everything else you have to do, so here's the education you need.' (Interview, Group, I1GL-168)

The provision of Toolbox Talk education also fostered individual readiness by reorienting workers to hazards and risks after the weekend.

The first thing Monday morning, we want you to sit down and have a safety talk. After you've had your safety talk, then you write your JSA, and now you're really thinking about safety, even if you're just cursing the Safety Manager for making you do all this stuff. And, now we send you to work. (Interview, Group, I1GL-72)

Also the weekly Tool Box Talks are great at keeping safety fresh in the minds of employees every week. The tool box talks cover different safety topics every week. (CIR, Individual, S24IL)

34. Employees receive appropriate safety and health training.	3
Comments: Annual training is given to employees as well as weekly tool box talks. Tool box talks are given on Mondays to bring employees' attention back to safety and health after the weekend. Additionally, [company] has begun giving employees OSHA 10 hour courses. The goal is to have all employees receive their 10 hour card. 10 hour courses are offered during employees' normal working hours and are taught by [Safety Manager] who is a certified trainer.	

(Document, Private, D6NL-34)

In addition, stories about past injuries and accidents served as real reminders of danger and the need

for peer concern.

I can tell you the stories that I've heard. Such as, one of the guys got his toes cut off. We did have a fatal accident here. Those were long before my time, so I don't know any details about them. … A lot of people, when you talk to them - everybody, I think, here. And I want to say that it's probably the way [Safety Manager] handles things. They kind of talked about it before, but now it's really a subject that when we go out there [points to production floor], you've got more people looking out for everybody. And I think that stems from things that happened long ago, before most of us got here. (Interview, Individual, I2IL-28)

But, it wasn't very hard selling employees. At the beginning, it was a bit hard, but you give them a carrot. Tell them, 'if you do this, we'll give you this.' But, a lot of them had already seen the things that I saw, as far as how unsafe it used to be. We've had a fatality here. We've had a catastrophe here. The fatality was in 1999, and the catastrophe was in 2008. They've seen what can happen. … It wasn't hard to get them on board, because it was just like 'guys, you know how bad it is here, as I know it is – as what I've seen it is.' (Interview, Individual, I1GL-122)

Safety rewards and incentives were touted by many sources to support cognitive and iterative

readiness – how can I benefit.

Incentives for safe practices … Many employees care about safety but do not actively think of safe practices without the incentive (what's in it for me). (CIR, Group, S4GL)

We have programs, like, if we go a quarter without safety problems, they get a bonus – or is it a year? I'm not part of that program, so... But, I think that was something they started, almost like bribing people to become part of that culture – to be part of that thing. And now they pride themselves on people that have been years and years and years without an accident. They get these bonuses. It's exciting and it's fun, and it's something that incorporates everyone in. (Individual, Group, I6GL-45)

Reward frequency set the tone for comradery and safety buy-in.

> *I think [safety incentive program] creates comradery. There's unexpected benefits that show up in those things, especially when you see it often. You see it twice a year – eh, it's just another safety lunch, but when you see it every month, then you start to hear, whether it's in your meetings - and, again, I don't know that you even asked a question about it, but the visibility of it - you start to hear about programs that we're involved in, and benefits that we're receiving, and you're getting luncheons, and people are getting jackets, and the more we see, the more we hear, the more you've got buy-in. 'This program's not going away, so I guess I better participate.' (Interview, Group, I3GL-91)*

The type of reward also mattered. For example, catered safety recognition lunches morphed into home-cooked lunches. This type of change propelled camaraderie.

> *… And then we reinstituted the (safety) lunches. Now they're not...they're not 'let's buy pizzas.' [Safety Manager] and [Director of Quality and Safety] both agreed that pizzas are not a good avenue anymore. So, [they] do something very different when we have lunches. It's either barbeque, or we have a lot of Hispanic group out here, and they love to cook. They love to do things, so we buy all the meats and the foods, and they do all the cooking for a burrito day or a taco day. You know, I mean, we get some pretty extensive tacos! But, so we're driving their involvement with it, as well. 'You earned this, so now you get a day off to cook, and do all this stuff, and serve the meal.' There's so many that sign up and jump onto that. It's not that they're getting out of work, it's that they're doing something that they like. We use that as another mechanism, and we keep moving forward from there. (Interview, Organization, I9OL-124)*

On some occasions, small gifts, such as water bottles to counter heat stress, boosted safety readiness. On other occasions, especially after the company heavily cut the safety incentive budget, small gifts were perceived as insufficient for the safety effort.

> *3) Safety Incentive Programs- The heat-related illness training & water bottle give away was not only a success, but it also created a large spike in employee morale as pointed out by members of the safety committee. (Document, Private, D21NL-7)*

> *So, 2015 was $12,000, 2016 was $10,000, 2017 was $1,000. It's a very big shift. Um. We saw a little bit of a downturn. We still do hear from people, you know, 'why would I do all this for $35 gas?' – type of thing. But, fortunately, it was engrained and it was a habit, so it wasn't a dramatic hit that the process took. I mean, you know, there was grumbling – rightfully so. (Interview, Organization, I9OL-114)*

Despite inducing positive individual readiness in some, incentives were ineffective and even fueled apathy for others.

> *But, when it came time for the shop floor, we did our audits, and when people failed, we told them they failed, and we told them why. And when they said, 'there goes my $35,' we said 'yep, just imagine that you could have a tank of gas that you didn't have before.' 'This is something you did.' 'Nobody did this to you, you did this to yourself.' (Interview, Organization, I9OL-122)*

Well, there was an incentive...safety incentive program. I can't say it gave me a lot of buy-in. My perception of other departments and others around me, the perception of buy-in wasn't there, because it felt lop-sided. The same departments always won, because maybe they had a good manager that had a different stress on it. They had a greater volume of people in that department, and therefore were able to play the percentages and the odds and get higher participation versus departments with two people and three people. So, how much did it really create buy-in, I don't know. But they did have a program, and it has since dropped off a little bit. (Interview, Group, I3GL-91)

1) Safety Incentive Program- Quality Control is in the lead in the safety incentive program. Overall participation in the safety management system is down. (Document, Private, D59NL-2)

Finally, some evidence, though not well corroborated, pointed to the readiness-inducing

value of other core processes, including accident investigation, which enabled the company to

explore reasons for inattention to safety.

Anyhow, [Safety Manager] was gone for three days, and they had an incident. Like I said, nobody was hurt, but there was $10,000 in property damage. Ten thousand dollars in [plastic] was damaged due to a forklift accident. The guy dropped a load of [plastic]. So, when [Safety Manager] got back there was the natural like, obviously we've got to investigate it. Even though there's not an injury we're still going to investigate it, because [Safety Manager] strongly believes that every accident or every incident, whether it results in accident, near miss or anything is a flaw in the system. It's not the employee. I mean, an employee did act unsafely, but why did they act unsafely? How did we make it to where it was easier for them to act unsafely than it was to do it the right way? (Interview, Group, I1GL-141)

Near-miss reporting program gave workers reason to think and speak about safety.

Near miss reporting is another big thing. … And, it was brought to everybody's attention that 'hey, something could have happened.' One person saw it - nobody else saw it, but it still is... 'hey, we're going to report this to the group'. We're going to report this to the Safety Manager and he'll address it. Maybe it spurs an even deeper change. It spurs new equipment purchases or discussion of new PPE, things like that. (Interview, Group, II3GL-56)

The company used surveys and leading indicators to directly and indirectly monitor positive and

poor safety attitude and behavior.

You know, the NSC (National Safety Council) wrote the employee perception surveys. [Safety Manager] took that and copied it onto an excel spreadsheet. [He] distribute(s) those every year at the end of the year. [He] do(es) them blindly; [Safety Manager doesn't] even want them handing it back to their supervisor, because [he doesn't] want them to have the fear of 'well, somebody's going to see what I said.' [He] want(s) a very honest answer. [He] just put(s) a box in the middle of the floor and say(s), 'put them in there.' (Interview, Group, 1GL-178)

We wanted to take a proactive approach, not reactive; it had to be proactive. So, if you are doing JSAs, and if you are doing near misses, and if you are doing STOP™ cards, we know that you're paying attention to it.

If you are reporting something happened, or you identified a safety concern in another area - how, JSAs or STOP™ cards - we knew you were focused on it. (Interview, Organization, I9OL-94)

What [leading indicators] say to me is our hazard awareness is dropping. We're getting complacent – exactly the term I would use. (Interview, Group, I1GL-144)

Progressive discipline, too, induced iterative safety readiness. Employees were aware that discipline was enforced.

Eventually, you just make [progressive discipline] something you have to do. At that point, it's like having an unguarded machine. Having an unsafe employee or uncooperative employee is just like having an unguarded machine. You own that hazard. And, eventually you have to take steps to correct that employee, because they are causing an unsafe condition or known hazard to everyone around them. Fortunately, we didn't have to do that a lot. I mean, we've done that a couple of times in the past couple of years – more managers than employees. We've lost a couple of managers, because they wouldn't come in, and there's not a lot of companies that do that. (Interview, Group, I1GL-116)

My only other thought would be manager participation – manager and supervisor participation and expectation through threats. You know, 'if you guys don't participate, if you don't do your STOP™ cards…'... JSAs – job safety analysis - had come into the mix, and it seems that those were a couple of years behind the STOP™ program - 2011, 2012. These were part of these repetitious, daily exercises that had to be done, and if they weren't done, there was penalties for it. (Interview, Group, I3GL-44)

Oh, and the benefits (of safety improvement) - better scores, better rates, better participation, greater awareness, greater comfort in talking to somebody else about a safety issue. I mean the self-realization that gosh, I've done a lot of stupid stuff over the years, and nobody called me on it. Now they are. (Interview, Group, I3GL-129)

d.   Individual Tasks and Skills

The company empowered individuals to advocate for safety, which, in turn, supported positive safety feelings, thoughts, and behaviors.

55. *Employees participate in hazard prevention and control activities.*	*3*
Comments: In addition to the STOP program and the completion of JSAs employees are also encouraged to provide suggestions for hazard controls. Several employee hazard control suggestions have been put into place.	

(Document, Private, D83NL-55)

It's important that employees not only understand the necessity for safety procedures, but also have a role in promoting safety and voicing any concerns. Managers must not only promote safety, but also lead by example, he says. (Document, Public, D80NL-23)

Workers had authority to report problems and to recommend safety improvements.

I think our employees are one of our major assets. If they feel something isn't safe, they'll go up to engineering. They can go and talk to anybody about safety if they're not comfortable, and we'll work through it. … (Interview, Organization, I4OL-104)

Well, if it's equipment or something that they need to do a job safer, we look into that and possibly purchase the new equipment. A lot of the ideas that we have come from employees as to how they want to do something to be able to make it safer. A lot of the tie-off bars or restraints for the [plastic] are ideas from the employees to make their job safer. So, supporting the employees in that aspect, and making sure that their voice is heard, and they know we're going to follow through on it has been a big help. (Interview, Organization, I4OL-83)

They even had authority to contact safety suppliers and to provide input on PPE.

52. Employees are involved in organizational decision making in regard to the allocation of safety and health resources.	3
Comments: Employees are given direct contact with safety suppliers. They also have input on any new personal protective equipment.	

(Document, Private, 83NL-52)

3.   Individual Change Readiness Construct: Summary

TABLE XLIII summarizes the individual readiness construct. Three themes emerged from this construct. Two frequently cited themes, namely iterative readiness and the context of readiness, were most relevant to the company's achievement of safety excellence. Private documents, especially Safety Meeting notes, and group- and individual-level interview subjects served as sources of the most data. The context of readiness was described in multiple quotations about leaders' and managers' actions, core safety processes, and workers' safety authority. In other words, the presence of a safety supportive context induced individual readiness. Quotations about iterative readiness and lack of readiness were equally-abundant, both historically and throughout the safety transition. However, as the safety culture matured, workers' thoughts, feelings, and actions tended toward safety.

TABLE XLIII: INDIVIDUAL CHANGE READINESS CONSTRUCT SUMMARY

Primary Sources		Private Documents, Interviews
Primary Units of Analysis		No-Level, Group-Level, Individual-Level
Prominent Themes		Iterative Readiness, Context of Readiness
Summary of Prominent Themes	Iterative Readiness	- An equitable number of quotations mentioned both iterative readiness and lack of iterative readiness. - Insufficient safety readiness was apparent under former and new owners. Even as the company attained excellent outcomes, employees periodically lacked safety readiness. Near miss reports listed unsafe behaviors and failures to use hazard controls. - As the company's safety culture matured, iterative readiness increased. Sufficient readiness led to improved safety outcomes.
	Context of Readiness	- The context of readiness theme coalesced around four topics. - Historically, the workplace context, specifically production pressure, autocratic leadership style, and workers' lack of safety ability, supported insufficient individual readiness. - New leaders and managers, who led by example and personally valued safety, influenced readiness. - Corporate safety policies, programs, activities, and rewards were designed to enhance health and safety cognition and behavior. - Individual's authority to advocate for safety and to report problems contributed to the context of readiness.

K.   Organizational Change Readiness Construct

As defined for this study, organizational change readiness or organizational readiness was the

collective organization-level psychological state and physical capacity needed to achieve specific

occupational safety and health change. This construct was one of the three most voluminous

constructs. Six hundred thirty-four quotations were linked with the organizational readiness major

code. These segments, when sub-coded into two themes, yielded 963 text segments. Seventy-five

percent of quotations were drawn from private documents, specifically Safety Meeting notes.

Another 15% of data emanated from group- and organization-level interviews. TABLE XLIV

reflects the distribution of quotations by source and unit of analysis.

TABLE XLIV: ORGANIZATIONAL CHANGE READINESS CONSTRUCT, NUMBER OF
SUB-CODED SEGMENTS BY SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	0	2	3	
Interviews	72	84	46	
Field Notes	2	0	0	17
Documents, Private				722
Documents, Public				15
Subtotal	*74*	*86*	*49*	*754*
Total	*963*			

The two organizational readiness themes were psychological readiness (62%) and physical

capacity (32%) (Figure 29).   Because organizational readiness is a new concept in the field of

occupational safety and health, both will be discussed.

Figure 29: Organizational Change Readiness Construct, Percent of Structure Quotations by Theme

314
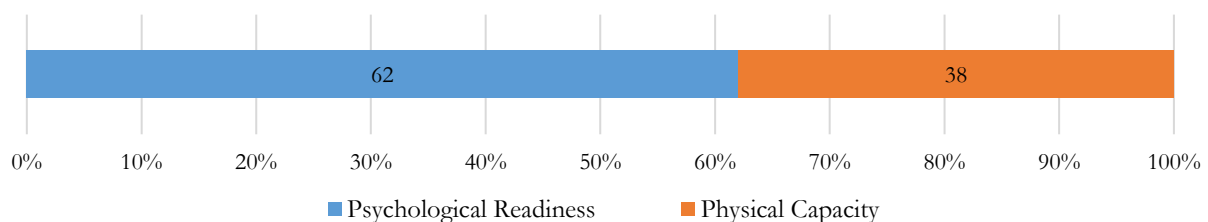
4.   Organizational Change Readiness Construct: Psychological Readiness

The psychological theme, as defined for this study, reflected an organization's shared interest in change, belief in ability to change, effort to make change, and organizational learning for the purposes of change.

In the case organization, psychological readiness was not an all-or-none phenomenon. Even though organizational readiness generally progressed over time, evidence indicated that readiness waxed and waned. Three aspects of psychological readiness were noted – recognizing or believing in the need to change or to maintain change, acting to make change, and improving change.

A.   Recognizing and Maintaining Change

In the distant past, strong evidence showed that fatalities and injuries spurred an interest in safety improvement.

> *Well, I don't know how many years ago, but they did have a death. I don't know any of the facts about it, but I think that was a hell of a wake-up call. (Interview, Organization, I5OL-14)*

> *There's a lot of people on the floor that have been here – [redacted name] is a good example - ten plus or fifteen years, so, they've been a part of all that before. They're really into explaining, 'hey, this is why we do things' (conversation regards past accident and injury events). (Interview, Individual, I2IL-36)*

> *So, the thing that prompted the company to make changes is that there were several accidents that were occurring, and we know that accidents are not good for the company's reputation. So, changes were made to prevent further accidents. (Interview, Individual, I7IL-18)*

> *You know, there are different ways to answer that, because me and a couple of these other guys were here when [redacted name] got killed. … But, that, for us…. I mean, hearing that that day... And, some of the injuries that have happened, like when [redacted name] got hurt. I think that's the biggest eye-opener you're ever going to get. With him, a cylinder fell and he lost a couple toes. So, things like that. (Interview, Individual, I8IL-28)*

Even so, production remained the priority and safety shortcuts were common.

After the initial Safety Manager retired, management got a little bit more involved in managing departmental and shop safety. The Plant Manager, specifically, did a lot with trying to get departments to manage their people and make sure they were doing the proper thing – working safely and following policies – the policies that we did have at the time. A lot of things back in the early days was 'get it done no matter what it takes.' So, people were taking shortcuts and skirting around this to get this done. But management jumped in a little bit and tried to correct a lot of that by being aware of certain departments – what they were doing – and then making the managers or supervisors take care of the issues. (Interview, Organization, I4OL-24)

The company, under the former owner, was psychologically ambivalent about safety. On one hand,

they were ready to hire a full-time Safety Manager around 2000; however, after his retirement two

years later, readiness to rehire a Safety Manager faded.

There was a person killed and another one seriously injured. And, I think from that point and on, they started to try to look at safety, and making sure that employees were working and doing the proper thing. It took a few years. Then they actually hired a Safety Manager to oversee the shop floor. (Interview, Individual, I4OL-13)

He retired, and it took probably… it took several years after that to actually fill the position again. I think that was 2013 when we hired another full-time Safety Manager. (Interview, Individual, I4OL-21)

After the 2008 and 2012 OSHA inspections, the company recognized the need for temporary safety

staffing to improve compliance

Ok. We had an OSHA compliance visit in 2008. … So, when they got hit with that, [redacted name] was kind of a floating employee. [Redacted name] bounced around from department to department and just kind of helped out where they needed help. And at that point, they didn't have anybody to do the OSHA compliance piece, so [redacted name] got involved in that. … That was after the OSHA visit. So, just kind of cleaning up the compliance things that they had found – the gaps we had in the company. (Interview, Group, I1GL-5)

Ironically, according to one source, despite their readiness to assign temporary staff, they ignored

OSHA's corrective deadlines.

As a company, we didn't react to [OSHA violations], we didn't respond to it. They gave us X number of days to put a plan in place; we didn't put a plan in place. They came back and said, 'where's your plan?' And we said, 'what plan?' So, he said, 'OK, here now, you have this number of days, put this plan in place,' and, we did it again. … Yeah. They never completed the implementation of the correction until [Director of Quality and Safety] was here. So, between [Safety Manager] and [Director of Quality and Safety], in particular, and the maintenance guys, is when we finally finished up the implementation and got past it. (Interview, Organization, I9OL-30)

The new owner, who sought to improve operations and profit, believed that business and

safety changes were needed.

Ok, so, we got purchased by venture capitalists. They came in – they owned like 17 other businesses, and they're very safety oriented. OK. So, there aren't a lot of people here who know it, but they have a competition between the companies. We don't talk about it very much, but we're now performing better than all the rest of them. We don't talk about it a whole heck of a lot, because it wasn't really something we wanted a lot of people knowing that there's a competition going on for this type of thing. So, I think they came in – that was a part of it, I'm certain. Because like three months before [Director of Quality and Safety] was hired on, they completed the sale to them. So, they had a whole different understanding, and they were looking at things quite different. (Interview, Organization, I9OL-25)

The company in general has made significant improvements towards bringing safety & safety awareness to the top of their priority list. I'm sure that there are multiple reasons for this but the end result is that it is working…. I'm sure there are financial motivations that triggered this change as industry is directed & controlled by fines & shutdowns of facilities whom do not follow safety guidelines. This being said it is also refreshing to know that [company] did not stop at just compliance, but has excelled at making [company] a safer place to work. (CIR, Group, S6GL)

Their belief was fueled by the company's high Experience Modification Rate (EMod) and high injury rates, which interfered with the company's ability to bid on projects; and high worker's compensation costs, which curtailed profit.

For one, it was our EMod score (refers to the Experience Modification Rating, which is assigned by a corporate insurer to rate a firm's injury experience). And, our accident rate was so high that we were starting to lose out on jobs in the US. Because certain companies won't let you bid the project, if you're an unsafe company – if you have a certain number of accidents. So, we had to get that score down to be eligible for these contracts and jobs in the United States. (Interview, Organization, I4OL-37)

So, vision-wise, what [President] ultimately said was 'you need to improve our safety presence,' and that was pretty much as far as it went. You know, as I dug and did different things, well, our EMod was over 1; it's like,' that is unacceptable.' … The EMod had to be lower - we wanted it less than one; at the time, we wanted it less than one. So, it was 'get us something that's going to do that. (Interview, Organization, I9OL-23)

Yeah, and the company, they want to keep safety, because if you have a lot of injuries - and it's part of the reason (that company improved safety and health) - you lose jobs. Companies don't want to do business with you. (Interview, Individual, I8IL-34)

To change the safety trajectory, the company saw the value in hiring another full-time Safety Manager.

… But, I think that's when (2013) they put [redacted name] in [Safety Manager] position. There was real focus on new hire training, and getting the new hires focused on safety. He did a lot of weekly trainings, like on Toolbox topics and things like that. Certain issues that would come up on the shop floor, he would make it a topic for the next week to discuss with the employees. So, each department has a 5-10-minute meeting in the morning where they would talk and discuss these topics in the mornings. (Interview, Organization, I4OL-34)

… And, [Director of Quality and Safety; executives] decided at the time they needed another Safety Manager, so [redacted name] was a pretty good candidate for that, because he's pretty driven. (Interview, Organization, I4OL-29)

Well, I think they're pretty much committed to [Safety Manager]; they made him full-time. It doesn't matter one bit to me, if they had safety and health, I'm not going to come in here and get hurt. That's just the way it is. (Interview, Individual, I8IL-103)

- *the designation of a Safety Manager in 2014, which was when "things [safety] really got underway" (Field Note, F1NL-28)*

Early in the transition, to prevent harmful exposures, it became apparent that stricter protective equipment policies were necessary. For example, prescription eye protection was required in lieu of contact lenses and respirators that required a clean-shaven fact. Even as the organization was ready to change, some individuals were not.

Another example is that they became more strict regarding footwear, the use of head protection – helmets, and the use of eye protection. In addition, [the subject] is commenting about how people who were wearing…who typically wore contact lenses were less likely to wear safety goggles. But, [company] began to require them to get eye protection with a prescription, so that they had to wear eye protection. They couldn't...there wouldn't be kind of a conflict between the contact lenses and the goggles. (Interview, Individual, I7IL-30)

There was collective belief in the need to train new hires; to maintain awareness through weekly Toolbox Talks and JSAs; and to introduce specialized training for heavy equipment operations and those handling chemicals and UV light hazards.

So, so, the other thing [subject] says is, before, [the subject] had mentioned these weekly memos. These weekly memos about actual happenings at [the company] or general safety rules or safety recommendations. Another thing in addition to that is a daily – I don't know if you could call it a memo or information sheet called Job Safety Analysis. So, basically what that does is it looks at the task that is about to be undertaken – that they're about to do, and they analyze it and look at what could go wrong and do preemptive analysis that would allow them to avoid anything that could go wrong by planning it in advance. (Interview, Individual, I7IL-77)

Another …. There have been changes with regard to training. It used to be the case that new employees would come and any of them could use a forklift or a crane or some of the heavy machinery or things like electrical saws. But, that is no longer the case. Now, in order to use anything serious that could cause an accident, like a forklift or crane, heavy machinery or anything that could cause problems, employees need to have a certification, and that is provided within the company. The training and certification that shows that they are competent to use this machinery. (Interview, Individual, I7IL-45)

So, another example is in the departments that use chemicals or special UV lighting. It used to be that anyone could step into those departments. And now that is not the case. Now, the company requires that people who go there have certifications, so they know if they need to use special eye protection for UV light or special – how do they call it – a respirator to keep from breathing in toxic chemicals. (Interview, Individual, I7IL-45)

As the transition progressed, the company believed that their engineering and fabrication talent could mitigate production-related safety challenges.

We work that very hard. Now, we're starting to get buy-in from other areas. So, like when we have a problem – out in our tool prep area - working on those big tall tools, you know, we had a person almost fall. And we created the near miss. When we created the near miss, it got a lot of attention. So, what are we going to do to fix it? We got buy-in from engineering to help us design or purchase something - a tool - that's going to help them work the height of the tool and create a safe work environment. So, we've got engineering buy-in working with us. We're starting to see things along those lines too. (Interview, Organization, I9OL-216)

In addition to their recognition of programmatic safety needs, tens of quotations attested to the company's recognition of safety problems, including such as high crane speeds; insufficient scaffolding; an outdated fire system; lack of forklift use guidance; insufficient parking lot lighting; and flooring deficiencies.

New Items
Soft starts for overhead cranes (Document, Private, D48NL-8)

Scaffolding Issues in Finishing: New scaffolding in finishing was found to be insufficient. [Safety Lead] to work with [Finishing and Material Handling Manager] on better solution (Document, Private, D12NL-5)

New Items
New Fire Safety System - [The Safety Manager] is working with [named employee] to figure out the logistics of installing a pull tab fire system and doing away the current phone alarm system. He will update us with his progress on that. Per [Safety Manager] (Document, Private, D29NL-9)

When new safety issues were not apparent, that too, was noted.

New Items
No new items were brought before the safety committee for the August Safety Meeting (Document, Private, D36NL-8)

New Items
1) No new business was brought to the table at the January Safety Meeting (Document, Private, D65NL-8)

B.   Acting to Change

To achieve change, recognition or belief must be followed by action – sustained action.

Historically, the company inconsistently followed through with safety action. Safety meetings and

Toolbox Talks, for instance, were conducted irregularly.

> *We have always supposed to have done weekly safety meetings, but when I first started, we didn't really do them. So that's a change. (Interview, Individual, I2IL-54)*

> *Well, we do the Toolbox Topics - a couple of those a month, I think. We used to do those years ago, and then they went away. (Interview, Individual, I8IL-40)*

> Initially, under new ownership, corporate organizational readiness was laissez faire.

> *Um, that timeframe, not a bunch [of positive changes were made]. It was 'well we've got a guy in charge of it now.' In 2014, our accidents actually spiked, because the old way of thinking was still kind of there. My feeling was it was more of a… What happened was everybody kind of threw their hands up and said, 'we don't have to deal with this anymore, because we have one guy, and everything safety - that's him, we don't have to deal with it, and we're good.' So, everybody threw their hands up, walked away from it, and our accidents spiked. (Interview, Group, I1GL-61, 65).*

Later, psychological readiness for change was demonstrated in a multitude of ways. Foremost,

according to a couple interview sources, the company supported or enabled the conduct of safety by

yielding decision-making authority and resources to others.

> *I think… I think for what [company] does is they've allowed people like [Safety Manager] and [Director Quality and Safety] to come in and expand, as far as the safety part goes. They've allowed them to come in and say, 'this is what we need to do' and they allowed them to do it. So, I mean I think that's… because some companies say they want safety – 'we want safety,' but they'd rather they do this instead. I think [company] has allowed them – and I don't think they could have achieved as much as they did without [company] being a part of that. (Interview, Individual, I2IL-121)*

> *I don't think [safety sustainability is] at the executive level at all. I think that the mid-level management group that we have now, we have driven it so hard, I think that if it's not already a habit, it's very close to habit. That's the part that's going to make it sustained, and the management group that we have here working on the shop floor now are the ones that are driving that, ok. I don't think…I don't think the executive groups…I don't think they're part of the equation anymore. … I think that the way and the rapport that [Safety Manager] and [Director of Quality and Safety] have with [Plant Manager] and [Assistant Plant Manager] and the other supervisors and how [they're] driving them, and how [they're] reporting, and how [they're] working with them to keep the environment safe, they're driving it to a different sustainability level than the executives are ever going to get it to. (Interview, Organization, I9OL-142)*

Sources indicated that training and educating were a prominent company-endorsed change

initiative. Newly hired workers were continuous trained, and all workers were annually retrained.

And, a lot of training with the new hires that come in, so they know how it's supposed to be done; so, they're working that way. It's less work for [Safety Manager] when the new hires come in – they go straight into safety training the way that it should be done. That way they're working safe from the beginning, and they're not picking up the old habits from the other guys that have been out there 10-15 years doing it a certain way. (Interview, Organization, I4OL-77)

We are now doing OSHA 10 classes. That just started. He's (Safety Manager) always done safety for initial hires, but the OSHA 10, I think, is now required for everybody. … That's fairly new that he just started. I think the start of last year, but I'm not quite sure. Then, I also did CPR classes. He's doing basic CPR classes for everybody here, too, and that was last year. (Interview, Individual, I2IL-44)

I believe that by training your employees like [company] in STOP™ safety and OSHA 10 has been one of the most beneficial factors in making this place a way safer place to work. (CIR, Individual, S14IL)

At [company], efforts to promote safety occur on an ongoing basis and include daily reminders designed to increase hazard awareness and weekly meetings to go over safety topics. That's not to mention additional meetings, presentations and training courses, [Safety Manager] says. (Document, Public, D80NL-21)

In between trainings, STOP™ cards, JSAs, and Toolbox Talks were cornerstone change actions.

So, one really important change, I think, we receive a memo – a safety and health memo. Each week we get a different one. Sometimes it contains information about specific accidents that have happened - even if a minor accident – explaining how that accident could have been prevented by safety procedures. So, for example, you have a wet floor, somebody slipped and fell, this could have been prevented, etc. …and percentage of injuries or deaths caused by different types of accidents. Sometimes we get a sheet about proper operation of electrical machinery or the cranes. Sometimes it's more general and has nothing to do with the company, like what happens when you get too much sun. Or, if you don't drink enough water, you get dehydrated. So, for example, if something happens at the company, the next…the next memo that we get is about what happened, and what could be done to prevent it. (Interview, Individual, I7IL-40)

The example Toolbox Talk entitled General Safety—Hazard Awareness, is a one-page document with narrative and reflective questions. This handout, which is offered in English and Spanish, is accompanied by thirteen Training Forms – one for each department, I presume. Each Training Form lists the Toolbox Talk title, date, and trainee names and signatures. Even though Training Forms contained additional information fields, specifically, instructor's name, time spent on training, self-evaluation rating (scale of 1 to 4), instructor evaluation rating, and instructor and trainee comments, the vast majority of these fields were incomplete. … (Field Note, F18NL-90)

Other indicators of psychological readiness were perpetual policy improvements, accident investigation for root-cause understanding, audits, Safety Committee involvement, attention to housekeeping, constant talk of safety, availability of quality PPE.

So, they investigated the accidents - things like people getting cut or having things fall in their eyes. What they did was they investigated these events in order to prevent – figure out ways to prevent - other accidents. (Interview, Individual, I7IL-28)

So, they're always talking about safety. They are always telling us and reminding us about safety. Those of us who had been here longer, well we're just like 'yeah, didn't you tell us this two months ago?' 'We've heard this before.' But, the fact is there are new employees who need to hear this, and there are other employees that have been there long but need to be reminded. So, that's one thing that is done. (Interview, Individual, I7IL-95)

Safety efforts also extend to the work environment at [company] and addressing any areas where slips, trips or falls could occur, he says. Maintaining an orderly and clean environment is crucial, too. (Document, Public, D80NL-22)

We had all the procedures in place, all the tools in place, and now we started auditing. We told people, 'audits start the first of next month' – 'audits start the first of next month.' And, we just had that conversation over and over and over. Once we started the audits, you know, the first one really was terrible, but they got better rather quick. Because they saw the effort that [Plant Manager] was there, [Director of Quality and Safety] was there, [Safety Manager] was there, and one of our other supervisors, [Plant Manager], and we were holding them to it. (Interview, Organization, I9OL-62)

Multiple sources indicated that, to achieve and sustain safety change, managers and workers

asserted collective vigilance on the shop floor.

[Safety Manager] would actually come around and talk to you 'so if you start seeing this, because you work here,' or 'if you start seeing this, then we need to fix it.' So, that's the kind of the changes that we made – the things that we could see. We missed a lot. [Safety Manager] would come through and say, 'we're going to do this.' (Interview, Individual, I2IL-40)

[Safety Manager] is just out there a lot pushing it to them. Making sure - 'no you can't do it that way.' 'I know you did it that way for years, but this is how you have to do it now.' Just constantly driving it home to them. 'This is how it's going to be done from now on'. (Interview, Organization, I4OL-77)

That's ... I think that's the hardest thing – sustaining where we're at now and maintaining our safety record. And that's just keeping vigilant. Making sure all the supervisors are managing their employees. Making sure they're working safe. [Safety Manager's] presence on the floor, so they know he's out there. If they're doing something wrong, they're going to hear about it. Just being vigilant and staying aware and making sure that all the employees are following procedures and working safe. That's the toughest thing. (Interview, Organization, I4OL-120)

Important things about safety is that everybody on the floor – everybody I work with - is aware of it. I think, not only do they need to be aware of what they're doing, I think they need to participate in it 100%. [Inaudible] I think our group is good enough that it's OK for me to tell you 'you know, don't do this,' and I think that's important. And I think any company needs to support that and that needs to be allowed. I think [company] does that. (Interview, Individual, I2IL-150)

C.   Improving Change

An aspect of organizational readiness regarded change improvement. For this organization,

more than one round of change, or continuous change, was be needed to reverse poorly-functioning

and deficient conditions.

Even historically, following adverse events, including the fatality and OSHA inspections, the

company saw the need to improve existing work processes, especially those related to material

handling.

> *So, another example, is that about...there was a death about 25 years ago, and that has been talked about.*
> *Before, materials were made of wood, which that is not as safe as steel. So, now, the company has an eye for*
> *safety and it's thinking about safety and has a concern for safety. Perhaps that death is, you know, part of*
> *that. (Interview, Individual, I7IL-116)*

> *I'll tell you something – I'll give you an example of how things operated. You have [redacted name], he was*
> *out tying a panel down. I probably shouldn't tell you all of this, but I'm going to. He was out tying a panel*
> *down, and he was on top of it, and [former Human Resources Director] came by and wrote him up. Well, he*
> *had done that same job that way, and that woman had seen him do the same job that way for several years.*
> *And (now) there was something wrong with that. … How is it a guy can be trained to do a job a certain*
> *way, and then get wrote up for doing it the way that he was trained? (Interview, Individual, I8IL-22)*

After the ownership change in 2013, the company first improved the existing safety

framework – policies, hazard controls, and incentives, for example. Then, policies and programs

were added. One written program, the injury and illness prevention program, was developed in

2014 as an over-arching framework for safety.

> *This formal Injury and Illness Prevention program has been created in order to standardize all the various*
> *safety policies and procedures into one effective, uniform program. … This Injury and Illness Prevention*
> *Program has been designed to meet the specific needs of [company] it is intended to be both practical and*
> *effective. (Document, Private, D1NL-71)*

> *So, we rolled out the safety incentive program, which was really just a way to get them to participate in the*
> *safety management system. We handed out t-shirts, we gave a presentation for 30 minutes, and then we let*
> *them go. (Interview, Group, I1GL-84)*

Procedures were changed. Quotations show that Work Instructions were augmented, forklift

checklists were created, and the SDS system was successfully created from the MSDS system.

> *Work instructions – biggest one. Every department is supposed to have work instructions written on what*
> *they do. Not all of them are current or up to date, because that is something that Quality is working on*
> *trying to improve. But, work instructions are the biggest ones. (Interview, Individual, I2IL-161)*

7. Safety Data Sheets are used to reveal potential hazards associated with chemical products in the workplace.	2
Comments: [Company] has transitioned their MSDSs to the new SDS format. They utilize an online system to maintain any updates to their SDS database along with using hard copy binders in each department so there are no access restrictions.	

(Document, Private, D6NL-7)

Hazard monitoring and controls were improved. For example, shielding was added to the Instron tensile testing machine. In addition, chemical labeling, chemical control ventilation, and exposure monitoring were improved company-wide.

> *It is an Instron. It's technically a break machine. It-it does flexible strength and tensile strength. It does other things too, but… …This wall... When they moved the office in here, they had a cage around the machine. So, when they build the lab right here, which it wasn't here before - it used to be across the way - then this was something that had to go in along with the door, and it was because the guy that was here, before I took over the position. You know, when he'd break things, they'd fly. They didn't incorporate that [points to the metal grate above the blast or shielding wall] until after he voiced that, because they'd still come over (during testing, pieces of plastic flew over the top of the shielding wall). (Interview, Individual, I2IL-108)*

> *For example, we used alcohols, but we also used stronger chemicals. And, now the labeling is more systematic. We know what is inside the containers – what chemicals are inside the containers. (Interview, Individual, I7IL-130)*

> *In addition to their engineering controls, the company operates an extensive air- and noise-monitoring program. [Company] purchased industrial hygiene monitoring equipment, and employees wear air-monitoring badges while working. These surveillance methods ensure that employee exposures remain well below OSHA permissible exposure levels. (Document, Public, D85NL-18)*

Periodic improvements were made to the Safety Incentive Program to increase participation and level the odds of winning.

> *1) Safety Incentive Program- Quality Control is in the lead in the safety incentive program. Overall participation in the safety management system is down. (Document, Private, D60NL-2)*

> *9) Safety Incentive Revamp- Changes to the Safety Incentive program have been implemented, and supervisors have been instructed to train employees on those changes. [Safety Manager] will follow up with employees. (Document, Private, D52NL-10)*

> *1) Safety Incentive Program- Changes are underway for the safety incentive prize structure as ongoing continuous improvement from blind survey. They will be announced as soon as they are finalized. (Document, Private, D53NL-2)*

We did things that people wanted. You know, the first quarter, we actually had a tie – a three-way tie, so we had to come up with a tie-breaker. Second quarter was a two-way tie. One of them was the guys who won the first quarter, but they didn't win the second quarter, and it was different third and fourth. Then, when we got to 2016, we adjusted a little, because we didn't want the tie-breakers, and we didn't want one group winning quarter after quarter. We wanted to make sure we could spread it out, you know, so we did different things to try and adjust it. We adjusted the point levels, and we made a once-a-year adjustment. So, if this wasn't quite working right, we adjusted it, and it went new in 2016. When we went from 2016 to 2017, we didn't make any changes; we kept it the same way it was. No, that's not true. 2016 to 2017 we made changes - 2017 to 2018 we did not make changes. (Interview, Organization, I9OL-98)

To learn about improvements, the company accepted employee suggestions.

Well, if it's equipment or something that they need to do a job safer, we look into that and possibly purchase the new equipment. A lot of the ideas that we have come from employees as to how they want to do something to be able to make it safer. A lot of the tie-off bars or restraints for the [plastic] are ideas from the employees to make their job safer. So, supporting the employees in that aspect, and making sure that their voice is heard, and they know we're going to follow through on it has been a big help. (Interview, Organization, I4OL-83)

I think our employees are one of our major assets. If they feel something isn't safe, they'll go up to engineering. They can go and talk to anybody about safety if they're not comfortable, and we'll work through it. (Interview, Organization, I4OL-104)

- *the company's willingness to seek and accept safety input from production workers (Field Note, F1NL-34)*

They also sought external guidance from OSHA SHARP consultants and their worker's

compensation insurance carrier.

And, there was another Director of Safety, before [Director of Quality and Safety], which is my current supervisor, and we set up the SHARP visit, which happened at the end of February 2013. (Interview, Group, I1GL-23)

- *use of the worker's compensation carrier, Pinnacle, for noise and chemical monitoring, and use of their incident investigation form for post-accident data collection (Field Note, F1NL-35)*

During the 2013 meeting, [Safety Manager] and the [company] team expressed their goal and commitment to achieve an OSHA Safety and Health Achievement Recognition Program (SHARP) award. … Over the next 3 years [company] Safety Manager, [redacted name], management, and employees worked tirelessly to elevate the company's safety program from good to outstanding. (Document, Public, D85NL-14, 15)

1. A comprehensive, baseline hazard survey has been conducted within the past five (5) years	*3*
Comments: [Company] has utilized the [redacted name] (OSHA) consultation program many times in past years. They have been working towards to the goal of achieving, then maintaining SHARP since 2013.	

(Document, Private, D6NL-1)

The company also introduced many new initiatives, such as incident investigations, near miss

reporting, change analysis procedures, Health Week, and SMART goals.

> *We do a health week. We did a health week in 2017, and we're planning one in 2018. That was one of great things we did in 2016 and in 2017, and we're planning 2018 - it was a great success. We've made a little competition out of it. We've gotten things from local vendors. You know, we got one of the athletic clubs to come here and give us a great deal. And, we'll sign employees up, and we'll do it through payroll, and they can attend. And, then they can get into programs, and as a company, we can get into the programs. We're looking into different things along those lines. That's helping tremendously. (Interview, Organization, I9OL-190)*

10. *Incidents are investigated for root causes.	*1*
Comments: Adding incident investigations has become a new focus for the safety committee.	

(Document, Private, D81NL-10)

5. Change analysis is performed whenever a change in facilities, equipment, materials or processes occurs.	*2*
Comments: The very small number of hazards during audits serve as a positive indicator that the appropriated systems are in place to manage change analysis.	

(Document, Private, D6NL-5)

> *We're also planning... We're starting to use SMART goal type of structures now to where we are giving different performance evaluations, and one of them is safety. You have to perform in a safe condition, in order to be moving forward with your bonus structure and be able to move forward with your promotion structure. We're using that to move into ergonomics. We're using that to move into environmental. (I9OL-190)*

In addition to improving their safety framework, the company rectified specific,

organization-wide safety problems. Tens of sequential Safety Meeting Notes show the company's

continuous actions to address concerns. For example, training was conducted for small dumpster

emptying.

> *New Items*
> *1) Small Dumpsters- Need to review procedures for emptying small dumpsters into large dumpster (Document, Private, D14NL-16)*
>
> *11) Small Dumpsters- [Continuous Improvement Manager] to write procedure for using small dumpsters. [Plant Manager] to handle the training. (Document, Private, D15NL-12)*
>
> *10) Small Dumpsters- No progress this month. Training needs to be implemented, and procedure needs to be written- [Plant Manager; Continuous Improvement Manager] (Document, Private, D16N-11)*
>
> *9) Small Dumpsters- A training exercise will be conducted at 12:30 PM February 30th to complete the training portion of this item. [The Maintenance & Tooling Manager] will conduct exercise. Supervisors will*

collect signatures of forklift certified employees who attend training. [The Plant Manager] has completed training at CPD. (Document, Private, D17NL-10)

A scaffolding certification and training procedure were developed.

NEW ITEMS ADDED
1) Scaffolding certification tags & training- [Bonding Manager] (Document, Private, D13NL-13)

11) Scaffolding Certification & Training- [Bonding Manager] looking into proper tags. Once these have been ordered procedures & training can be put in place. (Document, Private, D14NL-12)

9) Scaffold Certification & Training- [Continuous Improvement Manager] to write procedure for scaffold inspection. [Bonding Manager] to order tags & do training. (Document, Private, D15NL-10)

9) Scaffolding Certification & Training- Tags are on order. More thorough training needs to be implemented - [Bonding Manager] (Document, Private, D16NL-10)

8) Scaffolding Certification & Training- Tags will be here the week of February 3rd. [The Continuous Improvement Manager] to add list of certified personnel supplied by [the Bonding Manager] to the procedure. (Document, Private, D17NL-9)

In another example, forklift checklists were developed and implemented.

New Items
1) Forklift Check Sheets (Document, Private, D25NL-8)

5) Forklift Checklists- Maintenance is working on implementing this item. - [Maintenance Supervisor, Maintenance and Tooling Manager] (Document, Private, D27NL-6)

5) Forklift Check Sheets- Maintenance has committed to having these in place by the time of the next safety meeting. (Document, Private, D28NL)

5) Forklift Check Sheets- These check lists have been completed. [The Maintenance and Tooling Manager & Safety Manager] will meet to for a plan for implementation and training in each department. The check list is to be done daily by each forklift operator to insure that the forklifts are in optimal condition for use. Per [Maintenance and Tooling Manager & Safety Manager] (Document, Private, D29NL-6)

4) Forklift Check Sheets- These are in place and being used – there still is some training and prompting needed to ensure they are being used on every use of the forklift, but it seems to being going well. Per [Maintenance and Tooling Manager & Safety Manager] (Document, Private, D30NL-5)

New Items
No Accidents in March J
Fork Lift Check Lists – Forklifts have been observed without check lists. Are these check lists being done? When are these check lists being collected and read, for possible maintenance needed?   This item will be added to the agenda for the April Safety meeting. Per [Director of Quality and Safety] (Document, Private, D31NL-6)

327

While some issues, such as installing a new fire protection system and improving LOTO procedures,

were quickly resolved.

> *New Items*
> *New Fire Safety System - [The Safety Manager] is working with [named employee] to figure out the logistics of installing a pull tab fire system and doing away the current phone alarm system. He will update us with his progress on that. Per [Safety Manager] (Document, Private, D29NL-9)*
>
> *6) New Fire System- Superior will be here the week of March 23, on the night shift to install the new system. It will take them 2 weeks to do the install. Superior still needs to provide a map with specs for the conduit system to [the Maintenance Supervisor]. Per [Maintenance Supervisor & Safety Manager] (Document, Private, D30NL-7)*

Other efforts took months, such as installing soft start control on overhead cranes.

> *New Items*
> *Soft starts for overhead cranes (August 2016) (Document, Private, D48NL-8)*
>
> *7) Soft Starts on Cranes- VFDs installed on the North crane, and they work great. Maintenance scheduling installation for South crane (November 2016) (Document, Private, D51NL-8)*
>
> *7) Soft Starts on Cranes- VFDs installed on the North crane. Maintenance scheduling installation for South crane. [Plant Manager] to get with [Maintenance Supervisor] to get this scheduled. (December 2016) (Document, Private, D52NL-8)*
>
> *6) Soft Starts on Cranes- VFDs installed on the North crane. Maintenance scheduling installation for South crane. (January 2017) (Document, Private, D53NL-7)*
>
> *5) Soft Starts on Cranes- VFDs installed on the North crane. Maintenance scheduling installation for South crane. (February 2017) (Document, Private, D54NL-6)*
>
> *5) Soft Starts on Cranes- VFDs installed on the North crane. Maintenance scheduling installation for South crane. (March 2017) (Document, Private, D55NL-6)*
>
> *5) Soft Starts on Cranes- VFDs installed on the North crane. Maintenance scheduling installation for South crane. (April 2017) (Document, Private, D56NL-6)*
>
> *5) Soft Starts on Cranes- VFDs installed on the North crane. Maintenance scheduling installation for South crane. (May 2017) (Document, Private, D57NL-6)*

Nonetheless, the company faithfully followed issues to their resolution.

> *5) Tie-off points on Ovens- Material handling personal are rebuilding the oven extension roof so personal do not have to get on top of the oven to work- This item is closed. (Document, Private, D41NL-6)*

6) New Horses- Casters are here & being installed as horses become available for Tooling to retrofit. - Closed (Document, Private, D19NL-7)

1) Load Ratings on Carts- All carts currently in circulation have been load rated. All new carts are being load rated when fabrication- Closed (Document, Private, D40NL-2)

In summary, the company concedes that their "way of thinking" has changed over the past five years. Sources indicated that safety was not necessarily a state to be achieved, but a process of continued achievement.

Our way of thinking has changed over the last four, five years on how we do things. They think of the safest way to do it. (Interview, Organization, I4OL-67)

Well, I think that the significance of it is like IT - it's only a problem when it's a problem. Everybody expects it to be OK. And safety and stuff, you can give a lot of lip service to it, but it doesn't cost you anything until it costs you something. So, you don't…. I think that just comes from experience. And the company is very experienced. (Interview, Organization, I5OL-48)

… Leadership showing what needs to be done and continual improvements and constant change to better the work place (CIR, Individual, S12IL)

The multi-year safety improvement journey, in general, exemplified the constant state of organizational readiness.

[OSHA SHARP Consultation auditors] came back in 2013, and we had progressed, but we still weren't to a point where they would accept us into the program. So, we worked through the rest of 2013 and all of 2014, and reapplied in 2015, and made it 2015. That got us through 2015 and 2016, and then in 2017, we recert (recertified) and we got the three-year version. So, we improved all of those years. (Interview, Organization, I9OL-104)

1.   Organizational Change Readiness Construct: Physical Capacity

An organization's readiness for change is also marked by their capacity or physical ability to implement change. In this study, three aspects of capacity were found in text segments – staffing, time, and money.

A.   Staffing Capacity

Under former and new owners, the company dedicated staff to the conduct of safety. Historic safety staffing, though, was often reactive, part-time, or temporary.

According to a few sources, Safety Committee staffing was the oldest, lengthiest form of safety staffing at the company. For decades, perhaps, employees were permitted to participate in monthly Safety Committee meetings.

> *When reflecting on company hazards and safety processes, the VP pointed to a couple of pivotal events – a worker fatality in the late 1990s and, years later, the traumatic amputation of a worker's toes. Also mentioned were the longstanding activities of the company's Safety Committee and safety representative(s). (Field Note, Organization, F2OL-7)*

> *I'm pretty sure they do (have a Safety Committee). Used to hear about the minutes of it, but I haven't heard for a while, but I'm sure they do. They take it pretty serious. (Interview, Individual, I8IL-22)*

> *Yes. Yeah, we've always had a Safety Committee. At that time (in the past), I couldn't tell you (who participated). Right now, it's every department manager or their sub. So, if they cannot make it, they need to send a lead or one of the more experienced employees. There's members of… All executive management is invited. It's really people from all parts of the spectrum. (Interview, Group, I1GL-86)*

According to multiple document quotations, after 2013, in addition to attending Safety Committee meetings, staff engaged in safety improvement actions, including identifying and studying safety problems, writing procedures, conducting training, pricing or designing corrective actions, and implementing initiatives.

> *1) Load Rating on Carts- Engineering has identified 61 carts. 36 of the 61 carts have been assigned load ratings. 8 of those 36 carts have been marked with load ratings. [Engineering] has committed to sending the load rating information for the 36 carts to [the Safety Manager], [Continuous Improvement Manager], and [Maintenance and Tooling Manager] so [the Continuous Improvement Manager] can start the procedure & tooling can begin marking existing carts with permanent load ratings- [VP of Engineering, Quality and Safety] (Document, Private, D23NL-2)*

> *2) Large Sliding Door in Bonding- Drawings for the rails have been completed, and engineering has sent a request asking if drilling holes in the load bearing I-beams will compromise it's structural integrity. A sub-committee has been formed, and will meet Monday, July 14th to discuss this item further- [VP of Engineering, Quality and Safety] (Document, Private, D22NL-3)*

> *3) Wall Cleaning Fall Protection in Tool Prep Area- [Engineering] has met with tool prep personal, and has created a drawing that the committee and affected personal are satisfied with. [Engineering] will make a few minor adjustments for safety features, and release print to Tooling Department. [Engineering] is getting with [Tool Prep-Process Control Manager] to see if the device must be collapsible. (Document, Private, D65NL-4)*

> *11) SHARP Form 33-*
> **[Assistant Plant Manager] - Change analysis is performed whenever a change in facilities, equipment, materials, or process occurs- In process*

*[Bonding Manager] - Material Safety Data Sheets are being used to reveal potential hazards associated with chemical hazards in the workplace. - In process
*[Safety Manager] - Workplace injury/illness data are effectively analyzed. –Complete

(Document, Private, D17NL-12)

12) Air Regulators for Staple Guns- Air regulators have been purchased, and will be installed in March- [Maintenance Supervisor] (Document, Private, D18NL-13)

8) MSDS- The MSDS books are to be kept up to date, and maintained by the Logistics Managers of each building ([the company], CPD) for employees without computers to access. All other employees are to contact [the Safety Manager] to have MSDS Online Icons set up on their computers for MSDS access. - Closed (Document, Private, D19NL-9)

Many multi-unit sources referenced staffing of the safety function. Over the years, the safety function was staffed full-time by two Safety Managers in 2000 and 2014, and in between, by other part-time or temporary Representatives, Leads, and overseers. This pattern suggests that staffing capacity for organizational readiness was mixed.

There was a person killed and another one seriously injured. And, I think from that point and on, they started to try to look at safety, and making sure that employees were working and doing the proper thing. It took a few years. Then they actually hired a Safety Manager to oversee the shop floor. (Interview, Organization, I4OL-13)

He retired, and it took probably… it took several years after that to actually fill the position again. I think that was 2013 when we hired another full-time Safety Manager. (Interview, Organization, I4OL-21)

…you have [Human Resources Director], she was the HR lady here and she did safety. Then you had a couple of people that would float in and out and would do safety. Now you've got [Safety Manager] - full-time safety. … [Human Resources Director] said she was here for 20; I think she was here for seventeen. … When I first started here, you had a guy that had another role, and then he did safety, and he may have been here for a year or two. He's retired now, but you had an older guy that retired that they called Santa Clause. Then, I think [redacted name] took on the safety role for a while, too. So, [HR Director], she probably did 10 years, maybe more. (Interview, Individual, I8IL-8)

Well, the Santa Clause guy, I think he was (full-time), but I think they saddled him with other things too. But safety was his main job, if I remember. (Interview, Individual, I8IL-16)

(In 2013) Getting somebody who could support [Director of Quality and Safety] and help [him] with that was a very close second. That's where [Safety Manager] came from. Because [Director] couldn't…. The quality system and the safety system were both in minimalistic; [he] couldn't do them both at once. [He] physically couldn't do all that work - just the sheer volume of work. Trying to get through all of that was going to be the first thing. (Interview, Organization, I9OL-50)

But, I think that's when (2013) they put [redacted name] in [Safety Manager] position. … (Interview, Individual, I4IL-34)

The present Safety Manager is devoted, full-time, to safety.

> *Well, I think they're pretty much committed to [Safety Manager]; they made him full-time. (Interview, Individual, I8IL-103)*

> *[If leadership were not supporting safety] Well, a) [Safety Manager] wouldn't be here. [Safety Manager] wouldn't be the Safety manager. And, secondly, [he] wouldn't have the assets to do a lot of the things that [he's] done. (Interview, Group, I1GL-130)*

Other individuals, as needed, were assigned time to support safety, too. Engineers and shop

floor workers designed and fabricated fall protection and material handling restraints, for example.

> *Because of the unique nature of their work, [company] fabricates many of their production tools and equipment in-house. Safety is always included in the design of these tools and equipment, effectively engineering out potential hazards. (Document, Public, D85NL-18)*

> *If we need to build, we have our own steel fabrication shop. We can build whatever we need. … We've built almost all of our safety equipment here in-house. Because what we do is so unique, and the product is so specialized that we had to fabricate, design, and build our own safety equipment. We'll have a get-together, what we call an IOR – an interoffice review. We'll get the people involved, engineering, and we'll come up with ideas and brainstorm, and get a drawing and actually model it. (Interview, Organization, I4OL-104)*

> *Now, we're starting to get buy-in from other areas. So, like when we have a problem – out in our tool prep area - working on those big tall tools, you know, we had a person almost fall. … We got buy-in from engineering to help us design or purchase something - a tool - that's going to help them work the height of the tool and create a safe work environment. So, we've got engineering buy-in working with us. (Interview, Organization, I9OL-216)*

In 2016, marketing staff were involved in featuring the company's OSHA SHARP certificate.

> *I've got the sales and marketing guy [VP of Sales and Marketing] on board, because it's like, 'well, we have our SHARP certificate, what are we doing with it?' We posted it - oh, my goodness. There was an influx of e-mail about different inquiries and things, so we know it's an impact. (Interview, Organization, I9OL-200)*

One source implied that payroll personnel were engaged during Health Week in 2016 and 2017.

> *We do a health week. … We've gotten things from local vendors. You know, we got one of the athletic clubs to come here and give us a great deal. And, we'll sign employees up, and we'll do it through payroll, and they can attend. And, then they can get into programs, and as a company, we can get into the programs. (Interview, Organization, I9OL-190)*

B.   Time Capacity

To express their readiness for safety, the company gave employees time during the work

shift for safety training, including DuPont STOP™ Program training, new employee training,

OSHA 10-hour and 30-hour training, and annual training.

> *…implementation of safety training (i.e., OSHA 10-hour, site-specific, hazard-specific, DuPont STOP safety, and peer-to-peer)*
> - *topics covered include crane, forklift, rigging, lockout-tagout*
> - *production worker training averages 2 hours daily for 9 weeks*
> - *supervisors receive OSHA 30-hour training*
>
> *(Field Note, F1NL-29)*

> *So then, our HR Director at the time, [redacted name], she started the STOP™ Safety Program – DuPont STOP™ Safety, and we started that with training all the employees. I think it was like a 5 or 6-week course for 1 or 2 days per week. They broke up into teams, and we each got in here and went through the STOP™ Safety Program and watched all the videos and did all the pamphlets and everything. (Interview, Individual, I4IL-37)*

> *5) New Hire Safety Training- All new employees have received the 15 point safety training. [Safety Manager] to conduct STOP training for all new employees & interns, and OSHA 10 training for all new hire shop floor employees. Training will commence is 2 weeks. (Document, Private, D48NL-6)*

34. Employees receive appropriate safety and health training.	3
Comments: Annual training is given to employees as well as weekly tool box talks. Tool box talks are given on Mondays to bring employees' attention back to safety and health after the weekend. Additionally, [company] has begun giving employees OSHA 10 hour courses. The goal is to have all employees receive their OSHA 10 hour card. 10 hour courses are offered during employees' normal working hours and are taught by [Safety Manager] who is a certified trainer.	

(Document, Private, D83NL-34)

> *… [Company] is going above and beyond by offering OSHA 10- and 30-hour cards to their employees. [Safety Manager] teaches the courses in-house, and management supports his efforts by allowing employees to complete their training during normal working hours. (Document, Private, D85NL-17)*

Time was also allocated for employees to meet, fill out STOP™ cards every month, attend Toolbox

Talks every week, and complete JSAs every day.

> *So, each department has a 5-10-minute meeting in the morning where they would talk and discuss these topics in the mornings. (Interview, Organization, I4OL-34)*

> *Still, I get it from some employees, especially from newer hires, and that's why they sit through 9 weeks of safety training. A lot of it was 'I don't have time for this.' It's kind of like 'well, actually you do, because we're paying you to do it.' And, 'repeat after me, you're hourly, it doesn't matter what you're doing as long as you're here, you're getting paid, you really shouldn't have a preference.' And, kind of selling it to them that way. So, 'get here in the morning, grab yourself a cup of coffee, take 10 minutes to fill out a JSA, and put a*

positive spin on it.' 'We're giving you a break the first thing when you walk in in the morning.' 'Yeah, you've got to fill out this safety paperwork, but you're getting paid to do it.' (Interview, Group, I1GL-103)

[Company] uses their Safety Training Observation Program or STOP, to detect hazards, track their correction, involve employees in the safety program, and increase safety knowledge and awareness. Each employee fills out a STOP card on a monthly basis. This activity requires an employee to watch a task being performed and convey what positive and negative safety behaviors they observe. (Document, Private, D85NL-11)

Time was allocated for celebration, too. One executive source stated that, to offset the loss of Safety Incentive Program funding, safety lunches were reintroduced. Rather than spend money, the company agreed to give employees time during the work day to prepare food and to share lunch.

So, we do something very different when we have lunches. It's either barbeque, or we have a lot of Hispanic group out here, and they love to cook. They love to do things, so we buy all the meats and the foods, and they do all the cooking for a burrito day or a taco day. You know, I mean, we get some pretty extensive tacos! But, so we're driving their involvement with it, as well. 'You earned this, so now you get a day off to cook, and do all this stuff, and serve the meal.' There's so many that sign up and jump onto that. It's not that they're getting out of work, it's that they're doing something that they like. We use that as another mechanism, and we keep moving forward from there. (Interview, Organization, I9OL-124)

Occasionally, though, there was not enough time to move projects forward. Improvements to material handling carts and spreaders beams, for example, were delayed.

1) Load Ratings on Carts- Engineering is having trouble finding time to assign load ratings, but has made some progress. [The Safety Manager] has asked that the load ratings that are completed be released so we can begin putting the load ratings on the carts. Moving forward the committee has agreed that we need a procedure to assure load ratings are applied to all new carts being manufactured. [The Continuous Improvement Manager] to work on procedure- [VP of Engineering, Quality and Safety; Continuous Improvement Manager] (Document, Private, D22NL-2)

C.   Monetary Capacity

Under former and new ownership, the company demonstrated physical capacity, as a component of organizational readiness, by spending money to meet safety needs. Spending was more generous after the new owners took control.

I think the big change was when the company was sold to a corporate investment firm. We really started to get support for what we needed to get the shop safer – new equipment or whatever we need. (Interview, Organization, I4OL-85)

31. Individuals with assigned safety and health responsibilities have the resources to perform their duties.	3
Comments: Financial H&S requests are honored by management.	

<div align="right">(Document, Private, D82NL-31)</div>

(The company demonstrates support safety) By the programs. By the money and budgets that get put into it. By the e-mails that get posted. The postings that go out. The different processes. You're here. (Interview, Organization, I9OL-200)

At the start of the safety transition, sources cited spending on a new ventilation system in

2013 to control chemical vapors.

In addition to superior employee training and safety programs, [company] has invested in exceptional engineering controls as well. The company invested over $300,000 in a state of the art ventilation system to keep employee exposures well below OSHA permissible exposure levels. In addition to their engineering controls, the company operates an extensive air- and noise-monitoring program. (Document, Public, D85NL-18)

11. Feasible engineering controls are in place.	3
Comments: [Company] spent $300,000 dollars on a ventilation system for the casting room. With the unique nature of their work, [company] has to fabricate many of the tools and equipment they need for manufacturing. Safety is included in the design of these tools and equipment.	

<div align="right">(Document, Private, D6NL-11)</div>

Monies were devoted to the purchase of safety-related equipment, including welding ventilation,

welding curtains, and harnesses, and shielding for non-ionizing radiation shielding and projectiles.

Financially, I don't think [Safety Manager] has an issue. If we need it, he usually gets it. I don't really... I can just tell you from what I see. You know, like setting up the machine for that [points to the QUV machine], he said just buy what you need. You know, give me a list and... I don't think they have issues financially with doing things safely. (Interview, Individual, I2IL-81)

Well, if it's equipment or something that they need to do a job safer, we look into that and possibly purchase the new equipment. A lot of the ideas that we have come from employees as to how they want to do something to be able to make it safer. (Interview, Organization, I4OL-83)

The company demonstrated readiness capacity by funding comfortable, quality PPE or off-setting

the cost of personalized PPE.

Another huge factor that has helped to make work safer is that [company] buys the best most comfortable PPE that money can buy. Also by making all types available at all times in a vending machine. (CIR, Individual, S14IL)

… And we had a policy – we even paid for them. We pay $100 toward your safety shoes, and we provide all safety glasses. It's like, they didn't even know that, you know. So, it was 'lead by example,' and it was question and audit (Interview, Organization, I9OL-65)

Any PPE I need is provided. They give us a $100 boot allowance, because we have to have steel toe shoes. My safety glasses - they give me $100 a year to replace my safety glasses. So, I think for them, putting that effort forth to take care of us means that they're going to… They want to take care of us. (Interview, Individual, I2IL-140)

For high-dollar items, the company prioritized expenditures.

Well, the best I can speak to that is they take the easy ones and fix them right away, and they take the harder more expensive ones and try to get them into a queue through planning or capital expenditure planning or things like that. You know, they've still got a long ways to go, and if there was an endless supply of money, I'm sure they'd fix it. So, they just have to prioritize certain projects to get them done. But, they did put their money where their mouth is, and they fixed certain things. (Interview, Group, I6GL-98)

But, it's, like, [Safety Manager] and [Director of Quality and Safety], both...they see something that needs to be done, whether it's on the quality side or safety or health or any of that. It's, like, every other department, you put in your proposal, and they all meet as a team and look over it, and decide what they're going to do, and how they're going to roll that out. (Interview, Group, I6GL-61)

Multiple sources attested to safety incentive program spending. Prior to the change in company ownership, safety lunches were held quarterly, when no accidents occurred. After ownership changed, lunches continued, in some capacity.

Um, we do quarterly lunches, for… If we have no incidents that quarter, we do that. No, this is for everyone. This is companywide. Yeah, so if we do a quarter with no incidents or accidents, then [company] does a lunch for the company. They do that every quarter. (Interview, Individual, I2IL-130)

2) Safety Incentive Program- STOP Safety cards are up. Safety Lunch was a success. [President] suggested calling the lunch an Employee Appreciation Lunch next time. (Document, Private, D32NL-3)

We pushed through, and we implemented the new safety management system at that time. We rolled it out to the employees under the veil of the safety incentive program in January of 2015. So, right when they got back from the holidays, we had a big lunch, and we rolled out the new safety incentive program. We're not going to sell them the new safety management system, because they don't care – everybody wants to know 'what's in it for me.' (Interview, Group, I1GL-84)

Even though executives were hesitant to spend money on safety incentives, during the safety incentive program's first year, they generously budgeted $12,000.

Because, we would have safety lunches. It was, like, just a purpose where we're going to spend money and go have dinner – go have lunch. Neither [Safety Manager] nor I liked that, so we adjusted that. Then, that was the next step that the executive group had to get over, because it was all or nothing. They couldn't put it

in perspective. You had a safety injury, no safety lunch. You had no injuries, safety lunch. It's like, 'no, that's not how it works.' That was when it really became evident that they really started getting involved, ok. And, we built the incentive system. (Interview, Organization, I9OL-69)

So, we made it a competition. I mean we - 2015 – we had a $12,000 budget for the incentive awards. It was very hefty. I made use of it. I made things that… We did things that people wanted. (Interview, Organization, I9OL-98)

2) Safety Incentive Program- The safety incentive program will be altered slightly with a monthly traveling trophy that will be awarded to the department that wins each month. The criteria of the incentive program will remain unchanged. The Q4 prize will be a trip to Glenwood Springs that includes lodging, Glenwood hot springs pool passes, and a gift card for the trip. (Document, Private, D39NL-3)

1) Safety Incentive Program- Final safety meeting changes have been finalized, and are as follows: The winning departments will receive a $35.00 gift card for all employees who win the quarterly incentive prize. During the giveaway there will be a lunch provided that Toolbox Talk participation is at 80% or higher company wide. (Document, Private, D54NL-2)

In addition, year-end safety bonuses were given to those without recordable events to incentivize safe behavior.

And another thing, there's safety awards handed out at the end of the year, so people can get $100 or a couple hundred dollars in incentives for being well-behaved. (Interview, Organization, I5OL-65)

Safety – well, they've got their safety bonus at the end of the year. You get - it was more, it went down for some reason, but for 24 years you get $650. Twenty-four, I think, is the same as twenty. They had it at $750, I think they lowered it to $650. I'm the only one now that gets it. It was me and [redacted name] every year, and finally somebody did something where he got cut – wasn't necessarily his fault. They left a razor blade out, and he was coming down, and he didn't know it, and he lost his safety bonus. (Interview, Individual, I8IL-91)

Funds were spent on miscellaneous safety improvements, including flooring, industrial hygiene monitoring equipment to measure airborne chemical hazards, train-the-trainer courses for the Safety Manager, and medical assessments.

10) Casting Mezzanine Floor- Steel plate has been installed to cover hole in the mezzanine floor temporarily. [Purchasing Manager] has ordered 10 sheets of replacement flooring for a permanent solution. Material has been ordered, but delivery date has not been confirmed. (Document, Private, D19NL-11)

9. Expert hazard analysis is performed.	3
Comments: [Company] has an extensive air and noise monitoring program. The company has purchased IH monitoring equipment to use in-house and also tracks employer exposure to [redacted chemical] with badge monitoring. Monitoring results show that the engineering controls in place are effective at keeping employees exposure levels below the Permissible Exposure Level (PEL).	

Another thing that they do, for example, is each year we get a free flu shot, free hearing checks, free blood tests. That is something that wasn't done before, but is helping improve the health of all the workers. (Interview, Individual, I7IL-123)

Despite the convergence of data around monetary readiness, a few divergent examples were cited. Sometimes, perhaps for good reason, the budget-conscious company did not allocate money for improvements, such as purchasing a working platform for elevated job tasks; repairing a parking lot; and funding subsequent Safety Incentive Programs.

10) Working Platform for Box Tool- Quote received. Further discussion & possible cost justification is needed to move forward. – [Safety Lead] (Document, Private, D14NL-11)

4) [Company] Parking Lot- Quotes for fixing the parking lot have been submitted & rejected. [Maintenance and Tooling Manager] is going to have the holes packed with road base, and covered with steel plates to get us through the winter (Document, Private, D26NL-5)

2) Safety Incentive Program- [Safety Manager] proposed that we suspend the safety incentive program for due to the recent financial situation. The committee decided not to suspend the program due to its financial benefits on insurance rates & medical expenses. [Safety Manager] to schedule a meeting to determine 2016 Q1 prize. (Document, Private, D41NL-3)

Have you ever seen a garage door fall when the spring breaks? It loses all tension, and then an 1800-pound garage door is going to fall 18 − 19 feet that we have in there, and it happened. That's what happened to us. … We put a cost structure in place. We put a schedule in place. Here's what we've got to do. We have PMs that get done on them, but they're pretty spread out, so we adjusted all the PMs. We can't do them, because we have to have qualified people, so we have to have a third party do it. And, when the cost came in for that, 'no, we're not doing it.' (Interview, Organization, I9OL-146, 156)

In these cases, the company defined alternative pathways for achieving similar outcomes, such as conducting training in-house.

3) Safety Training for Supervisors- The cost of Safety Leadership training for our supervisors by an outside entity was $5000.00, and would cost the company 160 man hours. [The Safety Manager] created a class that saved the company $5000.00 & also saved 102 of the 160 man hours. There was concern from members of the safety committee about losing the supervisors for 2 hours due to safety training, but it was ultimately approved that the training be conducted over lunch with pizza bought by the company to make up an hour of the 2 hours per person lost due to safety training. [The Safety Manager] to schedule training for August. (Document, Private, D23NL-4)

Other times, spending with cut or rejected. In 2017, the safety incentive budget was cut by 90%.

Probably the biggest one – I shouldn't say the biggest one, but the one that hurt the most, was they took the budget away for the incentive system. Yep, and that was… It - it hurt. … So, the first year was $12,000, and then it went to $10,000, and we were good. … And then it was like, 'your budget is a $1,000 next year.' I'm kind of, like, '$1,000?' Right. Yeah. So, 2015 was $12,000, 2016 was $10,000, 2017 was $1,000. It's a very big shift. Um. We saw a little bit of a downturn. We still do hear from people, you know, 'why would I do all this for $35 gas?' – type of thing. (Interview, Organization, I9OL-114)

2.   Organizational Change Readiness Construct: Summary

The organization readiness construct was primarily mentioned in private documents, especially Safety Meeting Notes, and by group- and organization-level interview subjects. Quotations were divided into the psychological readiness and physical capacity themes. Very few divergent perspectives were offered.

The former owner was psychologically ambivalent about safety, as evidenced by inconsistent and intermittent safety effort. The company, under new ownership, demonstrated psychological readiness by recognizing safety improvement opportunities (i.e., staffing, policies, safety deficiencies), enabling safety actions (e.g., allocating resources, empowering others), and improving poorly functioning processes. Physical capacity for safety change was also evident in the company's provision of safety staff (i.e., Safety Manager, Safety Committee), time for activities and training, and money for hazard controls and deficiency corrections (TABLE XLV).

TABLE XLV: ORGANIZATION READINESS CONSTRUCT SUMMARY

Primary Sources	Private Documents, Interviews
Primary Units of Analysis	No-Level, Group-Level, Organization-Level
Prominent Themes	Psychological Readiness, Physical Capacity

Summary of Prominent Themes	Psychological Readiness	• The company, under the former owner, was psychologically ambivalent about safety. Even though they promoted safety on the production floor, implemented a few safety activities, and hired staff to improve compliance, all were intermittent and half-hearted. • Under new ownership, the company's readiness to change was fueled by safety-related financial and market risks. • To carry out their mission, the company recognized, for example, the need to hire of a second full-time Safety Manager, implement stricter PPE rules and training; and correct safety deficiencies and hazards. • To facilitate change, managers and leaders were given resources and empowered to make decisions. Multiple safety activities were also implemented. • Multiple rounds of change were needed to reverse poorly-functioning policies, written programs, procedures, and hazard controls; and to correct safety problems. New initiatives were also introduced. Internal and external resources were used to make those changes. Improvements were followed to full resolution.
	Physical Capacity	• Under former and new owners, the company dedicated staff, to the conduct of safety. Safety Committee members and safety representatives or mangers were some staff. Historic safety staffing, though, was often reactive, part-time, or temporary. • Under new ownership, employees were given time during the work shift to complete safety activities (i.e., JSAs) and safety training. Time was also allocated for celebration. For some special safety improvement projects, time was limited. • The company's monetary capacity improved after ownership changed. Funds were used to improve hazard controls, purchase safety rewards, and to correct safety deficiencies. On occasion, funding requests were postponed, partially-funded, or rejected.

L.   Performance Construct

Performance broadly referred to the outcomes or results of efforts and initiatives. In this study, the performance construct was characterized by both quantitative and qualitative data. The company's total recordable case rates (TRC) of occupational injury and illness served as the source of quantitative data.

Qualitative data were drawn from numerous narrative sources. Major and sub-coding of narrative resulted in 420 and 490 text segments about performance, respectively. Seventy percent of quotations were found in public and private documents, especially the latter. Of the remaining sources, group-level interview subjects offered more performance commentary (TABLE XLVI).

TABLE XLVI: PERFORMANCE CONSTRUCT, NUMBER OF SUB-CODED SEGMENTS BY SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	2	3	2	
Interviews	51	67	19	
Field Notes	3	0	0	10
Documents, Private				260
Documents, Public				73
Subtotal	*56*	*70*	*21*	*343*
Total	*490*			

Six performance themes emerged from the data. While most segments were about occupational safety and health performance, a small fraction – one theme – discussed business performance. From highest to lowest frequency of occurrence, themes regarded accidents

outcomes, intermediate outcomes, recognition, business, compliance, and other topics (Figure 30). The two most common themes will be examined in this chapter.

Figure 30: Performance Construct, Percent of Quotations by Theme

34.9	25.5	17.7	11.5	7.4	3

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%

■ Accident Outcomes   ■ Intermediate Outcomes   ■ Recognition   ■ Business Outcomes   ■ Compliance   ■ Other
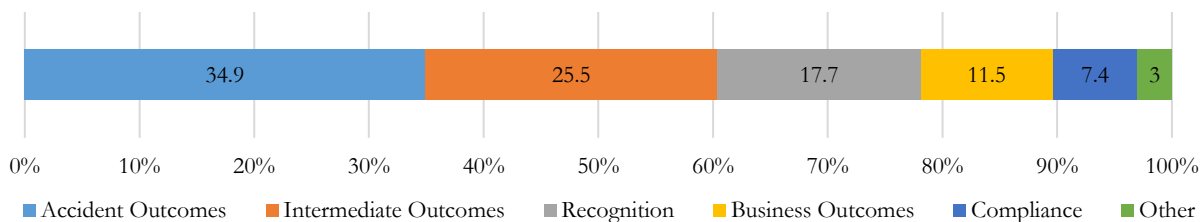
1.   Performance Construct: Accident Outcomes

Accidents are lagging indicators of the state of workplace safety and health, and they reflect the overall effectiveness or ineffectiveness of existing interventions. In this study, accidents encompassed injuries, illnesses, and property damage incidents. Very few incidents were cited.

a.   Quantitative Data

Total Recordable Cases rates (TRC) and Days Away, Restricted, and Transferred rates (DART) were obtained from the case organization's OSHA Form 300, Log of Work-Related Injuries and Illnesses, and Form 300A, Summary of Work-Related Injuries and Illnesses. TRC rates reflect the incidence of work-related injuries and illnesses. DART rates, which report the amount of missed work-time related to injury and illness, measures severity. Between 2007 and 2017, TRC and DART trends steadily declined. However, throughout the timeframe, both rates showed a saw-tooth pattern with peaks in 2008 and 2011. In those peak years, the company experienced 12 and 16

OSHA-recordable incidents per 100 full-time workers, respectively – 5 to 6 times higher than the national industry average. On average, between 2007 and 2014, the company's injury incidence and severity rates were two to three times above average. Figure 31 displays the company's TRC and DART rates from 2007 through 2017.

Figure 31: Case Organization, Occupational Injury-Illness Rate Timeline, 2007-2017 (OSHA's Form 300 and Form 300A)
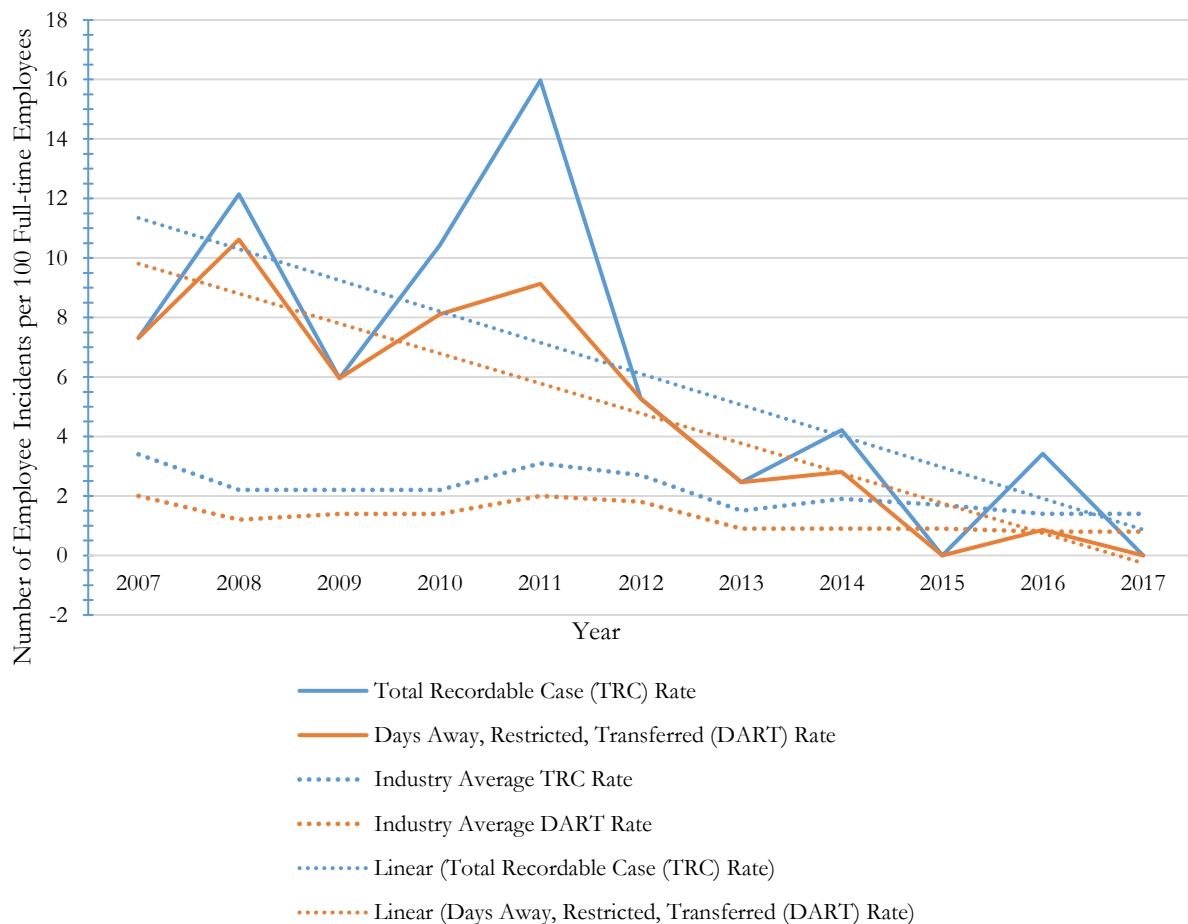
b.   Qualitative Data

One hundred seventy text segments mentioned three facets of accident outcomes – their

historic impact, their role in safety prioritization, and ultimately, their improvement.

1.   Historic Impact

Historically, accidents were common.

I forget what year it was, but our injury rates were very high back then. I want to say around 2000 or 2001. (Interview, Group, I1GL-54)

When I started here in 2006, it was scary. I want to say, my second day here, I watched my supervisor at the time break somebody's middle two fingers on his hand, and then told me – demanded - that I did the same thing that this guy was doing after they sent him off to the hospital, so we could get his job done. (Interview, Group, I1GL-43)

Multiple sources from all units of analysis recounted a work-related fatality in the late 1990s.

Shortly after I started, it was probably within the first year that I was here, we had a death here at the plant. There were some panels standing up out on the shop floor, and they were doing some packaging, and they went over like dominos. There was a person killed and another one seriously injured. (Interview, Organization, I4OL-13)

Well, I don't know how many years ago, but they did have a death. I don't know any of the facts about it, but I think that was a hell of a wake-up call. (Interview, Organization, I5OL-14)

…I and a couple of these other guys were here when [redacted name] got killed. I worked with his brother on the [redacted industry] before I came here. So, I knew him; I knew his brother. But, that, for us…. I mean, hearing that that day... That stays in your mind. (Interview, Individual, I8IL28)

When reflecting on company hazards and safety processes, the VP pointed to a couple of pivotal events – a worker fatality in the late 1990s and, years later, the traumatic amputation of a worker's toes. (Field Note, Organization, F2OL-7)

Subjects also recalled a worker's traumatic toe amputation in 2008.

Essentially what it involved is, we had a cylinder that had a… It was for a medical apparatus, and it had a dome bonded about 14 inches in. Well, that changed the center of gravity. We used to have these car tires that were stands, and that's how we fabricated the cylinders. You could spin the cylinder and do whatever work you needed to do on the outside of the cylinder. When they were doing that, because the center of gravity had changed, and it wasn't set up by the night shift material handling crew with that in mind, that cylinder came off of its stand and pretty much folded a guy over backwards. He got very fortunate - well not fortunate, he's fortunate he's still alive, he's still with us, but he lost two and one-half toes, because he was kind of crab walking under it. And if you've ever dropped a glass and watched it walk on the floor. It was doing that,

344

and he was crab walking under it, and when it came down and settled that last time, it folded his steel toe over and took 2 ½ of his toes. (Interview, Group, 1GL-124)

I can tell you the stories that I've heard. Such as, one of the guys got his toes cut off. We did have a fatal accident here. Those were long before my time, so I don't know any details about them. (Interview, Individual, I2IL-28)

There was a handful of incidents…accidents that I recall. I'm not sure if they're overlapping or not, into when the program really took hold, but a lot of lacerations, and one relatively significant accident where there was a loss of toes. (Interview, Group, I3GL-17)

A handful of quotations from all units of analysis conveyed the consequences of high

accidents, which occurred under former leadership. Most noted were the financial consequences of

high insurance premiums and property damage.

This formal Injury and Illness Prevention program has been created in order to standardize all the various safety policies and procedures into one effective, uniform program. … Accidents involving bodily injury to [company] employees, or which result in property damage can have a substantial detrimental impact on assets or profit objectives. We also have a moral and legal responsibility to provide and maintain a safe operation. (Document, Private, D1NL-71)

The higher your accident rates, the higher your insurance is. Our workman's comp insurance was pretty high. We've gotten that turned around. We got our EMod score down. So, that's been a benefit financially that our rates have gone down, and we're not just throwing money away on insurance. It can go toward safety products, production, or whatever else. (Interview, Organization, I4OL-100)

High accident rates also risked the loss of market share.

…And, our accident rate was so high that we were starting to lose out on jobs in the US. Because certain companies won't let you bid the project, if you're an unsafe company – if you have a certain number of accidents. So, we had to get that score down to be eligible for these contracts and jobs in the United States. (Interview, Organization, I4OL-37)

Yeah, and the company, they want to keep safety, because if you have a lot of injuries - and it's part of the reason (that company improved safety and health) - you lose jobs. Companies don't want to do business with you. (Interview, Individual, I8IL-34)

OSHA inspections, too, were a consequence of high accident rates. Inspections were triggered in

1998, following the fatality and severe injury, and in 2008 and 2012.

…2008, I think [OSHA inspection] was just a programmed inspection...looking through paperwork here, because I obviously have all of our old 300 Logs. The data collection that they and the Bureau of Labor Statistics do, OSHA had sent one of those to us in 2010, and they came out in 2012, because of the high injury rates. It wasn't a specific injury. What it was, was just high injury rates, because they sent us the data

collection, and we sent them back our OSHA 300 and 300A, and after that they had come back out, because were in the programmed inspection, we hit the…between 2010, or no 12 and 15, we were actually on the SST list. Site specific target. … High-hazard industry, high-hazard employer due to past things that have happened here, and also our injury rates. So, we were on the naughty kids list. (Individual, Group, I1GL-15)

Yeah, and we were getting inspections from OSHA pretty regularly, because of our accident rate. So, they were constantly coming over and checking on the shop. (Individual, Organization, I4OL-63)

2.   Role in Safety Prioritization

Around 2013, the combination of high accident rates and adverse consequences spurred an

interest in improvement. One group-level subject speculated that injury prevention was a capital

investment priority.

> *This is an assumption and a perception, but I think having the backing of the investment group and no longer the importance of safety being driven by one individual. How important is it to this one individual versus how important is it to this investment group of many men and women? 'Well, were not going to invest in a company that is unsafe and hurts employees.' (Interview, Group, I3GL-73)*

Accident prevention was also important to potential clients.

> *So, it varies – I wish they were all the same, but every bid package is different. So, like in Dubai, they'll want to know for the last six years, if we had near misses, if we had accidents, if we had this, if we have that, what the numbers were, how many employees were on for each one of these. I mean, they want in-depth. Then you'll have another project in the Middle East that they just want to know if you have the certification, so they're not going to get in trouble. I mean, it's just different. (Interview, Group, I6GL-7)*

> *What [clients are] looking at is seeing that we have [safety] things in place in our shop, because that means that it's going to transition to our On-Site. … They're also, in certain countries and areas, I believe, looking at that information to make sure that they did their due diligence to pick the best company that is out there and is doing the safest work. Because nobody wants their project tied to a major accident that happens – God forbid. Nobody wants their project to be tied to that either. (Interview, Group, 6GL-32)*

To make improvements, the company implemented core processes that spotlighted

accidents. According to a dozen documents and individual-level sources, one preeminent process

was accident and incident investigation.

> *(The company makes) use of the worker's compensation carrier, Pinnacle, for noise and chemical monitoring, and use of their incident investigation form for post-accident data collection. (Field Note, F1NL-35)*

10. *Incidents are investigated for root causes.	1
Comments: Adding incident investigations has become a new focus for the safety committee.	

So, they investigated the accidents - things like people getting cut or having things fall in their eyes. What they did was they investigated these events in order to prevent – figure out ways to prevent - other accidents. (Interview, Individual, I7IL-28)

So, there are other improvements that are made as new accidents happen. So, that is a concern for the company. If there's a new thing that happens that perhaps hasn't happened before, the company figures out a way to fix it. (Interview, Individual, I7IL-101)

Accident occurrence was monitored daily, and injury and illness trends were tracked over time.

So, all the managers, and I don't remember if it was once or twice a day… I remember, specifically in the mornings, we'd all get together at 8:00 as a group, and we'd walk around the plant. We'd start in Bonding. That manager would … 'this is my board, these are the things we're working on, here is my safety cross that shows how many days this department has been accident-free.' You know, you'd mark it in green, yellow or red. Red was an accident or lost time accident. Yellow might have been a near miss or a no-lost time accident, and green was no accidents or injuries to report. You know, that's where I remember the beginning of daily reporting, and we have since… Then we'd go to Tooling, and to Shipping, and then we'd walk all the way to the end, and then we'd have this big long daily meeting every day. (Interview, Group, I3GL-63)

20. Workplace injury/illness data are effectively analyzed.	*3*
Comments: [Safety Manager] does extensive analysis of injury, illness and hazard data. He shares the information with all levels of management and employees.	
21. Hazard incidence data are effectively analyzed.	*3*
Comments: See item #20.	

(Document, Private, D6NL-20, 21)

You have vice presidents and CEOs and the president sitting in [Safety Committee Meetings] saying, 'this is what we have to do, and how we've got to do it, and that's where we can actually get,' by looking at trends and near misses and speaking about incidents. We don't have as many incidents these days. We don't have a lot these days, but we look at the trends of near misses and say 'alright, this has happened, and this has happened, and these are the conditions that led to that, and therefore, the natural action is...'. (Interview, Group, I1GL-100)

For months, even after the company implemented safety improvements, accident outcomes lagged.

We had people with spider bites, because they weren't wearing gloves. We had splinters, because they weren't wearing gloves. We had people, as they were walking by, grabbing the edge of the [plastic], and we had a lot of things going on like that. Nothing where people were out for days at a time, but there were a lot of stitches, a lot of runs to the doctor's office, things like that, for just off-the-wall, really weird, crazy things. (Interview, Organization, I9OL-58)

In 2014, several recordable and non-recordable accidents were reported, including lacerations, falls, and strains.

In 2014, our accidents actually spiked, because the old way of thinking was still kind of there. My feeling was it was more of a… What happened was everybody kind of threw their hands up and said, 'we don't have to deal with this anymore, because we have one guy, and everything safety - that's him, we don't have to deal with it, and we're good.' So, everybody threw their hands up, walked away from it, and our accidents spiked. (Interview, Group, I1GL-65)

Accidents (March 2014)
1) Fabrication employee cutting dogbones without blade on table saw experienced kick back & received stiches on chin
2) Employee gathering lumber without gloves was bitten by spider & needed medical attention
(Document, Private, D19NL-24)

Accidents (August 2014)
1) Installation employee developed hernia on job site
2) Tool Prep employee smashed finger while demolding a panel
3) Installation employee developed right ear pain while diving
(Document, Private, D24NL-18)

However, by late 2014, according to documents and one group-level subject, the accident rate began

to decline. In 2015, for the first time, the company experienced no recordable injuries or illnesses.

We started seeing a reduction of accidents at the last quarter of 2014. We pushed through, and we implemented the new safety management system at that time. We rolled it out to the employees under the veil of the safety incentive program in January of 2015. … And then by that point – that was the first year - by the end of 2015, that was the first year that we went a full year without a recordable accident. We had a clean 300 Log. (Interview, Group, I1GL-84)

Accidents (November 2014)
There were no accidents in the month of November. There will be a safety lunch on December 12th in honor of the achievement!! (Document, Private, D27NL-16)

Accidents (July 2015)
No reportable accidents in the month of July! (Document, Private, D35NL-15)

Private documents, including OSHA's Form 300 and Safety Meeting notes, attested to many

accident-free months in 2016 and 2017.

Accidents (May 2016)
No recordable accidents for the month of May (Document, Private, D45NL-20)

Accidents (November 2017)
There were no recordable accidents in the month of November (Document, Private, D63NL-16)

Even so, there were occasional first aid events, OSHA recordable injuries, and property damage

incidents.

> *Near Miss (July 2016)*
> 1) *Finishing employee smashed finger.*
> 2) *Machining employee almost hit with air hose (Document, Private, D47NL-11)*
>
> *Unsafe Actions (October 2017)*
> 1) *Material handler cut leg on drop stock in the OMAG enclosure*
> 2) *Tool cart was pushed into [oven] pit by tool being pushed by forklift (Document, Private, D62NL-10)*
>
> *Anyhow, [Safety Manager] was gone for three days, and they had an incident. Like I said, nobody was hurt, but there was $10,000 in property damage. Ten thousand dollars in [plastic] was damaged due to a forklift accident. The guy dropped a load of [plastic]. (Interview, Group, I1GL-141)*

3.   Improved Outcomes

By 2016, the company's Total Recordable Case rate and lost-time incident rate had dropped

dramatically.

> *"Since implementing a safety and health management system, [company] experienced no lost-time incidents in 2016 and no reportable incidents whatsoever in 2015, [Safety Manager] says. Through Sept. 22, there had been no reportable incidents in 2017" (D80NL-25). Between 2013 and 2016, the company's average total recordable case rate and DART rate were below the industry average. (Document, Public, D85NL-19)*

Evidence strongly showed that, as accident performance improved, other performance improved.

Insurance costs dropped.

> *So, as a company, I think we're starting to recognize the value. We have seen what's happened to our workers comp premiums, and now they're reduced by 35% over what they were 5 years ago. And the cost has gone up, yet we've reduced them. So, I think we're starting to recognize some of these things. So, we're starting to use that to our advantage. (Interview, Organization, I9OL-190)*
>
> *In 2015, [company's] dollar value of worker's compensation claims was almost $3,000; in 2018, that number fell to just over $400. The company has also experienced over $20,000 in savings on their worker's compensation premiums since 2015, and [company] has an impressive experience modification rate of 0.70. In addition to the financial savings, the company has experienced they have also met their goal they set back in 2013. In 2017 [company] earned a 3-year renewal as a SHARP site, awarding the company SHARP status until 2020. [Company's] innovation and dedication to health and safety has made them an outstanding member of the [state] SHARP family. (Document, Public, D85NL-20)*

Medical costs dropped.

> *That kind of safety record has resulted in lower workers' compensation insurance premiums and health costs, he says. (Document, Public, D80NL-26)*

The company earned recognition from clients and OSHA's SHARP program.

> *…Before we implemented our safety management system, we were working on the [city] aquarium, and they wanted a site-specific safety program, and we didn't have any of that in place. … After talking with them and the general contractor, the only way that we could go on site - and I actually had to basically sign and have our sub-contractor sign that we follow their safety management system … The same general contractor that wasn't going to let us on site, because we didn't have a site-specific plan, sent an e-mail directly back to our sales team, our executive management, and [Safety Manager], praising our team for being out there and for their safety consciousness. They said that the sub-contractor that was working next to them had nine safety incidents in a month, and our guys had zero. They had no violations! Everybody was always following the safety program that we had set out. So, to go from down here to up here (interviewee moves his hands from low to high position) in the eyes of the same contractor, that was a big boost to our executives and our sales team. (Interview, Group, I1GL-165)*

> *2) SHARP Certification- Closed out 2016 with injury rates under the national average for NAICS code 326113. [Consultants] of [OSHA Onsite Consultation Program] scheduled to do 2017 inspection around May or June to ensure we do not have a gap in certification. They are proposing a 3 year certification. (Document, Private, D53NL-3)*

Morale improved.

> *… Fewer accidents means that workers go home in the same condition that they came to work. (Document, Public, D80NL-9)*

> *Yes, everyone definitely feels more safe at work. We're less exposed to danger and to accidents. … (Interview, Individual, I7IL-116)*

> *Morale goes up because employees realize the company places a priority on their safety and well-being, [Safety Manager] says. That contributes in turn to higher employer retention and lower turnover costs. Moreover, it's easier to recruit new employees. (Document, Public, D80NL-27)*

> *Morale. You know, employees are a lot happier to come to work. Like I said, when I came here, it was scary. The minute I took you out on the shop floor, you get the sense of danger when you come here. … So, for an employee to come in and realize that 'hey I'm going to leave with all my fingers and toes today,' the morale is huge. (Interview, Group, I1GL-174)*

> *The benefit is people get to go home without having to go to the hospital. You're not sending people to the doctor to get stitches. It makes for a more enjoyable workplace when you know where you're going to work is safe, and that the management cares about safety. (Interview, Organization, I4OL-115)*

c.   Performance Construct: Accident Outcomes Summary

Both quantitative and qualitative data informed the accident outcomes theme. Private documents were the best sources of information. Quantitative TRC and DART rates between 2007 and 2014 revealed rates of injury that were 2 to 6 times above the national industry average.

Between 2007 and 2017 TRC and DART trends declined. Quotations showed that historic

accidents were common, occasionally severe, and impactful to profit and market access. High

accident rates and their financial and customer consequences prompted the company to prioritize

safety. As safety initiatives were implemented, accident rates dropped and business performance

improved. Quantitative and qualitative data converged around two facts: 1) historic injury and

illness rates were high and some accidents were severe, and 2) accident and severity rates greatly

improved over time.

2.   Performance Construct: Intermediate Outcomes

Broadly speaking, intermediate performance refers to the actions that lead to or precede

injuries and illnesses. This theme was composed of 124 text segments. More than 100 quotations

were offered by documents. Individual-level sources made no references to intermediate outcomes.

There were no historic quotations about intermediate outcomes. Around 2014, though,

when the company started to improve safety processes, they recognized the potential utility of

intermediate measures of safety performance.

> *During that time, our previous Plant Manager had come to [Safety Manager] in a Safety Meeting, and said he heard the word "leading indicator." It's a buzz word in the industry, as you are aware. That was about the time when the Campbell Institute [a faction of the National Safety Council] put out the first White Paper (about leading indicators). They didn't know what one was, but they said 'well, it should follow this.' So, as he heard that, he said, 'I want [Safety Manager] to write me a safety incentive program.' … So, he said, 'write me a safety incentive program that's based on leading indicators'. (Interview, Group, I1GL-66)*

The safety team defined a set of safety activities that they believed were important to monitor.

Those tasks, including JSAs and STOP™ card completion and Toolbox Talks participation, became

intermediate outcomes.

> *[Safety Manager] had no idea what that was, but [he] at down in front of [his] computer and thought about what [he] need(ed) these guys to do. At that time, we had just started introducing JSAs. The tail-gate meetings were in progress. The STOP™ cards were in progress. We were introducing the JSAs, and [he] really kind of sat down and thought, what do [we] need these guys to do. So, [Safety Manager] want(ed) them to fill out STOP™ cards. [He] want(ed) them to do JSAs. [He] want(ed) them to do a weekly Toolbox Talks. [He] need(ed) them reporting near misses...things like that. So, [he] wrote our incentive*

program, which actually now closely…. Our incentive program really is a reflection of our current safety management system, as far as employee participation goes. (Interview, Group, I1GL-67)

[Safety incentive program] was… We drove it to leading indicators, not lagging. So, are you doing JSAs? Are you doing your STOP™ cards? Are you doing your audits? Are your audit scores correct? Are you doing near misses? We wanted near miss reporting, because if we report a near miss, it means the accident didn't happen. That's the direction we drove it. So, we tried to drive it to as many of the leading indicators as we could, instead of saying, 'we had no accidents for the last three months, so therefore you get a lunch.' So, that (accidents) became part of it, but that was only like 10% of the value, where all the other things stacked up to the 90%. (Interview, Organization, I9OL-90)

We wanted to take a proactive approach, not reactive; it had to be proactive. So, if you are doing JSAs, and if you are doing near misses, and if you are doing STOP™ cards, we know that you're paying attention to it. If you are reporting something happened, or you identified a safety concern in another area - how, JSAs or STOP™ cards - we knew you were focused on it. (Interview, Organization, I9OL-94)

58. Employees participate in the evaluation of safety and health performance.	3
Comments: The STOP program assists in the evaluation of safety and health performance.	

(Document, Private, D81NL-58)

Also monitored as leading indicators of performance were training completion, chemical exposures, housekeeping practices, and worker satisfaction with safety.

In addition to safety training conducted for the STOP program and necessary OSHA written programs, [company] is going above and beyond by offering OSHA 10- and 30-hour cards to their employees. [Safety Manager] teaches the courses in-house, and management supports his efforts by allowing employees to complete their training during normal working hours. At this time, 70% of employees have received their OSHA 10-hour card, with the long-term goal of having 100% of [company] employees earn a 10-hour card. Originally, OSHA 30-hour courses were reserved for managers and supervisors. However, the 10-hour course has been such a success that non-managerial employees are requesting to take the 30-hour course as well. (Document, Public, D85NL-17)

8. Expert hazard analysis is performed.	3
Comments: [Company] has an extensive air and noise monitoring program. The company has purchased IH monitoring equipment to use in-house and also tracks employee exposure to [chemical] with badge monitoring. Monitoring results show that the engineering controls in place are effective at keeping employee exposure levels below the Permissible Exposure Level (PEL).	

(Document, Private, D6NL-8)

15. Housekeeping is properly maintained.	3
Comments: Housekeeping throughout the facility was excellent. The amazing housekeeping is a testament to [company's] 6S system. Overall housekeeping is often a covariant of safety and health because many of the organizational factors that determine good housekeeping are the same factors that result in safety and health performance.	

(Document, Private, D83NL-15)

352

According to multiple sources, intermediate data were cultivated through daily walk-

throughs or Gemba walks and periodic audits and evaluations, both self- and external audits.

> *… Then, we'd have manager meetings, where we'd all get together in a room, twice a day once - in the morning and once in the afternoon. It's evolved now to just a big one every Monday morning to cover the week, and then every afternoon we get together. But at each one of these meetings, maybe not the Monday morning, everybody starts with their 5S score and their safety – no accidents or injuries. If there was… 'what happened?' Was there any near misses? So, it's a quick addressing of... And most of the times it's, 'well, Shipping, no accidents, no injuries and 5S score; and Bonding no accidents, no injuries, 5S score.' So, it's repetitive and redundant, but I think... I think, any more when something happens, people perk up and stop, because accidents are pretty few and far between. So, when it does its news – its news that something happened. (Interview, Group, I3GL-65)*

> *I viewed the Safety Audit results for March 2018 for 14 departments. The company's 10-question audit checklist asks generally about PPE, chemicals, safety training, fire extinguishers, and engineering controls. Each item is scored from 0 to 4. The latter score means that no violations were found, and the former means that seven or more violations were identified. In March 2018, three departments – Maintenance, R&D Lab, and Tool Prep - received less than a perfect score. Findings included employees without safety glasses, blocked egress, blocked fire extinguisher, and improperly stored flammable chemicals. Tool Prep scored the worst – 2s and 3s for three items. For some reason, in Tool Prep, management counted two violations more than once. (Field Note, F18NL-12)*

> *4) SHARP Form 33- JHA/JSA are nearly completed to a level satisfactory to schedule a second SHARP audit. After a review of all 60 questions on SHARP Form 33 [the Safety Manager] feels confident that we have the correct answers to the questions about our safety culture & procedures to score a 2 or 3 on all questions especially the 15 questions that were either not evaluated or we scored low on during the first audit. Managers & Supervisors still need to receive safety leadership training which [the Safety Manager] will research & schedule with the assistance of [the Director of Quality and Safety].-[Safety Manager] (Document, Private, D20NL-5)*

Because the company valued measures of performance, they posted safety, quality, delivery, and cost

metrics on Safety, Quality, Delivery, and Cost (SQDC) boards throughout the facility. The postings

highlighted strong and weak-performing departments.

> *The Safety Manager prepares monthly safety metrics for the SQDC (Safety, Quality, Delivery, Cost) Report. The 2018 SQDC Report to Supervisors is an Excel spreadsheet that compares safety performance for 13 departments. Performance is graded for STOP cards, monthly safety training, actual and expected JSA counts, number of JSAs per employee, and audit score. For January and February 2018, all departments obtained a composite audit score of 95% or better. All but three departments – Machining, Fabrication, and Bonding - completed 100% of STOP cards and training requirements. JSA performance, though, varied. Even though some departments completed more than one JSA per employee, one department – Fabrication - performed very poorly. The SQDC Report is one manifestation of the company's safety*

performance measurement process. … I observed SQDC Boards throughout the shop; they serve as communication tools. (Field Note, F18NL-13)

[Safety's] part of our performance indicators – key performance indicators. You know, how much did you ship? How much did you produce? How was your labor numbers? How many accidents have there been? How many near misses have been reported? (Interview, Group, I3GL-54)

2) Safety Incentive Program- Month one of quarter four has come to a close with Quality Control in the lead. All updated metrics are posted on safety boards around the shop. … (Document, Private, D38NL-3)

Leading indicators were used for decision-making, especially for performance accountability.

What we started doing from there is now we've got all these metrics. We're already measuring all these things, and now that we're measuring departmentally, we can see where the good departments are, and the bad departments are as far as performance in safety and health. It's not that they're bad people – their performance in safety and health. And, now we have tools and measurements to hold them accountable for safety and health. (Interview, Group, I1GL-81)

Toolbox Talk and training participation data, for example, were used to allocate rewards.

Sometimes participation was adequate for reward, and other times it was not.

1) Safety Incentive Program- Final safety meeting changes have been finalized, and are as follows: The winning departments will receive a $35.00 gift card for all employees who win the quarterly incentive prize. During the giveaway there will be a lunch provided that Toolbox Talk participation is at 80% or higher company wide. (Document, Private, D54NL-2)

1) Safety Incentive Program- Quality Control was the winner of the Q2 Safety award, and companywide we achieved 86% participation in weekly safety trainings so there was a safety lunch on 7/20 (Document, Private, D58NL-2)

Executives and managers used intermediate indicators to justify hazard correction and to predict the

risk of accidents.

You have vice presidents and CEOs and the president sitting in [Safety Meetings] saying, 'this is what we have to do, and how we've got to do it, and that's where we can actually get,' by looking at trends and near misses and speaking about incidents. We don't have as many incidents these days. We don't have a lot these days, but we look at the trends of near misses and say 'alright, this has happened, and this has happened, and these are the conditions that led to that, and therefore, the natural action is...'. 'This is what we need to do.' Then we'll either implement it in whole, or they'll say, 'well that's kind of expensive, but we're going to meet you half way.' 'We're going to get rid of the danger factor, but maybe we're not going to make the whole parking lot 18 inches of concrete.' So, that's where a lot of that decision-making comes from. (Interview, Group, I1GL-100)

[Safety Manager] would say, [his] leading indicators, [he's] got dialed-in enough to where an incident last July – there was no injury, but [he] sent out the safety management system participation … [He] sent out

their participation -everybody's statistics of where they're at department to department, and some observations that [he] made that month. [Safety Manager] wrote a very long Toolbox Talk. … [He] had written one called downward trending leading indicators, and all of [his] leading indicators were trending downward. [He] was starting to see more near misses, but they were not being reported. … [Safety Manager] wrote a long Toolbox Talk, and [he] told them, 'if we ...' - and the good thing is these are leading indicators, so we still have time, but the bad thing is that 'if we don't do this, something is going to happen.' 'I can't tell you where, but I'm going to tell you something's going to happen.' (Interview, Group, I1GL-139)

3.   Performance Construct: Summary

Two of six performance themes were deemed impactful to the company's achievement of safety performance excellence. Private documents provided data about both. Quantitative (i.e., TRC rates, DART rates) and qualitative data described accident outcomes. When integrated, data converged around two facts: 1) historic injury and illness rates were high and some accidents were severe, and 2) accident and severity rates greatly improved as the safety transition ensued. The intermediate outcomes theme was informed by qualitative data. Quotations showed that key safety tasks, such as JSA completion and 5S housekeeping, which were selected as important, were monitored, tracked, and communicated as intermediate indicators of safety performance. TABLE XVLII summarizes the information in this section.

TABLE XLVII: PERFORMANCE CONSTRUCT SUMMARY

	Primary Sources	Private Documents
	Primary Units of Analysis	No-Level
	Prominent Themes	Accident Outcomes, Intermediate Outcomes
Summary of Prominent Themes	Accident Outcomes	• Quantitative TRC and DART rates between 2007 and 2014 revealed rates of injury that were 2 to 6 times above the national industry average. Between 2007 and 2017 TRC and DART tends declined. • Qualitative data showed that historic accidents were common, occasionally severe, and impactful to profit and market access. High accident rates and their financial and customer consequences prompted the company to prioritize safety. As safety initiatives were implemented, accident rates dropped and business performance improved. • Quantitative and qualitative data converged around the fact that historic injury and illness rates were high and some accidents were severe, and the fact that accident and severity rates greatly improved over time.
	Intermediate Outcomes	• There were no historic references to intermediate outcomes. • Around 2014, the safety team defined a set of safety activities were believed to be important (e.g., JSAs, STOP™ cards). Those tasks became intermediate outcomes. • Intermediate indicators were tracked, posted, and used for decision-making and risk prediction.

M.   Time Construct

The time construct regarded the order of events from past to present and the periodicity of events (i.e., annual, week). This major code was applied to 560 quotations. Sub-coding resulted in seven hundred text segments. Private documents were the single best source of data – providing nearly 58% of time quotations. Group-level interview subjects also provided about 10% of data. Field notes and CIRs were generally not useful sources of time information (TABLE XLVIII).

TABLE XLVIII: TIME CONSTRUCT, NUMBER OF SUB-CODED SEGMENTS BY SOURCE AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	6	5	14	
Interviews	66	87	32	
Field Notes	4	1	0	15
Documents, Private				410
Documents, Public				60
Subtotal	*76*	*93*	*46*	*485*
Total	*700*			

Data revealed two broad time themes – dates and periodicity (Figure 32). Dates, especially the year of occurrence, were used to compile an event chronology. Periodicity, which referred to the daily, weekly, monthly, annual or other event frequency, is highlighted throughout chapter 4, and therefore will not be presented here.

Figure 32: Time Construct, Percent of Quotations by Theme
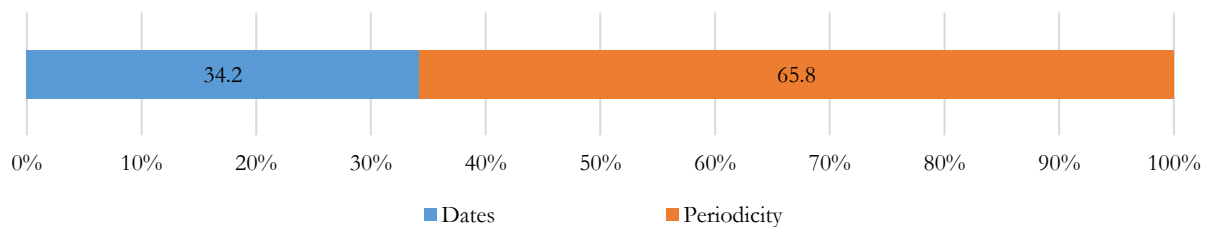
1.   Time Construct: Dates

All narrative sources and units of analysis cited dates that were perceived to be important. Most dates were cited by three or more sources. On occasion, subjects offered conflicting, but approximate, dates for the same event. While the research timeframe spanned from 2011 through 2018, dates outside of this range were contextually useful. In this section, the dates discussed in this section are displayed in chronological fashion on two Event Timelines (Figure 33 and Figure 34).

To better understand the processual relationship between event dates and the company's transition from a high-injury workplace to a safety-excellent organization, dates were grouped into four intervals. Each interval was characterized by unique business or safety factors – 1987 to 1999, Pre-Safety Period; 2000 to 2012, Early Safety Period; 2013 to 2016, Safety Transition Period; and beyond 2017, Safety Sustainability Period.

The Pre-Safety Period spanned from 1987 to 1999. During this period, the company was founded and production was prioritized. In 1987, a single entrepreneur established the company as an independent entity.

> *[Company] started out as a division of a larger company in the early 1980s, focused on manufacturing [plastic] windows for aquariums. [Company] was able to translate their success in the [plastic] industry into a solo venture, and the company received their incorporation status in May 1987. (Document, Public, D85NL-11)*

Five years later, the company changed states and moved to its current facility.

> *[Company] was founded in California in 1987, but relocated to [redacted city] in 1993 and still operates its main manufacturing facility inside a large building on [redacted address]. (Document, Public, D68NL-27)*

> *He expanded and moved the business to [city] in 1992. (D76NL-36)*

Toward the end of the Pre-Safety Period, according to public documents and interview sources, a December 23, 1998 material handling accident resulted in one worker fatality and a second severe injury. Some subjects recalled the date of fatality to be 1997 or 1999.

Ninety-eight. I've got the thing still at home. We were out in the new shop. Our shop started out in here (points to this building), and they moved it out there (points toward a different building). I don't know if it was later… could have been '98 or '97. That stays in your mind. (Interview, Individual, I8IL-28)

We've had a fatality here. … The fatality was in 1999. (Interview, Group, I1GL-122)

Accident Investigation Summary
Summary Nr: 201570322 Event: 12/23/1998 One Employee Killed By Falling Panel, Another One Injured
On December 23, 1998, Employees #1 and #2, who worked for the Material Handling Department, were installing a cardboard V board around a 9,378-lb [plastic] panel. A total of seven [plastic] panels were stored vertically with wooden panel holders or kickouts. Employee #1 was jacking the panel up from the bottom to create access to the bottom panel to install the packaging material. Wooden 4-ft by 4-ft blocks were used as a balancing tool when the jack was used. Employee #1 was working on Panel Number Three, which measured 9 ft 8 in. in height, 5 in. in width, and 25 ft in length. Employee #2 was just outside of Panel Number Three when the panel started toppling. Employee #1 was in the middle of the panel when he was killed by the weight of the falling panel. The other two panels were left standing and the remaining panels had fallen. Employee #2 suffered back strain while attempting to escape the falling [plastic] panels. He was hospitalized. Keywords: panel, blocks, back, crushed, fall, concussion, jack, sprain (Document, Public, D74NL-5)

Five days later, OSHA opened a post-accident investigation that culminated in safety citations and

fines. Documents show that the investigation closed in January 1999.

Inspection Information - Office: [redacted city]
Nr: 302071832 Report ID: 0830500 Open Date: 12/28/1998
[Company]
[redacted address]
[redacted address] Union Status: NonUnion
SIC: 2821/Plastics Materials, Synthetic Resins, and Nonvulcanizable Elastomers
Mailing: [redacted address]
Inspection Type: Accident
Scope: Partial Advanced Notice:Y
Ownership: Private
Safety/Health: Safety Close Conference: 01/07/1999
Planning Guide: Safety-Manufacturing Close Case: 01/22/1999
Related Activity: Type ID Safety Health Accident 101570752
(Document, Public, D74NL-5)

Violation Detail
Standard Cited:19100176 B Handling materials - general.
Violation Items
Nr: 302071832 Citation: 01001 Issuance: 01/08/1999 Reporting ID: 0830500
Viol Type: Serious NrInstances: 1 Contest Date:
Abatement Date:01/14/1999 X Nr Exposed: 7 Final Order:
Initial Penalty: $3,500.00 REC: A Emphasis:
Current Penalty: $2,800.00 Gravity: 10 Haz Category:

Penalty and Failure to Abate Event History

Type	Event	Date	Penalty	Abatement	Type	FTA Insp
Penalty	*Z: Issued*	*01/08/19 99*	*$3,500.00*		*01/14/1999*	*Serious*
	Penalty I: Informal Settlement	*01/19/1999*	*$2,800.00*		*01/14/1 1999*	*Serious*

(Document, Public, D74NL-10)

The Early Safety Period spanned 12 years, between 2000 and 2012. This timeframe was characterized by business growth and on-again, off-again attention to workplace safety and health. Around 2000, two sources recalled the hiring of the company's first fulltime Safety Manager, who retired 2 years later.

> *That was probably… geez, I want to say it was probably 2000, 2001 – somewhere around there. He (the first Safety Manager) was an older gentleman. He had a lot of experience out in the oil field – gas and oil safety. So, he came in and started working on a lot of things with policies, as far as fires and fire awareness and evacuation plan, and things like that, and PPE in certain departments. He was here for probably close to two years, I think. (Interview, Organization, I4OL-15)*

Simultaneously, in 2001, the company opened a second manufacturing facility in Asia.

> *In 2001, [company] expanded to [Asian country] as [company] Asia Ltd in order to provide itself with a manufacturing arm to support the booming projects fabrication plant in [city, state]. (Document, Public, D77NL-4)*

An OSHA On-Site Consultation document referenced the company's first consultation visit around 2003. Another source speculated that, years earlier, OSHA may have encouraged On-Site consultation given the company's high injury rates.

> *I can't remember exactly what the paperwork said, but OSHA had actually said 'you actually might want to look into our On-Site Consultation Services, because obviously you're doing something wrong.' So, the company knew about it, they just hadn't implemented it. So, the company, even previous to us starting it in 2013, had known about it, and had them over at least one time previous to that. Possibly even times after that. (Interview, Group, I1GL-54)*

1. *A Comprehensive baseline hazard survey has been conducted within the past five (5) years*	*3*
Comments: [Company] had a "wall-to-wall" inspection with OSHA compliance in 2012. They have developed a positive working relationship with OSHA compliance. This is the first comprehensive survey done by the [redacted] Consultants in the last 5 years, but [company] did use the [redacted] Consultants approximately 10 years ago.	

(Document, Private, I81NL-1)

Even so, between 2006 and 2008, hazards were unguarded, safety activities were sporadic, and

"safety was just talk."

> *Ok, when we weren't guarding those hazards back in 2006 when I came on board, it was a lot scarier. It's scary to look at it now and say, 'this is how we guard this, and this is how we take care of that.' But back then, there was none of that. It was just like 'well these hazards exist,' and 'be careful.' (Interview, Group, 1GL-174)*

> *There was a handful of incidents…accidents that I recall. I'm not sure if they're overlapping or not, into when the program really took hold, but a lot of lacerations, and one relatively significant accident where there was a loss of toes. That's…that's the era that I recall the most. It was 2007 – 6, 7, 8 – when safety was just talk. (Interview, Group, I3GL-17)*

> *…There was always a lot of Toolbox Talks and Toolbox topics. Those always seemed to kind of be around. They would come and go, but they've been steady for years now. But they would show up and disappear, and we'd talk about them as groups or individuals. Um, so that was one of the other things that was there may be in the 2006, 2007, 2008, 2009, 2010 era. They were not consistent, but they're consistent now. (Interview, Group, I3GL-86)*

By 2008, another employee had been significantly injured, and whether related or unrelated, a

second OSHA inspection ensued.

> *We've had a catastrophe here. … The catastrophe was in 2008. (Interview, Group, I1GL-122)*

> *Ok. We had an OSHA compliance visit in 2008. It kind of took us off guard – you don't see OSHA a lot on the [redacted geography]. So, it was probably, well, the second time we'd seen them, but the first time that we had a wall-to-wall inspection. (Interview, Group, I1GL-5)*

> *Throughout the day, the Safety Manager raised several relevant safety and health topics:*
> - *OSHA inspections with citations in 2008 and 2012 (Field Note, F1NL-25)*

Later that year, the company appointed a Safety Representative to improve compliance.

> *So, when they got hit with that, I was kind of a floating employee. I bounced around from department to department and just kind of helped out where they needed help. And at that point, they didn't have anybody to do the OSHA compliance piece, so I got involved in that. I wrote our hazard communication program at the time. I did our respiratory protection program at the time. Um, I redid our material safety data sheet books at that time, and then put the indexes in them and things like that...hazard communication pieces, as far as labeling; PPE; risk assessment – I had a huge hand in that. Pretty much everything to try to get us into compliance. … That was in 2008. (Interview, Group, I1GL-5)*

Between 2009 and 2012, according to group- and organization-level sources, a series of safety

activities were implemented by the Human Resources Director, who oversaw safety. Even though

sources agreed with the existence of safety activities, the perceived dates of implementation varied.

The STOP™ Program began around the 2010 timeframe.

Researcher:	Do you remember about what year the STOP™ program might have started?
Subject:	My guess would be around 2009. (Interview, Group, I3GL-32)

… But it (the STOP™ Safety program) was an eye-opener to a lot of people on the shop floor on how to work safe and be aware of your surroundings and watch out for other people. I think that was a big, big help in kicking things off, and letting the shop floor employees know that we were serious about safety. … I think that was before [Director of Quality and Safety.] It's probably been six, seven years ago that we started the STOP™ Safety Program. (Interview, Organization, I4OL-39)

We'd started the STOP™ safety program in 2010, but it hadn't gained a lot of tr...it wasn't working. (Interview, Group, I1GL-25)

Between 2010 and 2012, Job Safety Analysis and a new-hire safety checklist were implemented.

So, they developed a safety checklist. Whenever we had a new hire, we'd walk them through the shop and point out all the things that they need to look out and watch for when they're out working in the shop. And then they would go through the STOP™ Safety training course. … Probably 2012. (Interview, Organization, I4OL-47)

My only other thought would be manager participation – manager and supervisor participation and expectation through threats. You know, 'if you guys don't participate, if you don't do your STOP™ cards…'. JSAs – job safety analysis - had come into the mix, and it seems that those were a couple of years behind the STOP™ program - 2011, 2012. (Interview, Group, I3GL-44)

The Early Safety Period ended with another noteworthy injury and a March 5, 2012 OSHA

inspection, complete with violations and financial penalties in August 2nd – the company's third

compliance inspection.

We had an accident in the CNC where an employee was in the CNC while it was running. … It's our big 5-axis CNC machine, and they can do milling and saw cutting of [plastic]. Well, he was in there with it, and they were moving something out of the way, but the machine was still running, and he backed into it, and it cut him all across his back. … I don't think [Safety Manager] was the manager of safety yet, so it was probably 2012 or 2013. (Interview, Organization, I4OL-53)

During that compliance visit in 2012, it wasn't a pleasant experience for [the company] just because there was a lot of citations. (Interview, Group, I1GL-15)

Inspection Information - Office: [redacted city]
Nr: 281164.015 Report ID: 0830500   Open Date: 03/05/2012
[Company]
[Redacted address]

(Document, Public, D75NL-5)

From the business perspective, corporate sales were superb, and the company had become an

international leader in specialty plastic manufacturing.

> *In fact, 2011 was one of the best years in the 25-year history of [company] thanks in large part to the fact exports almost doubled, says [redacted name], chief financial officer of the company. "That was fairly unexpected, but pleasantly so." (Document, Public, D68NL-7)*

The Safety Transition Period occurred between 2013 and 2016. This interval was marked by

significant business and safety changes and significant safety improvement. In January 2013, a part-

time Safety Lead was appointed to carry out post-compliance improvement.

> *[Redacted name] wasn't the Safety Manager at the time – [he] was just a lab tech. It was early 2013, when the previous management, who is no longer here – we had a regime change. But they came to [Safety Lead] in 2013, like in January, and asked [Safety Lead] if [he] would do what [he] did for the lab for the rest of the company. So, [he] said yeah. [Safety Lead] wasn't full-time in safety, [he] was still running our lab, and [he] had additional safety responsibilities that were put on [him]. (Interview, Group, I1GL-23)*

Documents show that one month later, that individual and the former Director of Safety met with

OSHA On-Site Consultants to initiate safety improvement efforts.

> *When the OSHA On-Site Consultation Program began working with [company] in 2013, the company was laying the groundwork of their health and safety with guidance from [redacted name], Safety Manager for [company], and the support of upper management. (Document, Public, D85NL-13)*

> *During the 2013 meeting, [Safety Manager] and the [company] team expressed their goal and commitment to achieve an OSHA Safety and Health Achievement Recognition Program (SHARP) award. (Document, Public, D85NL-14)*

In March 2013, company ownership officially changed – the owner sold the business to a capital

investment firm. To assist with the ownership change, the former CEO returned as President.

[Redacted] … was the former CFO. The owner-founder brought him back, because he was transitioning the company, and [former CFO] recognized that there was a (safety improvement) need. [Former CFO] was very good at identifying the right people in the place. He was CFO, left for ten years, and came back as President, not as CEO. (Interview, Organization, I5OL-16)

We were bought in early 2013 by an investment company called [Investment Company]. Previous to that, we were owned by [redacted name], who was one of the founders of [company] – him and his father. So, they bought our company after that 2012 OSHA inspection. (Interview, Group, I1GL-27)

In early 2013, [redacted name] and [redacted name] co-sponsored the purchase of [company]. With more than $30 million in sales, [company] is the world's largest manufacturer and installer of [plastic] walls … with facilities in [redacted city, state] and [Asia]. The transaction was completed in March 2013 and was backed by two institutional investors. They [capital investment firm] now own [company]. (Document, Public, D66NL)

Organization-level interview sources agreed that other pivotal executive – the Director of Quality and Safety – was hired in 2013, or 2014 as some recalled.

When we hired our new quality and safety Director, [redacted name]. I think it was 2013 when he started. (Interview, Organization, I4OL-27)

Because like three months before [Director of Quality and Safety] was hired on (mid-2013), they completed the sale to them. (Interview, Organization, I9OL-25)

Hiring [Director of Quality and Safety], four years ago, was probably the biggest thing. Some of that is when they sold the company five years ago - it had to be professionalized. (Interview, Organization, I5OL-9)

Throughout 2013, sources commented on the safety improvements, constant safety focus, ventilation upgrade for chemical control, and proactive use of the Safety Committee.

Because then there was a couple of years before [redacted name] left in September 2015 where it was a lot - a lot of safety, a lot of safety. So, 2013, 2014, 2015 was tons and tons of safety. (Interview, Group, I3GL-86)

They made a big step in, probably 2013, with the ventilation in the casting area to turn the air over back there, because they didn't have proper ventilation. They've done a lot to getting the ppm (parts per million refers to an airborne concentration of chemicals) levels down to a safe level. (Interview, Organization, I4OL-51)

The next year, 2014, saw more proactive safety effort, including the hire of the Safety Lead as fulltime Safety Manager. Multiple Multi-unit sources noted this event.

It was not until 2014, when the company hired a full-time Safety Manager, that proactive safety and health activity really gained traction and outcomes began to improve. (Field Note, F2OL-8)

In early 2014 - actually mid - about May of 2014, [Director of Quality and Safety] said 'he either works in the lab or…' had two bosses, so [redacted name] had conflicting priorities. He said, 'he either works in the lab under you, or he works as a Safety Manager under me.' So, at that point [he] was pulled out of the lab. [He] trained somebody else to work in the lab. [Redacted name] was pulled out of the lab, and that's when [he] was officially made the Safety Manager in about May of 2014. So, we were able to focus a lot more. That was 100% of my responsibility as opposed to one foot in production and one foot in safety. (Interview, Group, I1GL-39)

That year, the Safety Incentive Program, as an extension of the safety management system, was

crafted with Safety Committee assistance.

During [2014], our previous Plant Manager had come to me in a safety meeting, and said he heard the word "leading indicator." … So, he said, 'write me a safety incentive program that's based on leading indicators'. (Interview, Group, I1GL-66)

Our incentive program really is a reflection of our current safety management system, as far as employee participation goes. We wrote it off that, we fought it out in the Safety Committee for months – most of 2014, because it was change. … You know we kind of had to sell it all the way up the line, to where finally, I think it was November ... December ... early December of 2014, we rolled it out to the executive managers. We told them this is what we're going to do, is that OK? (Interview, Group, I1GL-67)

"We are proud to be recognized for our commitment to employee safety and health," states [Safety Manager], [company]. "Our safety and health management system, which we instituted in 2014, is proving to be an effective tool in reducing our injury and illness rates." (Document, Public, D78NL-5)

Safety activities like work instructions and periodic JSAs and STOP™ cards were fully implemented.

Continued safety training such as new employee indoctrination training, and OSHA training…2014 (CIR, Individual, S21IL)

I reviewed Work Instruction (WI) 2701WI, revision C, dated October 13, 2014, which is titled Inspection, Care and Use of Synthetic Web Slings. The first of 4 pages references the document title, the names and signature dates of the WI owner, Plant Manager, Assistant Plant Manager, and Document Controller. This section is followed by a proprietary ownership statement. On subsequent pages, the WI "describes how to inspect a sling to see if it is suitable for service, gives rules for using slings, and illustrates how to calculate the actual capacity of a sling;" lists the required PPE and responsibilities; and outline steps for removing a sling from service, using a sling (including the sling angle and load chart), and inspecting a sling. This document appears official and useful to workers who are responsible for using web slings. (Field Note, F18NL-8)

In August 2014, after the company completed hazard abatement, their 2012 OSHA inspection case

was finally closed. Despite these accomplishments, the year ended with higher-than-expected rates

of injuries and illnesses.

In 2014, our accidents actually spiked, because the old way of thinking was still kind of there. My feeling was it was more of a… What happened was everybody kind of threw their hands up and said, 'we don't

have to deal with this anymore, because we have one guy, and everything safety - that's him, we don't have to deal with it, and we're good.' So, everybody threw their hands up, walked away from it, and our accidents spiked. (Interview, Group, I1GL-65)

We started seeing a reduction of accidents at the last quarter of 2014. (Interview, Group, I3GL-84)
One premier safety event in 2015 was the January implementation of the Safety Incentive

Program featuring a $12,000 incentive budget.

… We implemented the new safety management system at that time. We rolled it out to the employees under the veil of the safety incentive program in January of 2015. So, right when they got back from the holidays, we had a big lunch, and we rolled out the new safety incentive program. We're not going to sell them the new safety management system, because they don't care – everybody wants to know 'what's in it for me.' So, we rolled out the safety incentive program, which was really just a way to get them to participate in the safety management system. We handed out t-shirts, we gave a presentation for 30 minutes, and then we let them go. (Interview, Group, I1GL-84)

I mean we - 2015 – we had a $12,000 budget for the incentive awards. (Interview, Organization, I9OL-98)

There was evidence of organizational readiness as the company satisfactorily responded to an OSHA

heat stress inquiry with no inspection, citation or penalty.

Following interview, the subject told the story of how adequate recordkeeping satisfied a 2015 OSHA inquiry. The inquiry may have been prompted by an employee complaint. Even though OSHA did not conduct an On-Site audit, the company was required to respond to OSHA's inquiry. The company's production floor is not cooled; however, the Safety Manager provided records about the company's heat stress protocol, including past Toolbox Talks and administrative controls. Regarding the latter, shop managers make Gatorade available throughout the shift and encourage workers to stay hydrated. (Field Note, F3GL-8)

There was evidence of strategic safety planning as safety needs were identified and prioritized.

2) Large Sliding Door in Bonding- As a committee we have committed to fix the safety issue of the door falling down. Plans to redesign & rebuild the door will be delayed until at least 2015 as it will be a capital expenditure item. (Document, Private, D20NL-3)

There was evidence of individual change readiness, as employees coached peers and superiors.

One hourly employee asked the CEO to kindly put his safety glass[es] on, covering his eyes not his forehead. … 2015 (CIR, Organization, S32OL)

To augment business and financial performance, the capital investment firm added an executive

consultant, who eventually became the CEO.

They brought in [redacted name]; he's our CEO now. They brought him in in the beginning as a consultant to feel out the business and see how operations ran, and then they put him in as the CEO probably three years ago. (Interview, Organization, I4OL-93)

End-of-year metrics revealed high international sales and no OSHA recordable injuries and illnesses.

Since 2015, exports have driven [company's] growth as China emerged as the company's top market. "It's over 50 percent of our business now," says [VP of Operations]. "We've done a lot of big projects in China. China is booming." In 2016, the company launched a website specifically for the Chinese market. (Document, Public, D79NL-20)

… By the end of 2015, that was the first year that we went a full year without a recordable accident. We had a clean 300 Log. (Interview, Group, I1GL-84)

In year 2016, the company moved beyond compliance to proactive safety and health with

their first annual Health Week and their first OSHA SHARP certification in August 2016.

In recognition of your exemplary commitment to employee safety and health. I would like to present you with a Certificate of Recognition under the OSHA Safety and Health Achievement Recognition Program (SHARP). You have successfully participated in a comprehensive safety and health onsite consultation survey conducted on April 28, 2016, by the Consultation Program and [redacted location]. (Document, Private, D3NL-2)

In August of 2016, [company] earned recognition as a SHARP participant. Several health and safety practices contributed to [company] success, these include the company's STOP program, OSHA 10 and 30 hour training, and their commitment to engineering controls. (Document, Public, D85NL-15)

The year culminated in lower-than-average injury rates and significant 3-year performance

improvement.

From 2013 through 2016, [company's] average recordable case (TRC) rate was 2.8, and their average days away from work, job restriction or transfer (DART) rate was 1.7. Their TRC and DART rates for this period were significantly below the Bureau of Labor Statistics industry average TRC and DART for these years. For North American Industry Classification System (NAICS) code 326113, BLS reports the industry average TRC rate was 5.3, and the industry average DART rate was 3.1. (Document, Public, D85NL-19)

Beyond 2016, the organization entered the Safety Sustainability Period. Safety activities and

conversations continued.

The fact that safety is a major part of our job. We are always reminded by filling out JSA's every day and the safety guy, [Safety Manager] is always walking through the work area. … 2017 (CIR, Individual, S11IL)

Constant Reminder of Safety, it's never put on the Back burner or considered 2ⁿᵈ … 2017 (CIR, Individual, S18IL)

The incentive program continued with a much lower incentive budget.

And then it was like, 'your budget is a $1,000 next year.' I'm kind of, like, '$1,000?' Right. Yeah. So, 2015 was $12,000, 2016 was $10,000, 2017 was $1,000. It's a very big shift. (Interview, Organization, I9OL-114)

Proactive safety and health continued via the 3ʳᵈ annual Health Week.

We do a health week. We did a health week in 2017, and we're planning one in 2018. That was one of great things we did in 2016 and in 2017, and we're planning 2018 - it was a great success. We've made a little competition out of it. We've gotten things from local vendors. You know, we got one of the athletic clubs to come here and give us a great deal. And, we'll sign employees up, and we'll do it through payroll, and they can attend. And, then they can get into programs, and as a company, we can get into the programs. We're looking into different things along those lines. That's helping tremendously. (Interview, Organization, I9OL-190)

Even amidst success, incidents occurred, like the property damage event in July 2017. … Anyhow, [Safety Manager] was gone for three days, and they had an incident. Like I said, nobody was hurt, but there was $10,000 in property damage. Ten thousand dollars in [product] was damaged due to a forklift accident. The guy dropped a load of [product]. (Interview, Group, 1GL-139, 141)

Following a May 2017 On-Site Consultation audit, the company earned a 3-year SHARP certificate in August 2017.

(Document, Private, D6NL)

In 2017 [company] earned a 3-year renewal as a SHARP site, awarding the company SHARP status until 2020. [Company's] innovation and dedication to health and safety has made them an outstanding member of the [redacted state] SHARP family. (Document, Public, D85NL-20)

At year's end, the company's OSHA 300 Log was clean – no recordable injuries/illnesses and lost-time events, and 80% of the company's market share was international.

> *[Note: In 2017, the company's TRC rate was 0.0, and their DART rate was 0.0. However, 2016 is the most recent year these BLS data are available.] (Document, Public, D85NL-19)*

> *As about 20 percent of 2017 sales went to domestic customers, the company is also growing in several other international markets. "It used to be 90 percent States, 10 percent international," says [VP of Operations]. (Document, Public, D79NL-23)*

In addition, the President, who had been hired to assist with the transition, resigned.

> *So, our President resigned late in December, and [redacted name], the CEO, picked up all of it, so now he is president, CEO, top executive of the company. (Interview, Organization, I9OL-15)*

By early 2018, annual work comp claim costs had fallen to $400, and the company had saved $20,000 in work comp premiums.

> *In 2015, [company's] dollar value of worker's compensation claims was almost $3,000; in 2018, that number fell to just over $400. The company has also experienced over $20,000 in savings on their worker's compensation premiums since 2015, and [company] has an impressive experience modification rate of 0.70. (Document, Public, D85NL)*

2.   Time Construct: Summary

The time construct uncovered two themes that were relevant to the company's achievement of safety excellence. Quotations about the dates and periodicity themes were primarily found in private documents and group-level interviews. Using key dates as bookends, the chronological events were divided into four intervals or periods. In the Pre-Safety Period (1987-1999), the company was established and oriented toward production. A fatality, serious injury, and an OSHA inspection characterized safety. Between 2000 and 2012, in the Early Safety Period, international markets expanded and attention to workplace safety fluctuated. High injury rates prompted OSHA inspections in 2008 and 2012. During the Safety Transition Period, which began with a change in company ownership and ended with OSHA SHARP recognition, safety became a corporate priority marked by significant staffing, core process, and performance changes. Beyond 2016, the Safety Sustainability Period, safety efforts continued and wellness efforts were added. Simultaneous with

the chronology of events were short, repeated cycles of safety activity – daily JSAs, weekly Toolbox

Talks, monthly STOP™ cards, and annual program evaluations (Table XLIX)

TABLE XLIX: TIME CONSTRUCT SUMMARY

	Primary Sources	Private Documents, Interviews
	Primary Units of Analysis	No Level, Group-Level
	Prominent Themes	Dates, Periodicity
Summary of Prominent Themes	Dates	• Four subjective time periods characterized the state of safety at the company – Pre-Safety Period (1987-1999), Early Safety Period (2000-2012), Safety Transition Period (2013-2016), and Safety Sustainability Period (beyond 2016). • In the Pre-Safety Period, the company was established and oriented toward production. A December 1998 material handling accident caused one fatality and a second injury and resulted in a post-accident OSHA investigation. • The Early Safety Period between 2000 and 2012 was characterized by business growth and fluctuating attention to workplace safety. The first full-time Safety Manager was hired around 2000 and retired in two years. Between 2006 and 2008, safety was just talk. Another OSHA inspection took place in 2008. Beyond 2009, markets and profit were superb and a couple proactive safety initiatives were implemented - the STOP™ Program and new-hire checklist. High injury rates prompted an OSHA audit with citations and fines in March 2012. • The time between 2013 and 2016 was the Safety Transition Period. Company ownership and leadership changed in 2013. Soon hired were a Director of Quality that assumed safety oversight and a full-time Safety Manager. A behavior-based Safety Incentive Program was implemented in 2015. Safety programs were in place, and employees at all levels were supporting safety – organization and individual readiness were apparent. The company's first injury-free year occurred in 2015. Injury prevention efforts were supplemented by wellness initiatives in 2016 (i.e., Health Week). Safety achievements included OSHA SHARP certification and below-average rates of injury and illness. • The Safety Sustainability Period extended beyond 2016. As safety requirements, incentives, and proactive efforts continued, the company earned 3-year SHARP recertification in August 2017. By early 2018, annual work comp costs had fallen to $400, and the company saved $20K in work comp premiums.

Figure 33: Case Organization, Event Timeline, 1985 – 2020

$20,000 Savings in
Work Comp Premiums
(2015-2018)

Awarded 3-year
SHARP Certificate

2020

Annual Work Comp
Cost, $400

Leading Indicators
Guide Safety

See
Event Timeline
(Figure 34)

President Resigns -
CEO Leads

Introduced Job Safety
Analysis

HR Director Oversees
Safety

Export Sales Doubled

Implemented DuPont
STOP Safety

2010

Inconsistent Use of
Toolbox Talks (2006-
2010)

OSHA Inspection

"Safety was just
talk." (2006-2008)

2005

First Safety Manager
Retires

Hired First Full-time
Safety Manager

Opened Overseas
Manufacturing Facility

OSHA Citations &
Penalties Issued

Aware of Onsite
Consultation

2000

OSHA Post-Accident
Investigation

Employee Fatality &
Severe Injury

1995

1990

Company Officially
Incorporated

1985

Figure 34: Case Organization, Event Timeline, 2012 – 2016
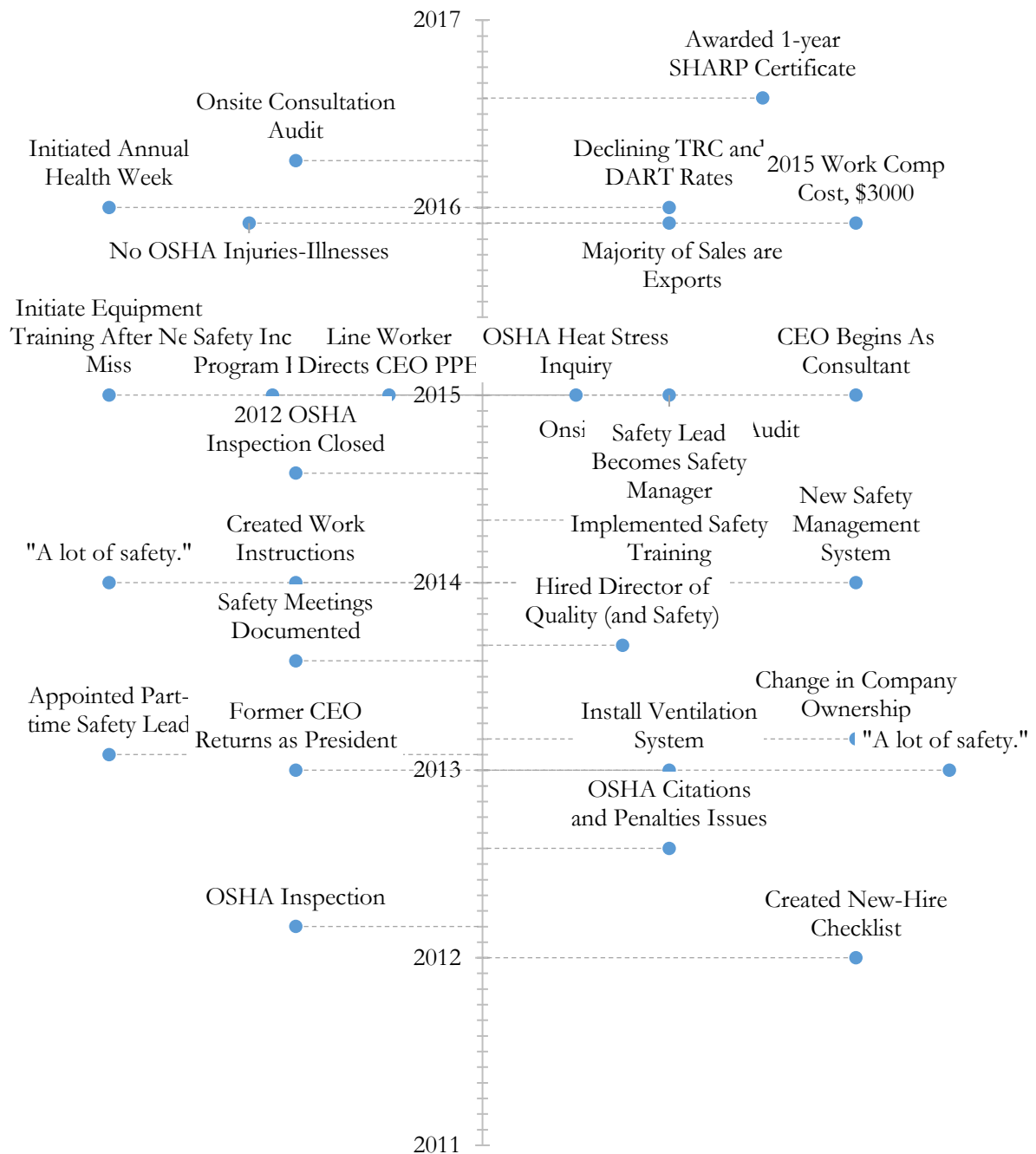
N.   Hazards Construct

The hazards construct emerged from data and encompassed quotations about workplace

safety and health hazards. This major code was assigned to 306 text segments. Because the

construct is narrowly defined, sub-codes were not applied. TABLE L shows that private

documents, specifically Safety Meeting Notes, yielded 70% of quotations. Interview subjects at all

levels of analysis also mentioned hazards.

TABLE L: HAZARDS CONSTRUCT, NUMBER OF SUB-CODED SEGMENTS BY SOURCE
AND UNIT OF ANALYSIS

Data Source	Level			
	Organization	Group	Individual	None
CIRs	1	0	1	
Interviews	15	31	20	
Field Notes	0	1	1	13
Documents, Private				213
Documents, Public				10
Subtotal	*16*	*32*	*22*	*236*
Total	*306*			

For this construct, quotations unanimously agreed that hazards were prevalent in the

company. Danger and risk were implied in multiple multi-source and multi-unit quotations about

employee perceptions, accidents, injuries, near misses, safety programs, controls, and audits.

> *Like I said, when I came here, it was scary. The minute I took you out on the shop floor, you get the sense of danger when you come here. Ok, when we weren't guarding those hazards back in 2006 when I came on board, it was a lot scarier. (Interview, Group, I1GL-174)*

> *Near miss reporting is another big thing. Now that we're talking, it's coming to the front of my mind. Encouraging near miss reports, and it doesn't mean somebody had to get hurt, and it doesn't mean that there was almost an accident, it means that there was an observation made. And, it was brought to everybody's*

attention that 'hey, something could have happened.' One person saw it - nobody else saw it, but it still is... 'hey, we're going to report this to the group'. We're going to report this to the Safety Manager and he'll address it. Maybe it spurs an even deeper change. It spurs new equipment purchases or discussion of new PPE, things like that. (Interview, Group, I3GL-56)

4. An effective hazard reporting system exists.	3
Comments: Hazards are reported in several ways. They can be reported directly to their supervisors or operations manager whose office is right off the shop floor. They can be reported directly to the company safety manager and they can be reported through the STOP cards.	

(Document, Private, D6NL-4)

The company conducted Safety Committee meetings every month from August 2013 through January 2018. Each month throughout this period, a meeting agenda was prepared and meeting notes were recorded. Documents show that six to ten safety-related issues were addressed each month along with a discussion of near misses, hazardous conditions, unsafe behaviors, and new items. Safety Committee members were managers and executives. (Field Note, F18NL-15)

Not surprisingly, most hazards were most evident on the manufacturing floor and at installation sites.

In the high-bay on the shop floor, I immediately noticed the acrylate chemical odor, loud noise, thousand-pound [plastic] panels, wet surfaces, task-specific protective attire, busy activity, mostly male workforce, multiple working zones, varied work tasks, and the walking zone defined by floor paint. (Field Note, F1NL-8)

Again, it goes back to, we do large projects, we do large panels, and we work with large equipment, and they could be hugely unsafe if we are not following procedures. (Interview, Group, I6GL-56)

In the states, we have no problems (meeting safety requirements). In a lot of countries in the world, we have no problem; we're miles above what they want anybody to be. ... Whereas, you're sending them to China, they want them to work on bamboo scaffolding. (Interview, Group, 1GL-168)

Hazards were also apparent in the office environment.

Like, I remember I was walking down stairs, and I was carrying a box. I was wearing heels and other stuff, and one of the other Directors is, like, 'is that really safe for you to be doing that?' And, he came and grabbed the box, because I'm in heels and it's not really safe to be doing that. And, it was a joke, but it's, like, stopping you, and it makes you think. (Interview, Group, I6GL-19)

The facility infrastructure, too, was aging. Quotations mentioned parking lot deterioration and doors in disrepair.

2) Large Sliding Door in Bonding- As a committee we have committed to fix the safety issue of the door falling down. Plans to redesign & rebuild the door will be delayed until at least 2015 as it will be a capital expenditure item. Drawings will be complete the week of May 19th, and then Engineering will bring in an FEA (Finite Element Analysis is used by engineers to prototype equipment) Analyst to approve plans for improvement. If plans get the green light they can be quoted. Leading finally to a timeline to complete improvements. – [VP of Engineering, Quality and Safety] (Document, Private, D20NL-3)

Nearly two hundred quotations listed specific safety and health hazards. Safety hazards posed the risk of immediate injury and were more common. Safety hazards included moving parts; heavy loads; and hoses, cords, and tracks. Machinery and tools were used to cut, grind, and assemble materials, in departments like Fabrication, Finishing, and Tool Prep.

We had an accident in the CNC where an employee was in the CNC while it was running. … It's over by the…on the north side of the building. It's our big 5-axis CNC machine, and they can do milling and saw cutting of [plastic]. Well, he was in there with it, and they were moving something out of the way, but the machine was still running, and he backed into it, and it cut him all across his back. (Interview, Organization, I4OL-53)

I think it just goes back to everybody is cautious as far as making sure that there's safety. … It's the fact that we have large projects and we're working with heavy equipment. They don't just want themselves to be safe, they want the person that's working next to them to be safe as well. (Interview, Group, I6GL-50)

Near Miss
2) Nail gun misfired, and shot 2 nails almost striking tooling employee
3) Two quality employees were almost hit by a forklift a commercial (Document, Private, D43NL-11)

Material handling hazards were cited by every source and unit of analysis. Those hazards pertained to forklifts, cranes, and rigging equipment, which are used to move large raw materials and products.

Well, there's a series of videos they took, because last week they had to take the panel out and flip it over, so they could polish the other side. You might find that interesting. You could observe the safety things that they're doing, to make sure that they flip an essentially 90,000-pound panel over. This one is 14 inches thick and 51 feet long. (Interview, Organization, I5OL-44)

It used to be the case that new employees would come and any of them could use a forklift or a crane or some of the heavy machinery or things like electrical saws. But, that is no longer the case. Now, in order to use anything serious that could cause an accident, like a forklift or crane, heavy machinery or anything that could cause problems, employees need to have a certification, and that is provided within the company. The training and certification that shows that they are competent to use this machinery. (Interview, Individual, I7IL-45)

I know, as far as the crane, at any given moment, you can hear somebody yelling across the room to someone else, or watching someone else, because the crane is coming through and maybe they're turned the opposite way. You'll always hear that on this floor. (Interview, Individual, I2IL-150)

Sources of slipping and tripping were found indoors and outdoors.

> *I forget, but there was a trip hazard or an open space in the floor, an uncovered - we'll call it a manhole, that wasn't what it was - but somebody was doing maintenance and left it open, and I got dinged in my department. Well, geez, I'm not even doing it, but it doesn't matter. It's not what you did wrong, it's just an observation on this day. It's been taken care of, but now I know to look at that spot when I walk by it. So, it planted a seed. Seeing those audit results plants seeds, and just reminds you to look at things you wouldn't ordinarily look at. (Interview, Group, I3GL-120)*

> *… Like when I go get the sample, trips and falls are the biggest hazards. (Interview, Individual, I2IL-21)*

> *Near Miss*
> *2) Casting employee tripped on conduit in spin cast room & nearly fell (Document, Private, D36L-10)*

> *4) [Company] Parking Lot- Quotes to concrete the entire [company] parking lot are coming back per [Maintenance and Tooling Manager]. This will open up parking, and get the employee cars off the streets as well as fix the safety issue of holes in the parking lot. (Document, Private, D27NL-5)*

Multiple sources and units of analysis disclosed a variety of other safety hazards at the company,

including elevated job tasks, confined spaces, street traffic, sharp objects, projectiles, hot surfaces,

and general shop floor busyness.

> *But also, everyone on the shop floor, they're always aware…like where the crane is. It gets loud sometimes, because you have machines going. And, you have this happening over here, and this happening there (moves hands from side to side to indicate overall busyness of shop floor). You can almost see that everybody is looking around before they make their next move - making sure there's not a forklift behind them, or making sure that the crane is in a certain spot, or there's nobody behind them doing anything else. (Interview, Group, I6GL-40)*

> *I use the hot glue gun, and I've burned myself pretty good a couple of times with the hot glue gun. (Interview, Individual, I2IL-21)*

> *March 2015 Near miss reporting*
> *2) Janitorial employee bumped head on [plastic] panel. Sharp edged drew a bit of blood*
> *3) Fabrication employees breaking [plastic] drop nearly hit an employee with a loose flying piece of [plastic]*
> *4) Panel fell from suction cups 6 inches to the pallet below at CPD.*
> *7) Loose plywood we left unsecured leading to potential projectile hazards*
> *(Document, Private, D31NL-9)*

> *6) Man in [Oven] Alarms- Man in [Oven] alarms will be wired to estop switches that will stop the heating & pressurization of the [ovens]. Conduit has been run, and the project is on schedule to be completed during the [oven] encapsulation on February 1st, 2016 (Document, Private, D40NL-7)*

In addition to safety hazards, several sources mentioned health hazards, which cause injury or illness over time. Chemicals, fumes, spiders, and ergonomics were examples of health hazards. Chemicals were most frequently mentioned by documents and interview subjects at all levels.

> *I deal with a lot of chemicals in here, but I don't have any place to dispose of chemicals in this room. I don't have a hood – I don't have things like that. That's kind of a challenge for me, depending on what chemicals I use, because I can't use certain chemicals in this room without a vented hood. (Interview, Individual, I2IL-96)*

> *On and before 3/5/12, the employer did not ensure that flammable chemicals such as Lucite syrup were stored in a laboratory-safe or flammable material refrigerator/freezer. This condition exposed employees to fire and burn hazards. (Document, Private, D75NL-10)*

> *Beyond the ovens and finishing area was a fabrication area where [plastic] panels were cut to size and smoothed with a very large computer-programmed grinding tool – the CNC. White plastic shavings, like piles of wet snow, surrounded this activity. According to the Safety Manager, plastic shavings are flammable, so wetting was necessary. (Field Note, F1NL-10)*

Other manufacturing-related health hazards, like noise, ultraviolet light, thermal stressors, and ergonomics, though mentioned less often, were well corroborated.

> *Not Wearing PPE*
> *5) Casting employee not wearing hearing protection in vicinity of high decibel noises*
> *(Document, Private, D52NL-16)*

> *A good example is that machine out there – a QUV (an accelerated weathering testing machine). It's ultraviolet light, and obviously it's out in the middle of everything [points to new machine in a high bay area where others can walk by], so we had to make sure that we came up with the best way to keep that safe so that people just wouldn't go and be glaring into the lights. (Interview, Individual, I2IL-11)*

> *The ovens were not operating at the time, so the amount of heat by-product – a thermal stress risk to workers – was not apparent. (Field Note, F1NL-11)*

> *We're using that to try and build the goals for 2019, so we're already thinking ergonomics for 2019. We don't have repeatable injuries, but we have repeatable activities that we have to get something focused on ergonomics. Those guys out there with those sanders and polishers, they're always doing... (subject performs circular reaching motions with both arms). (Interview, Organization, I9OL-230)*

> *I think back in the beginning, there was probably smoke in the welding shop, and they put in another fan and another vent. I think we started with one, and we have three now, or we started with two and we ended up with three. We have harnesses now, to get up on things. (Interview, Individual, I8IL-61)*

1. Hazards Construct: Summary

The hazards construct emerged from the data. Seventy percent of hazard quotations were found in private documents. No sub-codes were assigned to this construct. Hazards were an inherent part of custom plastic manufacturing. All historic and current quotations agreed about the ubiquity of hazards, especially on the manufacturing floor. More safety hazards than health hazards were noted. Safety hazards included machines, tools, forklifts, cranes, elevated work, confined spaces, sharp objects, hot surfaces, and shop floor hubbub. Fewer, but equally important health hazards, included chemicals, non-ionizing radiation, thermal stressors, and ergonomics. These points are summarized in TABLE LI.

TABLE LI: HAZARDS CONSTRUCT SUMMARY

Primary Sources		Private Documents
Primary Units of Analysis		No Level
Prominent Themes		None
Summary Prominent Themes	Hazards	• Hazards were abundant in this custom plastics manufacturing company, especially on the shop floor, but also at installation site, and in offices. • A myriad of safety hazards, including machinery, power tools, forklifts, cranes, rigging equipment, sources of tripping, elevated work, confined spaces, sharp objects, hot surfaces, and shop floor busyness were present in nearly every department. • Health hazards, such as chemicals, UV light, heat, cold, and ergonomics, placed workers at risk of injury and illness over time.

CHAPTER V

Introduction

The purpose of this appreciative, retrospective case study was to explain, using a systems model, how one medium-sized business created an exemplary occupational safety and health program that lowered total recordable case rates of occupational injury and illness. To achieve that goal, subjects were interviewed and surveyed, and public and private documents were examined.

This final chapter answers the primary and secondary research questions by highlighting major and unique data. Chapter 5 also discusses research findings, strengths and limitations, other insights, and practical and research implications.

Research Questions

As stated in chapter 1, this investigation posed one primary research question.

Question 1: How do medium-sized businesses with exemplary occupational safety and health performance achieve low rates of occupational injury and illness?

To inform the answer to that question, six secondary inquiries were also posed.

Question 2: What extra-organizational factors are perceived to play a role?

Question 3: What organization level factors are perceived to play a role?

Question 4: What group level factors are perceived to play a role?

Question 5: What individual level factors are perceived to play a role?

Question 6: What is the role of change readiness?

Question 7: What is the processual relationship among these factors?

The relationship between all seven research questions and the theoretical constructs, data sources, and units of analysis is clarified in TABLE LII. In this study, because the secondary research questions informed the primary question, the secondary questions are answered first.

TABLE LII: ALIGNMENT OF RESEARCH QUESTIONS, CONSTRUCTS, DATA SOURCES AND UNITS OF ANALYSIS

Primary Research Question			
Q1: How do medium-sized businesses with exemplary occupational safety and health performance achieve low rates of occupational injury and illness?			
Data Source	Unit of Analysis	Construct	Secondary Research Questions
Critical Incident Report, Work Unit Climate Survey, Interviews, Private Documents, Public Documents, Field Notes	Organization-Level, Group-Level, Individual-Level, Context (No-Level)	External Environment	Q2: What extra-organizational factors are perceived to play a role?
		Leadership, Mission and Strategy, Culture	Q3: What organization-level factors are perceived to play a role?
		Structure, Management Practices, Core Processes, Work Unit Climate	Q4: What group-level factors are perceived to play a role?
		Individual Tasks/Skills, Performance	Q5: What individual-level factors are perceived to play a role?
		Organizational Readiness, Individual Readiness	Q6: What is the role of change readiness?
		Time	Q7: What is the processual relationship among these factors?

A.   Secondary Research Questions

1.   Question 2: What extra-organizational factors are perceived to play a role?

Extra-organizational factors emanated from data in the external environment construct.

a.   External Environment Factors

Five external factors played prominent roles in the case's achievement of exemplary performance. In order of discussion, those factors are new company ownership; markets and customers; safety regulation; low- and no-cost resources; and external business suppliers and service providers.

1.   New Ownership

Most fundamental to the case's significant performance improvement, perhaps, was the 2013 change in ownership. The founding entrepreneur sold the company to an external capital investment firm, whose expertly owned and operated growth-oriented firms. Even though fewer sources mentioned this factor, the investor's financial and growth interest and their risk aversion appeared to catalyze change for nearly all subsequent safety initiatives. In other words, the company's safety trajectory shifted positively under new ownership.

> …. *I don't think [safety improvement] was caused by them, but having them… You know, like I say, it was more of a catalyst. It sped it along a little bit. I honestly don't know what they did or said behind closed doors or in meetings about how safety is going to be approached. But my perception and opinion on it is, you know, just having them there made it...lent more legitimacy to the program – to all the programs, not just safety, but benefits and the change in organizational structure. I think that was a big part of it. It just took people out from under this microscope of one man picking the way things were being done. When on Monday it was this, but by Friday it was something totally different – safety is out the window –'I'm more concerned about this.' And, the next week, safety's back on the table. The week after that, it's not on the table anymore. So, it's the whims of one person. (Interview, Group, I3GL-77)*

According to literature, ownership has been cited as a barrier to safety activity and performance in smaller firms. Owners, who are likely founders, often assume multiple organizational roles and tend to be highly oriented to the survival of their business; their personal knowledge, norms and preferences tend to drive the state of the organization (Champoux and Brun, 2003; Hasle and Limborg, 2006; Sorenson et al., 2007; Hasle et al., 2009). In addition, even though owners are competent in their respective field (Rue and Ibrahim, 1998), they have limited safety and health knowledge and interest (Hasle et al., 2012). To change the organizational safety status quo,

then, either a change in ownership or a change in the owner's knowledge, philosophy, and ability

may be necessary.

2.   Markets and Customers

Markets and customers became a factor in the case's achievement of safety performance. In the

early 2010s, the company's international market – their primary market – grew increasingly safety-

minded. The reasons for the market's safety orientation were beyond the scope of the study.   To

qualify for some business opportunities, the company was compelled to disclose their safety

programs and performance to potential clients. Consequently, to preserve market access, the

company elected to improve safety programs and to prioritize safety performance.

> …They're not just looking that we have a safety program, they want details behind the safety program. They want to know what we do. They want to know what our Toolbox Talks are - who's involved in them. They want to know that we have a weekly training, monthly training, what we do, how we handle that, and they want the proof that backs that up. … But every bid package is different. So, like in [redacted city], they'll want to know for the last six years, if we had near misses, if we had accidents, if we had this, if we have that, what the numbers were, how many employees were on for each one of these. I mean, they want in-depth. ... (Interview, Group, I6GL 7)

Burke and Litwin (1992) specifically list customer factors as an external driver for

organization change. Smaller businesses maintain more direct and personally responsive

relationships with customers than larger businesses (Coviello et al., 2000). "They know that they

must keep an eye on their environment, they know that they need to watch their customers very

closely, they need to watch their competitors, they need to watch technology and they need to watch

government to see what is going on in the regulatory arena" (Nerone, 1997). In the U.S., even

though safety and health performance is not customarily considered a consequence of business

operations, some workplace improvements and preventive changes have been prompted by

customer considerations (Mayhew and Ferris, 1998; Lamm, 2000; MacEachen et al., 2010). This

evidence suggests that the OSH profession should understand the value of safety and health to the

greater organization.

3.   Regulation and Standards

Persistent regulatory pressure also influenced the company's achievement of safety improvement. In a fourteen-year time span, the company underwent three OSHA enforcement inspections – 1998, 2008, and 2012. Each inspection was progressively impactful in terms of violations, citations, and fines. In 2012, for example, OSHA auditors found violations of the General Duty Clause and chemical handling, confined spaces, hazardous energy and machine guarding. Corresponding financial penalties and corrective costs were burdensome and exceeded $300,000.

> *Yeah, and we were getting inspections from OSHA pretty regularly, because of our accident rate. So, they were constantly coming over and checking on the shop. (Interview, Organization, I4OL-63)*

Following every inspection, the company implemented safety changes – safety staffing; written policies, such as hazard communication, respiratory protection, and injury and illness recordkeeping; behavior-based initiatives (i.e., STOP Program), and training, for instance. Even though many changes were either intentionally or unintentionally temporary, which led to waxing and waning of safety, a safety framework was forming. While regulation prompted the pursuit of compliance, standards, especially OSHA standards, literally guided improvement by defining technical safety requirements. Early in their safety improvement transition, the company paid attention to compliance standards.

> *… We had an OSHA compliance visit in 2008. … So, when they got hit with that, [redacted name] was kind of a floating employee. [Redacted name] bounced around from department to department and just kind of helped out where they needed help. And at that point, they didn't have anybody to do the OSHA compliance piece, so [redacted name] got involved in that. … That was after the OSHA visit. So, just kind of cleaning up the compliance things that they had found – the gaps we had in the company. … [Safety Representative] wrote our hazard communication program at the time. [He] did our respiratory protection program at the time. Um, [he] redid our material safety data sheet books at that time, and then put the indexes in them and things like that...hazard communication pieces, as far as labeling; PPE; risk assessment – [Safety Representative] had a huge hand in that. Pretty much everything to try to get us into compliance. (Interview, Group, I1GL-5)*

As a driver of safety improvement, enforcement and regulatory standards have been described in literature as ineffective – overly prescriptive, inflexible, and temporarily influential (Bartel and Thomas, 1985; Pare, 2013; Legg et al., 2015). However, Sinclair and Cunningham (2014) strongly concluded that OSHA inspection increases the conduct of safety activities. Other studies have linked regulation, especially enforcement, to better performance (Gray and Mendeloff, 2005; Haviland et al., 2010). Interestingly, even though OSHA inspections are considered rare, especially in smaller firms (Silverstein, 2008; Sims, 2008; Cordaro, 2015), the case underwent three OSHA audits in a period of fifteen years.

4.   Resources

When the plastics manufacturer encountered a clear need for specialized safety information, they sought a handful of external resources. For example, following their 2012 OSHA audit, the case engaged the OSHA On-Site Consultation Program, who intermittently audited and guided the company's safety improvement journey. Even as On-Site consultants highlighted organization-specific strengths and weaknesses, the case conducted self-evaluations using the Safety and Health Program Assessment Worksheet (Form 33). The company also used publicly-available web resources (i.e., Toolbox Talks, Campbell Institute White Paper) and community-based service entities, such as health and government agencies.

On one hand, the case's resource-seeking habits are consistent with literature reports about smaller firms, who recognize their limited internal knowledge and ability (Baird et al., 1994; Nerone, 1997). On occasion, these self-reliant organizations do seek input from local entities and trusted professionals (Midsize Business Institute, n.d.; Street and Cameron, 2007). On the other hand, the case reached out to the OSHA On-Site Consultation Program. The consultation program's loose connection with the regulatory arm of OSHA may deter some businesses. Even so, studies have

shown that tailored interventions lead to favorable safety practices and goal-achievement

(Champoux and Brun; 2003; MacEachen et al., 2010; Hasle and Limborg, 2012).

5.   Suppliers and Service Providers

Finally, throughout the safety transition, after the case made improvement decisions and

allocated funds, the company engaged local suppliers and service providers to make major and

minor physical and programmatic safety improvements, such as installing security cameras;

purchasing protective gloves and material handling equipment; preventively maintaining cranes,

rigging, and ovens; and repairing flooring and the parking lot. The purchase of the DuPont STOP™

Training Program was particularly impactful, as STOP™ became a foundational safety awareness

program. In addition, the company rented equipment, such as lifts, for special purposes.

> *6) New Fire System- Superior will be here the week of March 23, on the night shift to install the new*
> *system. It will take them 2 weeks to do the install. Superior still needs to provide a map with specs for the*
> *conduit system to [Maintenance Supervisor]. Per [Maintenance Supervisor and Safety Manager].*
> *(Document, Private, D30NL-7)*
>
> *Spreader beam condition: Spreader beams have been inspected by outside, qualified personal who suggested*
> *that we by [sic] different rigging/shackles. [Maintenance and Tooling Manager] to get [Safety Lead]*
> *information to get new rigging ordered. (Document, Private, D12NL-8)*

Supply and service businesses literally prevented or minimized injuries and lessened injury

severity by augmenting the company's infrastructure; ensuring the integrity of safety-critical

equipment (i.e., cranes); and delivering safety training, equipment, and safety gear. In this study, a

large number of quotations about suppliers and services emanated from Safety Meeting Notes,

which were a prominent, but unexpectedly abundant, source of data. Had Safety Meeting Notes

been unavailable, this factor may have been unrecognized. Publications suggest that intermediary

organizations can serve as effective conduits of workplace safety and health information

(MacEachen et al., 2010; Sinclair et al., 2013; Legg et al., 2015).

2.   **Question 3: What organization level factors are perceived to play a role?**

Factors from all three organization-level constructs, specifically leadership, mission and strategy, and culture, contributed to the company's achievement of safety and health excellence.

a.   Leadership Factors

Direction-setting and team-building were two leadership factors that propelled safety performance.

1.   Direction-Setting

Company leaders knowingly and unknowingly made safety-impactful strategic decisions. Former leaders pursued international business markets that eventually became safety-minded. Those leaders also implemented the DuPont STOP™ Safety Program, which superseded OSHA compliance and set the corporate tone for safe behavior and accountability. New leaders, who sought to professionalize the company, saw that negative safety performance – violations; OSHA citations; fines; high injury rates; high worker's compensation premiums; medical costs; and high Experience Modification Rating – threatened markets, profit, and production. Consequently, new risk-averse leaders prioritized workplace safety and health.

> *… OSHA reporting was way behind. Our worker's comp insurance was through the roof. I mean, just nothing was out there. So, vision-wise, what [President] ultimately said was 'you need to improve our safety presence,' and that was pretty much as far as it went. ... So, the vision was 'improve it, make our safety presence better.'… The EMod had to be lower - we wanted it less than one; at the time, we wanted it less than one. So, it was 'get us something that's going to do that.' (Interview, Organization, I9OL-23)*

New leaders supported the safety transition by attending Safety Committee meetings, monitoring performance changes, and authentically enabling the safety strategy by staffing and empowering the safety function, prioritizing improvements, and affirming the importance of safety.

2.   Team-Building

To achieve safety goals, leaders aligned staff with safety tasks. Following previous OSHA inspections, former leaders appointed temporary safety representatives to shore-up compliance. The company's reinstatement of a former CEO as President not only facilitated the 2013 ownership

transition, but enabled safety improvement. By hiring the Director of Quality; linking safety and quality programs; approving the hire of the Safety Manager; and ensuring that safety-responsible individuals possessed adequate authority, resources, and training to change the safety status quo, new leaders laid the foundation of the safety team. New leaders also established positive rapport with operations managers and bestowed problem-solving and decision-making authority on the Safety Committee.

Though leadership and management are poorly distinguished in safety and health literature, abundant reference is made to the need for top management commitment (Zohar, 2002; Zohar and Luria, 2003; Christian et al., 2009; Beus et al., 2010). Nielsen et al. (2015) stated "it is well-known that management commitment is probably the single most important factor in creating organizational change and improving safety." Consistent with this study's concept of direction-setting, management commitment has been defined as the prioritization of and active engagement in safety (Neal and Griffin, 2004; Sheehan et al., 2016).

b.   Mission and Strategy Factors

Both mission and strategy contributed to the company's achievement of excellent safety performance.

1.   Mission

The company's business mission to produce highly-engineered plastic products for customers, and the new owner's investment mission to optimize operations and expand profit, merged to drive the pursuit of better safety outcomes. From a business perspective, the company's principle market, which was international, had become increasingly safety-minded. From an ownership standpoint, because market access was vital, production opportunities had to be maximized and risks, including safety risks, minimized. Leaders understood that safety was mission-

related. Even though the importance of safety was codified in the company's Safety Manual, safety was not specified in the corporate mission statement.

> *It is the policy of [company] to provide a safe place of employment, and to establish safe operating practices, which will result in safe working conditions and efficiency of operations. (Document, Private, D1NL-59)*

The relationship between the business mission and safety and health is rarely discussed in literature. That gap was bridged to some degree in the mid-2000s by the American Industrial Hygiene Association's Value Strategy, which defined tools and methods for linking workplace health initiatives to "increased revenues, decreased costs, faster time to market, improved operational efficiency, increased capacity, improved employee morale, decreased employee absenteeism and turnover, higher quality, increased market share, and improved customer retention" (AIHA, 2008). The results of this case study indicate that safety and health must be authentically important to a company, not just proverbially expressed. While safety need not be verbalized in a mission statement, the safety and health function should play a recognized role, either directly or indirectly, in the business mission (Zanko and Dawson, 2012; Health and Safety Executive, 2005).

2.   Strategy

The safety strategy defined the nature and conduct of core safety processes (i.e., policies, JSAs, safety incentive program, training), and thereby influenced safety culture, work unit climate, individual readiness, leadership direction-setting, and performance.

> *It was decided that every employee has to do at least one JSA (Job Safety Analysis) a day in every department. Every employee has to participate in the Toolbox Talks weekly; we'd like them to be done on Monday. I'll tell you the reason behind that in a minute. And, they've got to do one STOP™ card a month. So, now they have a daily, weekly, and monthly responsibility. What we're trying to do is put safety in front of them at least once a day, every day. All we are doing is raising hazard awareness. (Interview, Group, 1GL-70)*

The strategy was multifactorial and sequential. In addition to creating core processes– all of which are customary OSH functions, the company identified effective safety communication channels and

planned the order of safety implementation to successfully engage employees at all levels in the

company.

> *We were selling these changes to the Safety Committee and using the Safety Committee as an outlet to disperse it through the rest of the employee body. It worked. I mean, it still works. (Interview, Group, I1GL-92)*

Even as executives of the case organization defined the business strategy, they were marginally

involved in developing the safety strategy. Instead, under the disciplined guise of those with safety

oversight, namely the Director of Quality and Safety and the Safety Manager, the safety strategy

evolved informally, but intentionally, over months. That strategy was heavily infused with quality

and systems principles, including performance measurement, Gemba Walks, and 5/6S.

> *And [Director of Quality and Safety] was hired on in September of 2013. So, he came in and [Safety Manager] went to work under him. What we did from there is we started…. [Director of Quality and Safety] is very, um, management system driven – system driven. We're talking Lean Six Sigma, ISO, things like that. So, we started to integrate everything in under that kind of umbrella. (Interview, Group, I1GL-35)*

Like mission, safety strategy is rarely mentioned in occupational safety and health circles.

Safety and health are typically guided by regulatory and voluntary standards, rather than strategic

planning. However, this study showed that the beyond-technical planning was needed to implement

and sustain safety initiatives.

c.   Culture Factors

Both overt and covert safety culture played roles in the company's achievement of low injury

and illness rates.

1.   Overt Culture

Safety culture, once established, influenced the sustainability of safety initiatives. To create a

safety culture, the company took overt actions. They articulated and documented their core values,

including safety; shared stories of historic dangers, accidents, and injuries; repeatedly talked about

safety – responsibilities, hazard awareness, hazard control, and training; posted safety performance

statistics as visual reminders of safety; and ritualistically engaged in safety activities – JSAs, STOP

Program, and Safety Committee meetings and awarded incentive prizes to those who cooperated.

> *Core Values*
> · *Service to Our Customers Above All Else*
> · *Commitment to Safety and Excellence*
> · *Continuous Improvement*
> · *Work with Passion, Commitment and Enthusiasm*
> · *Work as a Team*
> · *Being Pioneers-Not Following Others*
> · *Attention to Profitability*
>
> *(Document, Private, D84NL-19)*

> *I can tell you the stories that I've heard. Such as, one of the guys got his toes cut off. We did have a fatal accident here. Those were long before my time, so I don't know any details about them. … They kind of talked about it before, but now it's really a subject that when we go out (to the production floor), you've got more people looking out for everybody. And I think that stems from things that happened long ago, before most of us got here. (Interview, Individual, I2IL-28)*

Importantly, these actions persisted organization-wide, because they were endorsed by leaders and

managers. Even though overt safety actions intended to improve safe behavior and working

conditions, the by-product was overt safety culture.

2. Covert Culture

As overt safety culture took root, covert safety culture emerged. Covert culture first

manifested as tolerance for safety and health. As safety actions grew customary, employees

increasingly adhered to safety requirements, personally-valued safety, and demonstrated concern for

peer well-being. Ultimately, workers advocated for safety, even when pressure to act unsafely

periodically arose.

> *It's part of a culture change, you know, and it's taken almost ten years of repetition and enforcement and expectation and not letting up on…. hey, this is required. … I mean I think that (STOP™) program, plus some of the other things that they have brought in and tried to do. It's all about the culture, and that's what's the biggest change. (Interview, Group, I3GL-40)*

> *The Executive Team made the decision to make Health and Safety part of [company] culture. … Truly part of our culture. Having open discussions about health and safety. There isn't a fear behind the policies, instead it is ingrained in our day to day work. (CIR, Group, S31GL)*

There is abundant information about safety culture in literature. This study demonstrated, first, that safety culture can and should be created. The case organization's overt actions, including talking about safety, measuring safety performance, and rewarding safe behavior, have been touted as culture-building factors (Solomon, 2015; Jebb, 2015). Second, the results indicated that safety culture is associated with a state of safety and healthfulness. Flin et al. (2000) cited a direct link between strong safety culture and strong safety performance.

3.   Question 4: What group level factors are perceived to play a role?

Nine group level factors from the structure, management practices, core processes, and work unit climate constructs contributed to the achievement of low rates of occupational injury and illness.

a.   Structure Factors

Of the six structure factors uncovered in this study, safety arrangement and corporate arrangement were most influential.

1.   Safety Arrangement

Safety arrangement referred to the physical and functional positions of those, who carried out safety responsibilities. Even though former leaders assigned safety roles and responsibilities, nearly none were dedicated or formalized. That changed, though, following the 2013 ownership transition when safety was prioritized and the Director of Quality was hired. Then, safety was drawn under the quality umbrella, and a Safety Manager was appointed.

> *It was not until 2014, when the company hired a full-time Safety Manager, that proactive safety and health activity really gained traction and outcomes began to improve. (Field Note, F2OL)*

To lend more credibility to the safety function, the company modified job titles and the reporting hierarchy. The word 'safety' was added to the titles of leaders with safety oversight, and eventually, the Safety Manager reported to the Director of Quality and Safety, who reported to the Vice

President of Engineering, Quality, and Safety, who reported to the CEO. These structural

modifications sent a message that safety was on equal footing with important corporate functions

like quality and engineering. In addition, the roles of the Director of Quality and Safety and the

Safety Manager were legitimized through their full-time status and authority to make decisions and

use resources.

In their Safety Manual, the company formalized safety responsibilities for workers, managers

and supervisors, executives, the Safety Manager, and the Safety Committee.

> *Executive Management:*
> - *Assumes full responsibility for the implementation and administration of the Injury and Illness Prevention Program.*
> - *Will designate a committee to review consistency with those procedures outlined in our program.*
> - *Will set as well as initiating action to comply with State and Federal safet(y) requirements.*
> - *Will give maximum support to all programs and committees whose function is to promote safety and health.*
>
> *(Document, Private, D1NL-85)*

Of those with safety responsibilities, the Safety Manager was favorably regarded as the embodiment

of the safety program. The Safety Committee, though, was the corporate safety think tank.

Committee members, who were leaders and managers, served as conduits for safety input and for

dissemination and implementation of safety initiatives.

The study results suggest that safety responsibilities, job titles, and a reporting hierarchy

should be formally integrated into the organization; the safety structure should neither be temporary,

isolated, nor bereft of authority. Further, in this company, and as cited by Shannon et al. (1997), the

Safety Manager is a pivotal member of the safety structure. Literature has also touted the

importance of Safety Committees, whose existence is positively associated with lower accident rates

(Chew, 1988; Liu et al., 2010; Parker et al., 2007; Parker et al., 2015).

2.   Corporate Arrangement

Safety leaders and managers used the company's functional arrangement, namely their department structure, as a mechanism for program implementation and accountability. In general, each department was trained, audited, and incentivized as a unit. For example, adherence to safety requirements, including daily JSA and monthly STOP card completion, was measured by department. The safety incentive program was also centered on inter-departmental competition. By leveraging the department structure, the company was able to identify stronger and weaker parts of the organization. When safety or performance problems arose in a specific locale, the company examined the tasks, processes, and personnel habits to identify common, correctable threads.

> *What we started doing from there is now we've got all these metrics. We're already measuring all these things, and now that we're measuring departmentally, we can see where the good departments are and the bad departments are as far as performance in safety and health. It's not that they're bad people – their performance in safety and health. And, now we have tools and measurements to hold them accountable for safety and health. So, if your employees aren't driving you, then management is driving you. (Interview, Group, I1GL-81)*

The use of corporate arrangement as a strategy and framework for implementing and monitoring safety may be novel. In this case, safety leaders and managers took advantage of one type of functional arrangement – the department. Other functional arrangements related to worker qualifications (i.e., apprentice, journeyman, certification) or physical structure (i.e., executives, managers), for example, that could be leveraged for safety purposes.

b.   Management Practices Factors

Lower rates of occupational injury and illness were achieved, in part, through the application of traditional management practices, especially safety planning and controlling.

1.   Planning

In this study, the case organization focused tenaciously on management-level safety planning to identify needs, define near-term goals, and to devise ways to achieve them. Management-level planning, which is different from strategic planning, is narrower in scope and shorter in timeframe.

At the management level, planning was used to create a framework that supported compliance and conformance, including mapping out core safety processes, preparing training curricula, defining injury reduction goals, crafting a record-keeping system, developing time-bound action plans, and using performance data to modify plans. Corrective planning was conducted to repair infrastructure problems (i.e., potholes in the parking lot, damaged flooring) and augment equipment (i.e., load ratings for carts). Even though managers from all departments contributed to safety planning, especially through their roles on the Safety Committee, most effort was put forth by the Safety and Plant Managers.

> …I think that the way and the rapport that [Safety Manager] and [Director of Quality and Safety] have with [Plant Manager] and [Assistant Plant Manager] and the other supervisors and how [they're] driving them, and how [they're] reporting, and how [they're] working with them to keep the environment safe, they're driving it to a different sustainability level than the executives are ever going to get it to. (Interview, Organization, I9OL-142)

The OSH profession does not necessarily think about safety management in terms of traditional management practices. Perhaps this is due to the compliance-based nature of safety or the standardized ways that hazards are evaluated and controlled. A small amount of OSH literature references safety planning. In an empirical study of SMEs, Arocena and Nunez (2010) found that preventive planning, as a component of safety management systems, was not associated with fewer accidents. Other researchers found that problems with safety planning (i.e., interventions, resources), were a barrier to safety activity (Masi and Cagno, 2015) and safety improvement (Champoux and Brun, 2003). However, the inclusion of safety planning on OSHA Form 33, which is used by OSHA On-Site consultants to evaluate performance excellence, suggests that planning is an important management function.

2.   Controlling

Throughout their safety improvement journey, company managers exerted systematic control to understand the status quo and monitor their progress toward goal achievement. Control

practices, like observing, auditing, and tracking, ensured the attainment of set goals. Throughout the safety transition, different types of management control were employed. Early in the performance improvement process, the company implemented twice-daily controlling. Operations managers walked the shop floor, observed safe behavior, shared performance statistics, and corrected hazards.

> G-E-M-B-A, it's like Japanese for 'area' – 'this area', if I remember right. So, all the managers, and I don't remember if it was once or twice a day… I remember, specifically in the mornings, we'd all get together at 8:00 as a group, and we'd walk around the plant. We'd start in Bonding. That manager would … 'this is my board, these are the things we're working on, here is my safety cross that shows how many days this department has been accident-free.' … Then we'd go to Tooling, and to Shipping, and then we'd walk all the way to the end, and then we'd have this big long daily meeting every day. In some cases, it was time consuming and repetitious and, um…. (Interview, Group, I3GL-63)

As safety conditions improved and stabilized, operations-level controlling was relegated to a brief, once-daily meeting.

The Safety Manager exerted control in numerous ways – by measuring the conduct of core safety processes (i.e., JSA completion, Toolbox Talks participation, near misses); auditing hazards; tracking incidents, injuries, and illnesses; trending near misses; and monitoring hazard correction.

> I viewed the Safety Audit results for March 2018 for 14 departments. The company's 10-question audit checklist asks generally about PPE, chemicals, safety training, fire extinguishers, and engineering controls. Each item is scored from 0 to 4. The latter score means that no violations were found, and the former means that seven or more violations were identified. In March 2018, three departments – Maintenance, R&D Lab, and Tool Prep - received less than a perfect score. Findings included employees without safety glasses, blocked egress, blocked fire extinguisher, and improperly stored flammable chemicals. Tool Prep scored the worst – 2s and 3s for three items. (Field Note, F18NL-12)

Some aspects of the control function, specifically auditing and performance monitoring, have been widely presented in OSH literature. However, when referring to management practices, the OSH profession does not use the term' control,' which implies hazard control. Over the past two decades, performance evaluation has become commonplace. Despite the value, there is debate about the best approach and the best performance indicators (Liu et al., 2014; Tremblay and Badri, 2018). In OSH, auditing is often conducted visually and guided by checklists, rather than set goals.

In their review, Shannon et al. (1997) associated auditing and other initiatives with significantly lower incidence of injury.

c.   Core Process Factors

Three core process factors played dominant roles in the case's achievement of safety excellence. Those factors were hazard controls, safety activities and rewards.

1.   Hazard Controls

Hazard control practices, equipment, and protective gear literally minimized and prevented injuries and illnesses. Historically, when injury rates in the case organization were high, hazards were not always controlled.

> *Ok, when we weren't guarding those hazards back in 2006 when I came on board, it was a lot scarier. It's scary to look at it now and say, 'this is how we guard this, and this is how we take care of that.' But back then, there was none of that. It was just like 'well these hazards exist,' and 'be careful.' So, for an employee to come in and realize that 'hey I'm going to leave with all my fingers and toes today,' the morale is huge. (Interview, Group, I1GL-174)*

Following new ownership, the type and number of controls increased, and for expensive controls, improvements were planned and prioritized. The company preferred engineering controls to stop hazards at their sources. Their first capital expenditure, a state-of-the-art chemical control ventilation system, was prompted by OSHA inspection findings. Also implemented were fall arrest systems, working platforms, material handing restraints, projectile and non-ionizing radiation barriers, and multiple additional guards, curtains, and assist-devices. The case also implemented an array of administrative or work practice controls, including policies, procedures, training, vaccinations, and housekeeping. Personal protective equipment (PPE) were abundant – safety glasses, foot protection, gloves, and respirators were most common.

> *Another huge factor that has helped to make work safer is that [company] buys the best most comfortable PPE that money can buy. Also by making all types available at all times in a vending machine. … The biggest or most important factor I believe is that they make sure that all PPE is comfortable and easily assesiable [sic]. (CIR, Individual, S14IL)*

In small and mid-sized firms, insufficient hazard control is attributed to financial and knowledge constraints (Champoux and Brun, 2003; Hasle and Limborg, 2006; MacEachen et al., 2010; Olsen and Hasle, 2014). When controls are used, smaller enterprises tend to implement simple, behavior-based controls, which are less effective and defy the control hierarchy prescribed by the OSH profession (Antonsson, 1997; Gardner et al., 1999).

2.   Safety Activities

As the company transitioned from less safe to safety-excellent, they implemented an increasing number and variety of safety activities, including Job Safety Analysis (JSA), STOP™ cards, Safety Committee meetings, near-miss reporting, accident investigation, and audits and evaluations. These activities served different purposes. Some activities, such as JSAs and Toolbox Talks, intended to raise hazard awareness. Others, like the STOP™ program, empowered workers to advocate for safety via peer coaching and pausing unsafe work.

> *So, with the JSAs, you got to think about it at least once a day. You can't just put your blinders on. You got to think about safety at least once a day, even if you're writing down the same old thing that you do day-in and day-out. Now you're focusing on what could happen, how we're going to prevent it, blah, blah, blah, blah, blah. (Interview, Group, I1GL-71)*

Yet other safety activities, like near-miss reporting, anticipated risks, and accident investigation and Safety Committee meetings intended to uncover and correct safety issues.

> *…Anyhow, [Safety Manager] was gone for three days, and they had an incident. Like I said, nobody was hurt, but there was $10,000 in property damage. Ten thousand dollars in [product] was damaged due to a forklift accident. The guy dropped a load of [product]. So, when [Safety Manager] got back there was the natural, like obviously, we've got to investigate it. Even though there's not an injury we're still going to investigate it, because [Safety Manager] strongly believe(s) that every accident or every incident, whether it results in accident, near miss or anything is a flaw in the system. (Interview, Group, I1GL-141)*

Audits and evaluations were implemented to measure policy adherence and regulatory compliance and to track goal achievement.

According to OSH literature, small and mid-sized firms perform fewer and less effective safety activities than larger organizations (Dennis, 2002; Champoux and Brun, 2003; Barbeau et al.,

2004; de Kok, 2005; Gray and Mendeloff, 2005; Lentz and Wenzl, 2006; Sims, 2008; Sinclair and Cunningham, 2014). When conducted, the most common safety activities are safety inspections, new hire training, and policies generation (Sinclair and Cunningham, 2014). As stated in the premise of this study, the conduct of safety activity is associated with lower rates of injury (Boyer and Zaidman, 2014). Regular safety meetings are one activity that has been linked to with fewer injuries (Shannon et al., 1997; Mearns et al., 2003).

3.   Reward

Rewards, including safety lunches, a safety incentive program, and annual safety bonuses, influenced the company's achievement of low rates of injury and illness. Reward programs motivated many, but not all, workers to pay attention to safety, and because rewards were based on departmental performance, they created camaraderie around safety. Most impactful was the safety incentive program, which the company painstakingly designed around required safety activities (i.e., JSAs, STOP™ cards, Toolbox Talks, training) rather than lagging performance. Because employees pushed for enviable prizes, including overnight vacations, quality clothing, and gift cards, the incentive program also spurred managers to support safety.

> *… We fought [incentive program] out in the Safety Committee for months – most of 2014, because it was change. They didn't want to create a reward system based on safety paperwork. They really wanted it off results; they didn't want people getting hurt. You know, they were still looking at lagging indicators, because there's that old way of thinking. So, there was a lot of salesmanship, 'well, if we're doing these up front, we're taking care of the accidents up front – we're being proactive.' So, we tried it. As the safety team tried to take a more proactive stance, some of the management followed along. You know we kind of had to sell it all the way up the line, to where finally, I think it was November...December...early December of 2014, we rolled it out to the executive managers. We told them this is what we're going to do, is that OK? (Interview, Group, I1GL-67)*

Safety lunches, which were historically linked to injury-free performance, were recast as celebrations for team-building and special occasions (i.e., OSHA SHARP certification). Annual safety bonuses, based on years of service, were also offered to employees who had not sustained lost-time or recordable injuries.

Safety and health literature hold mixed views about incentive programs. Some studies show that rewards suppress injury reporting, pressure injured workers to prematurely return-to-work, and subvert safety culture (Tompa et al., 2007). Others indicate that rewards spur safety involvement and safe behavior (Elsler et al., 2010; Kankaanpää, 2010; Tompa et al., 2007; Uegaki et al., 2010). The well-known Maine 200 incentive program resulted in a large drop in incidence rates of injury among mid-sized companies (Pare, 2013).

d.   Work Unit Climate Factors

The last group-level factors that played prominent roles in positive safety performance were work unit climate factors, specifically perceptions about management's priority of safety and perceptions about freely reporting safety problems.

1.   Management Priority of Safety and Health

Most employees in the case organization believed that safety and health were always a top priority of management (Figure 35).

Figure 35: Work Unit Climate Survey: Percent Response, Management Priority of Safety and Health by Unit of Analysis
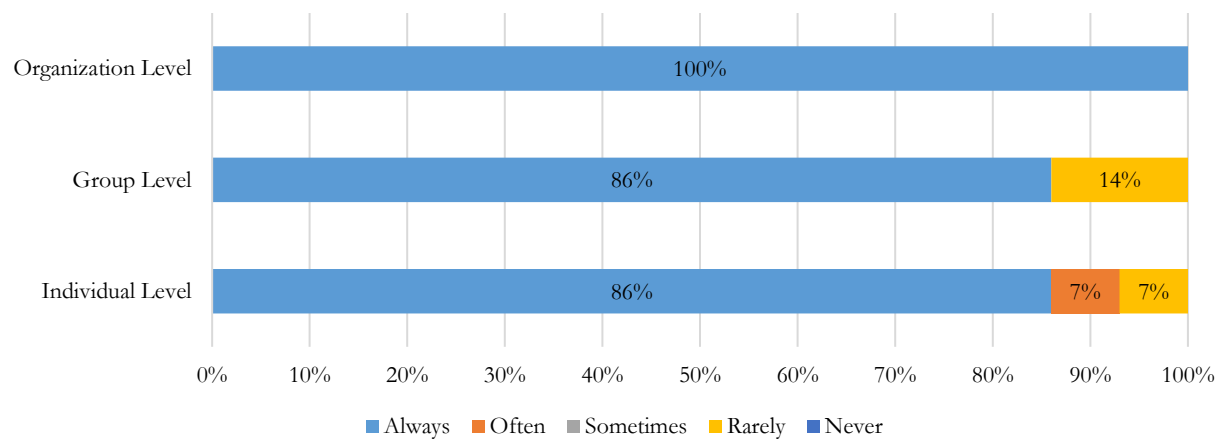
Workers saw tangible evidence of prioritization through the hiring of a fulltime Safety Manager; daily safety mantra; management's presence on the shop floor; and implementation of controls and corrections, even when they were costly or difficult. The perception of priority validated the safety program and positively influenced personal readiness and work unit climate.

As discussed in this chapter under leadership factors, top management commitment has been abundantly studied and advocated in OSH literature. Employees' perceptions of that priority, though less mentioned, are the substance of safety climate. Hahn and Murphy (2008) stated that organizations with strong safety climates have fewer injuries, in part, because the existence of safety initiatives sends signals to employees that safety is a priority. "If there is evidence that the organization is serious about adherence to safe work practices, then employees are more likely to adhere" (Hahn and Murphy, 2008).

2.   Freely Reporting Safety Problems

As the company's safety transition progressed, nearly all employees felt free to report safety problems. That was beneficial for at least two reasons. First, open reporting demonstrated that leaders and managers authentically cared about safety; they were not afraid to hear the truth – safety was not just hollow talk. Second, workers felt, and were, empowered to raise concerns, recommend improvements, purchase supplies, and even pause work.

> *I think our employees are one of our major assets. If they feel something isn't safe, they'll go up to engineering. They can go and talk to anybody about safety if they're not comfortable, and we'll work through it. (Interview, Organization, I4OL-104)*

> *You know, one time I walked through - I wasn't working - and there's a path you can take (across the floor) if you're not dressed appropriately. So, I was wearing high boots, and the first thing out of their mouth was 'you got PPE and steel toe in there?' So, yeah, I don't think anyone around here worries about bringing any of that up. (Interview, Individual, I2IL-150)*

Freely reporting safety problems is a type of worker involvement. DeJoy et al. (2000) identified the reporting of safety concerns as one of sixteen factors that influenced safety climate. A strong safety climate has been linked with safe behavior (DeJoy et al., 1995; Hofmann and Stetzer, 1996; Varon and Mattila, 2000), and lower injury rates (Dedobbeleer and Beland, 1991; Gillen et al., 2002; Hofmann and Stetzer, 1996; Mearns et al., 2003; Zohar, 2000).

4.   Question 5: What individual level factors are perceived to play a role?

Factors from the performance and individual tasks and skills constructs influenced the case's achievement of low rates of injury and illness.

a.   Individual Tasks and Skills Factors

Person-job fit was the primary influencing factor for the individual tasks and skills construct. Person-job fit literally enabled the safe conduct of work by matching employer's safety demands with workers' skills and abilities

After safety became a company priority, the employer defined the safety requirements of the job (e.g., expected safety requirements). All employees were expected to read and understand the

corporate safety policy and to acknowledge, by signature, their personal responsibility for safety. Employees were required to follow safety procedures (e.g., 2-person rule, fall protection protocol. The company demanded that workers participate in new and periodic classroom training (i.e., OSHA 10-hour) and more frequent informal education (i.e., Toolbox Talks). There were also safety activity demands related to work instructions; STOP™ cards; JSAs; audits; accident and incident investigation; and personal protective gear.

> *Another example is that they became more strict regarding footwear, the use of head protection – helmets, and the use of eye protection. In addition, [subject] is commenting about how people who were wearing…who typically wore contact lenses were less likely to wear safety goggles. But, [company] began to require them to get eye protection with a prescription, so that they had to wear eye protection. They couldn't…there wouldn't be kind of a conflict between the contact lenses and the goggles. (Interview, Individual, I7IL-30)*

Workers were expected to be proactive participants by raising safety issues and participating on the Safety Committee.

To meet these demands, employees applied their learned knowledge, skills and abilities and their innate traits. At the organization-level, the former owner, who was characterized as profit-oriented, micro-managing, and whimsical about safety. In contrast, the new CEO practiced a democratic leadership style to empower decision-making at all organization levels.

> *Some of that is when they sold the company five years ago - it had to be professionalized. When you're owned by an owner-entrepreneur, and all the decisions have to go through them, then... And [CEO is] trying to push decision-making as deep into the organization as possible and broaden that and think that the collective brain power is going to be more important than the ego control with an owner-entrepreneur. … (Interview, Organization, I5OL-9)*

The Director of Quality and Safety leveraged his quality systems knowledge and prior safety experience, along with his disciplined manner, to design and implement the safety program. The internally-hired Safety Manager, despite having no prior safety education, offered intimate knowledge of the company and possessed desirable traits, namely attention to detail and drive. The workforce, through multiple rounds of formal and peer training, learned safety on-the-job.

Safety and health literature does not discuss person-job fit, but does mention safety skill, knowledge, and ability. Masi and Cagno (2015) found that inadequate OSH skill was one of many barriers to the conduct of safety activities. In the average smaller firm, managers were found to have insufficient safety knowledge and skill (Rue and Ibrahim, 1998; Arocena and Nunez, 2010; Masi and Cagno, 2015). Personal traits are an interesting aspect of person-job fit. In general, small business owners have been characterized as informal, control-oriented, overly-confident, and profit-motivated (Eakin, 1997; Mayhew, 1997). "… His and hers norms, knowledge and resources determine the quality of the work environment" (Sorenson et al, 2007), as do his or her personal and cultural beliefs (Hasle and Limborg, 2006; MacEachen et al., 2010). The relationship between personal traits and safety performance remains unclear.

b.   Performance Factors

Evidence from this study showed that outcome and intermediate performance played roles in this company's shift from high- to low-injury.

1.   Outcome Performance

Outcome performance reflected the state of safety. The historic state of safety was characterized by high rates of injuries and illnesses, OSHA inspections, violations, fines, high worker's compensation premiums, and high medical costs.

> *For one, it was our EMod score (refers to the Experience Modification Rating, which is assigned by a corporate insurer to rate a firm's injury experience). And, our accident rate was so high that we were starting to lose out on jobs in the US. Because certain companies won't let you bid the project, if you're an unsafe company – if you have a certain number of accidents. (Interview, Organization, I9OL-230)*

As the company implemented safety improvements, they monitored outcomes, including property loss incidents and first aid and OSHA recordable accidents. Business outcomes, such as insurance rates, medical costs, and morale, were also monitored. Leaders were pleased with improved outcomes, which spurred their increasing supported safety.

In 2015, [company's] dollar value of worker's compensation claims was almost $3,000; in 2018, that number fell to just over $400. The company has also experienced over $20,000 in savings on their worker's compensation premiums since 2015, and [company] has an impressive experience modification rate of 0.70. In addition to the financial savings, the company has experienced they have also met their goal they set back in 2013. (Document, Public, D85NL-20)

Morale goes up because employees realize the company places a priority on their safety and well-being, [Safety Manager] says. That contributes in turn to higher employer retention and lower turnover costs. Moreover, it's easier to recruit new employees. (Document, Public, D80NL-27)

OSH researchers have long-studied outcome performance. Some professionals discount outcome safety performance as failure-oriented, lagging, reactive, unstable, based on inaccurate data reporting structure, prone to suppression, and not indicative of the greater safety program (Hopkins, 2009; Laitinen et al., 2013; Havold, 2005; Hopkins, 2009). However, "lagging indicator data provide necessary information on safety performance related to injuries and accidents that can motivate people to work on improving safety performance." (Sheehan, 2016) Studies of safety activities are usually linked to outcome performance, (Chew, 1988; Sims, 2008; Sinclair and Cunningham, 2014; Cagno, Micheli, Jacinto et al., 2014; Masi and Cagno, 2015).

2.   Intermediate Performance

Intermediate or leading performance referred to the upstream activities that led to safety outcomes. Rather than solely rely on outcome or lagging data, the case monitored a set of factors that corresponded to their safety management philosophy. For example, because the case valued JSAs, Toolbox Talks, near miss reporting and housekeeping, they measured and trended these intermediate indicators.

We wanted to take a proactive approach, not reactive; [safety incentive program] had to be proactive. So, if you are doing JSAs, and if you are doing near misses, and if you doing STOP cards, we know that you're paying attention to it. If you are reporting something happened, or you identified a safety concern in another area - how, JSAs or STOP cards - we knew you were focused on it. (Interview, Organization, I9OL-94)

By monitoring intermediate performance, the company anticipated safety problems and made corrections before accidents occurred. For instance, when audit findings revealed weak performing departments, the case implemented interventions.

I would say, [Safety Manager's] leading indicators, [he's] got dialed-in enough to where an incident last July – there was no injury, but [he]… sent out their participation -everybody's statistics of where they're at department to department, and some observations that [he] made that month. [Safety Manager] wrote a very long Toolbox Talk. … [He] had written one called downward trending leading indicators, and all of [his] leading indicators were trending downward. [He] was starting to see more near misses, but they were not being reported. [Safety Manager] was walking by supervisors and telling their employees, 'hey, tie off' or 'hey, where are your safety glasses.' I'm looking at the supervisor and saying, 'I shouldn't be doing this at this point, you should be doing this.' 'What are you doing?' [Safety Manager] wrote a long Toolbox Talk, and [he] told them, 'if we ...' - and the good thing is these are leading indicators, so we still have time, but the bad thing is that 'if we don't do this, something is going to happen.' 'I can't tell you where, but I'm going to tell you something's going to happen.' (Interview, Group, I1GL-139)

Leading performance factors reflect the state of safety activity. In this study, the case relied heavily on intermediate performance, which provided a shorter performance timeline than outcome data. These precursors enable the identification and mitigation of risks before adverse events occur (Grabowski et al., 2007; Hopkins, 2009; Lingard et al, 2011). Sheehan et al., (2016) empirically demonstrated a negative association between some intermediate and outcome indicators.

5.   Question 6: What is the role of change readiness?

Organizational and individual change readiness embodied the motivation to achieve low rates of injury and illness.

a.   Organizational Change Readiness

The achievement of performance excellence was influenced by two organizational change readiness factors – psychological readiness and physical capacity for readiness.

1.   Psychological Readiness

Psychological preparedness reflects an organization's shared interest in change. Preparedness influenced the company's ability to recognize the need for change, to make change, and to improve upon the change that had occurred. For the case, psychological readiness shifted from ambivalent to active as the safety transition progressed.

The company, in general, has made significant improvements towards bringing safety & safety awareness to the top of their priority list. I'm sure that there are multiple reasons for this but the end result is that it is

working…. it is also refreshing to know that [company] did not stop at just compliance, but has excelled at making [company] a safer place to work. (CIR, Group, S6GL-4)

Early on, the company acknowledged the need for safety staffing, policies, training, and stricter personal protective equipment. Safety deficiencies related to scaffolding, material handling equipment, fire protection, and lighting, for instance, were collectively recognized.

The company moved beyond acknowledgement and implemented safety changes. Executives yielded decision-making authority and resources to others, especially the Director of Quality and Safety, Safety Manager, and Plant Manager. The safety team improved policies and defined core safety processes (i.e., STOP™ cards, JSAs, accident investigations, audits). Workers followed safety requirements.

Change was not a one-time-through effort – cycles of change were necessary to alter the status quo and sustain excellence. The case improved existing policies, procedures, and controls, before adding new ones. Even new programs, like the safety incentive program, were modified and remodified to meet intended goals. Hazard controls were augmented or added; the company believed that in-house engineering and fabrication talent could rectify their unique manufacturing hazards.

> *I don't think [safety sustainability is] at the executive level at all. I think that the mid-level management group that we have now, we have driven it so hard, I think that if it's not already a habit, it's very close to habit. That's the part that's going to make it sustained, and the management group that we have here working on the shop floor now are the ones that are driving that, ok. I don't think…I don't think the executive groups…I don't think they're part of the equation anymore. … I think that the way and the rapport that [Safety Manager] and [Director of Quality and Safety] have with [Plant Manager] and [Assistant Plant Manager] and the other supervisors and how [they're] driving them, and how [they're] reporting, and how [they're] working with them to keep the environment safe, they're driving it to a different sustainability level than the executives are ever going to get it to. (Interview, Organization, I9OL-142)*

Psychological change readiness, by name, is not addressed in OSH literature. In the business and health fields, though, psychological readiness has been well-researched (Armenakis et al., 1993; Weiner, 2009; Holt and Vardaman, 2013; Rafferty et al., 2013; Stevens, 2013). Shared psychology, according to Weiner (2009), is cultivated by organizational learning, which is the social or group

process of identifying problems, formulating goals, building consensus, and integrating new plans with the status quo. In this study, once the company prioritized safety, through organizational learning, they developed a collective state-of-mind about achieving performance excellence.

2.   Physical Capacity for Readiness

The company's capacity to undertake safety improvement played a role in performance achievement. Physical capacity referred staff, time and money resources.

Quite literally, personnel, time and monetary resources were the tools of change for the case. Safety tasks were assigned to company employees. A portion of managers' and leaders' responsibilities were devoted to safety tasks, such as writing procedures, conducting training, implementing initiatives, pricing and designing corrective actions, and participating on the Safety Committee. The Safety Manager was dedicated to safety, full-time.

To express their readiness, the case gave production workers time, during their shift, to complete safety requirements (i.e., STOP cards, JSAs) and to participate in training (e.g., OSHA 10-hour training). Time was also allocated for safety lunch celebrations.

> *Still, [Safety Manager] get(s) it from some employees, especially from newer hires, and that's why they sit through 9 weeks of safety training. A lot of it was 'I don't have time for this.' It's kind of like 'well, actually you do, because we're paying you to do it.' And, 'repeat after me, you're hourly, it doesn't matter what you're doing as long as you're here, you're getting paid, you really shouldn't have a preference.' And, kind of selling it to them that way. So, 'get here in the morning, grab yourself a cup of coffee, take 10 minutes to fill out a JSA, and put a positive spin on it.' 'We're giving you a break the first thing when you walk in in the morning.' 'Yeah, you've got to fill out this safety paperwork, but you're getting paid to do it.' (Interview, Group, I1GL-103)*

Money was spent, consciously and wisely, on a host of hazard control devices, including a high-dollar chemical control ventilation system, shields and barriers, welding curtains, personal protective equipment and more.

> *Any PPE I need is provided. They give us a $100 boot allowance, because we have to have steel toe shoes. My safety glasses - they give me $100 a year to replace my safety glasses. So, I think for them, putting that effort forth to take care of us means that they're going to – they want to take care of us. (Interview, Individual, I2IL-140)*

The company also funded rewards for the safety incentive program; safety lunches; and year-end safety bonuses. In addition, monies were allocated for other safety-related issues, including training and repairs.

Capacity for change is discussed in OSH literature. In smaller businesses, lack of time and money to devote to safety are commonly cited problems (Hasle and Limborg, 1997; Gunnarsson et al., 2014; Masi and Cagno, 2015). To alter capacity, authors have proposed the use of intermediary organizations, such as governmental agencies, insurance companies, and suppliers, to facilitate and disseminate safety (Olsen and Hasle, 2015; Cunningham and Sinclair, 2015).

b.   Individual Change Readiness

Two aspects of individual change readiness – iterative readiness and context of readiness – contributed to lower rates of occupational injury and illness in the case organization.

1.   Iterative Readiness

Iterative readiness referred to an individual's mental preparedness to act in a safe manner, and the concept applies to employees at all levels in an organization. Though abstract, this factor was the impetus or force that moved individuals in the case organization to carry out safety and health.

Historically, when safety was not a corporate priority and there was no tangible safety program, workers were not mentally prepared to work safely.

> *I think back in those earlier days, it was just get the job done and get it done on time and get it done quickly. There was a lot of short-cuts, and it was easy to do them. It was,' well we know we can do this, because it's tribal knowledge,' and whether it was safe or not was 'ah, we probably won't get hurt.' You know, I don't know if there was a lot of not-reporting going on but employee buy-in was one of the hard parts. (Interview, Group, I3GL-70)*

> *I think one of the big challenges is some of the long-tenured employees that we've had that did things a certain way for a number of years. And then we've come to the point where we're trying to make things safer, and trying to get people to work safe. And trying to get that mentality across to the older employees has been kind of difficult. (Interview, Organization, I4OL-77)*

Iterative readiness developed as the company's safety program was developed, communicated and enforced. As expectations were set, policies were released, core safety processes were required, audits were conducted, and hazards were controlled, most workers followed suit. For example, leaders funded safety improvements; managers participated in required safety meetings (i.e., Gemba Walks); and production workers completed daily JSAs and wore PPE. As safety remained a corporate priority and safe habits became customary, individuals at all levels of the organization began to behave proactively by freely reported hazards, coaching peers, conveying improvement ideas, and participating in voluntary health and training initiatives.

> *As far as for me, I'm going to come in and do whatever I have to do, and we're going to be safe about it, and get it done. I think these guys out on the floor are the same way. I know that [redacted name] back in tool prep, safety is a big thing for him. He'll talk about somebody doing something unsafe, and he'll say something about what he did to them or said to them. Quite a bit out here, I think it's instilled in people here now. (Interview, Individual, I8IL-113)*

Throughout the company's safety transition journey, even though readiness waxed and waned, iterative readiness generally increased.

Oreg et al. (2011) states that when organizations chooses to undertake a specific change, they cannot assume that individual change recipients either understand or accept that change. Because change is implemented through people, who must alter their way of work, individual readiness is an important consideration (Eby et al, 2000; Judge et al, 1999). According to Stevens (2013), individuals who feel mentally prepared for a specific change are more like to support and participate in the change. The counterpart to iterative readiness in OSH literature is employee motivation, which has been studied (DeJoy et al., 2004; Lu and Shang, 2005).

2.   Context of Readiness

The context of readiness referred to the physical and functional circumstances that spurred individual change readiness. In the case organization, safety-related thoughts, feelings, and actions

were positively influenced by three main contextual factors – leadership and management practices, core processes, and fulfillment of personal needs.

Leaders and managers, especially the Safety Manager, influenced readiness by walking the walk or leading by example.

> *But, when it came time for the shop floor, we did our audits, and when people failed, we told them they failed, and we told them why. And when they said, 'there goes my $35,' we said 'yep, just imagine that you could have a tank of gas that you didn't have before.' 'This is something you did.' 'Nobody did this to you, you did this to yourself.' (Interview, Organization, I9OL-122)*

Multiple core safety processes were designed to enhance safety thoughts, attitudes and behaviors. For example, workers were required to read, understand, and sign the acknowledgement of safety rules in the corporate safety policy. Training and education instilled safety knowledge and expectations. The STOP™ program prompted readiness by requiring workers to apply safety knowledge, analyze work habits, and communicate with peers.

Readiness was also mobilized when workers' needs were met. Those needs included empowerment, reward, contribution, and safety equipment, for example. Workers were authorized to report problems, and they earned rewards for acting in a safe manner.

> *It's important that employees not only understand the necessity for safety procedures, but also have a role in promoting safety and voicing any concerns. … (Document, Public, D80NL-23)*

> *…And another thing, there's safety awards handed out at the end of the year, so people can get $100 or a couple hundred dollars in incentives for being well-behaved. (Interview, Organization, I5OL-65)*

Authors theorize that change readiness is influenced by the environment in which change occurs (Holt et al., 2007; Stevens, 2013). Though context covers a wide range of conditions, it includes such things as perceptions about management ability to achieve change; capacity and leadership support for change; extra-organizational factors that facilitate or inhibit change (i.e., profit, customers); and others' reactions to change. As the context changes, individual change readiness may change. Stevens (2013) offered the following example of contextual influence: "…changes in leadership during a change implementation may bring into question whether an initial

411

evaluation of leader competency is still accurate. The individual then engages in an initial evaluation

process that compares the current conditions to the prior evaluations and responses. … if another

senior member of the leadership team takes over for another and thus represents a continuation of

expectancies of competency on the part of the change agents," the individual continues to support

the change.

6.   **Question 7: What is the processual relationship among these factors?**

To achieve low rates of occupational injury and illness, the case underwent a transition

process. The chronology of events that marked the transition, while independently informative,

enlightened a complex, dynamic processual relationship between the system of factors discussed

thus far.

The event dates uncovered in the study could be grouped into four sequential time intervals

– the Pre-Safety Period (1987 – 1999), Early Safety Period (2000 – 2012), Safety Transition Period

(2013 – 2016), and the Safety Sustainability Period (beyond 2017). Each interval was bracketed by

key events and characterized by a set of factors, working in processual fashion, which appeared to

explain the company's state of safety.

From the paucity of information about the Pre-Safety Period, which predated the research

timeframe, two safety system factors, namely performance and external environment factors, were

actively operating. Specifically, the December 23, 1998 material handling injury and fatality triggered

external regulatory oversight that continued into 1999. These events were followed by the first

corporate safety awakening.

> *Shortly after I started, it was probably within the first year that I was here, we had a death here at the plant. There were some panels standing up out on the shop floor, and they were doing some packaging, and they went over like dominos. There was a person killed and another one seriously injured. And, I think from that point and on, they started to try to look at safety, and making sure that employees were working and doing the proper thing. … (Interview, Organization, I4OL-13)*

During the Early Safety Period, which began in 2000 and ended in 2012, the processual relationship among factors was more complex. The company's waxing and waning safety interest and action were explained by the intermittent interplay of leadership, structure, core processes, management practices, external environment, and performance factors. For example, around 2000, in response to the fatality and OSHA inspection, leaders hired a full-time Safety Manager, who developed some core safety processes (e.g., policies). Despite a degree of Safety Committee activity and management support for safety, individual safety knowledge, skill, ability, and readiness lagged and outcome performance (i.e., TRC rates) was poor.

> *There was a handful of incidents, accidents, that I recall. I'm not sure if they're overlapping or not, into when the program really took hold, but a lot of lacerations, and one relatively significant accident where there was a loss of toes. That's…that's the era that I recall the most. It was 2007 – 6, 7, 8 – when safety was just talk. (Interview, Group, I3GL-17)*

Poor performance triggered more external regulatory oversight in 2008 and 2012, which spurred additional cycles of temporary safety structure changes (i.e., safety representative) and safety activity (i.e., STOP™ program). Even though a larger system of factors was active during the Early Safety Period, structure, core process, and management factors – the traditional elements of safety – were most apparent.

Performance excellence culminated during the Safety Transition Period (2013 – 2016). Evidence indicates that a system of factors from all theorized constructs operated like interconnected cogs during this time period. Because the processual relationship of factors and evidentiary events are the substance of the primary research question, both are presented in the next section.

Beyond 2016, during the Safety Sustainability Period, a system of factors continued to play roles in performance excellence. However, the factors and their processual relationship were slightly different than those during the safety transition. In this phase, external environment, mission and strategy, core processes, individual readiness factors, and performance were the most influential

413

systems factors. Market access, external resources (i.e., OSHA On-Site Consultation Program), and positive business and safety performance spurred leaders' ongoing prioritization of safety. Even as leaders cut support for one core process, namely the safety incentive program, they supported other proactive health improvement processes, such as Health Week. Even as the safety structure remained unchanged, the strategy evolved. New strategic effort was aimed at ergonomics and inclusion of safety in personal performance evaluations. Both evaluations and ongoing rewards intended to motivate individual readiness.

> *We're also planning... We're starting to use SMART goal type of structures now to where we are giving different performance evaluations, and one of them is safety. You have to perform in a safe condition, in order to be moving forward with your bonus structure and be able to move forward with your promotion structure. We're using that to move into ergonomics. We're using that to move into environmental. (Interview, Organization, I9OL-190)*

OSH literature neither discusses the system of performance factors nor the dynamic, processual role of factors in different phases of change. This study demonstrated that, at different periods in the study timeframe, different systems factors were more or less active. Historically, when safety performance was poor, group-level systems factors were more active than factors related to external environment, change readiness, or other levels. To achieve low rates of injury and illness, multiple factors across all constructs were serially and simultaneously active. And, to sustain performance excellence, external environment and outcome performance factors prominently influenced organization-level factors (i.e., direction-setting, mission, strategy), which fueled group-level factors and individual readiness.

B.   Primary Research Question

1.   **Question 1: How do medium-sized businesses with exemplary occupational safety and health performance achieve low rates of occupational injury and illness?**

The exemplar case achieved low rates of occupational injury and illness by serially and simultaneously activating a system of extra- and intra-organizational factors, over time. Even

though impactful transition occurred between 2013 and 2016, historic factors – injuries, repeated OSHA inspections, and basic core processes – laid the foundation for change.

a.   External Environment Factors

The external environment provided both negative and positive change pressure from regulatory audits, violations and fines, unfavorable insurance ratings, high worker's compensation and medical costs, market opportunities, and capital investment ownership. Burke and Litwin (1992) theorized that the external environment was the primary driver of organizational change. From an occupational safety and health perspective, Limborg et al., (2014) concluded that "Improvements in working conditions and preventive measures are often linked to external influences, such as notes from the Labour Inspection or demands from customers."

b.   Organization-Level Factors

Internally, at the organization-level, new executives responded to external threats and opportunities by setting organizational priorities, one of which was safety. Leaders strategically managed safety in conjunction with other mission objectives. Citing other authors, Spangenberg and Theron (2013) proposed that leaders, not the external environment, drove change. "Leaders are responsible for the creation of a vision-directed, high-performance organizational culture, with the appropriate strategy and suitably qualified, high-quality human capital required for implementing the vision and strategy" (Spangenberg and Theron, 2013).

Even though leaders specified the organization's mission and business strategy, they did not define the safety strategy. Rather, the safety strategy evolved under the capable guise of safety staff. The safety strategy, though informal, not only specified core safety processes, it defined the sequence of program implementation. As such, the company's strategy was designed to provoke individual change readiness, work unit camaraderie, and safety culture. In smaller businesses, even though strategic planning is neither well-understood nor commonplace, studies strongly correlate

415

success with strategic effort (Jackson, 1994; Miller and Cardina, 1994). "Every strategic plan begins with a long-term vision for something different in the future" (Nerone, 1997).

The case did not appear to consciously create a safety culture. Instead, culture was a product of consistent, persistent safety improvement effort – ritualistic safety activity, corporate value statements, stories of impactful events, visual safety reminders, and safety celebrations. Once stable, safety culture sustained the safety program when threats to safety, such as time pressure, periodically arose.

c.   Group-Level Factors

The physical and functional arrangement of the organization aided safety improvement. Leaders build a safety structure that outlined safety roles, responsibilities, and a reporting hierarchy. Even as a Director of Safety and Quality and a dedicated Safety Manager led and managed improvement efforts, the Safety Committee became the safety think-tank and conduit for communication. Safety staffing has been cited as a barrier to safety activity in smaller firms (Masi and Cagno, 2015). In the smallest firms, the owner-operator may serve as safety representative; however in mid-sized and larger firms, a knowledgeable, "dedicated safety officer" is likely employed (Masi and Cagno, 2015). "The amount of energy and creativity injected by top managers and, above all, by the coordinator (safety professional) appeared also to be a distinguishing factor" among companies that successfully or unsuccessfully reduced workplace accidents (Hale et al., 2010)

The case implemented a set of complementary core processes to literally induce safe behavior and to control hazards. Core processes included corporate policies; written compliance programs; work procedures; hazard awareness and training techniques (i.e., JSAs, STOP cards, Toolbox Talks, training); reward and disciplinary practices; and evaluations and audits. Even though core processes were the most visible manifestation of the company's transition to safety excellence, they were not a prominent lever of change.

416

To carry-out the organization's safety priority, management set safety goals and monitored performance. To mitigate hazards and improve safety conditions, external entities, including suppliers, service providers, and resources, such as OSHA's On-Site Consultation Program, were engaged. Safety management practices are often criticized in OSH literature. Managers have been characterized as safety unaware, poorly trained, and strapped for time, money and staff resources (Chew, 1988; Limborg and Hasle, 1997; Baptista Nunes et al., 2010; Masi and Cagno, 2015). Managers are said to prefer business operations over safety (Baptista Nunes et al., 2006). Others note, though, that management practices in smaller enterprises may differ greatly from organization to organization (Gardner et al., 1999). Improved safety performance has been associated with better safety management practices, including assigned responsibilities and daily communication about safety (Salminen, 1997; Mearns et al., 2003).

The case achieved safety excellence by incentivizing safe behavior and supporting safety camaraderie among work units. Work units, who were the recipients of core safety processes and management oversight, perceived safety to be a priority, and they perceived their ability to freely express safety concerns.

d.   Individual-Level Factors

At the individual level, the case made safety expectations clear. To meet employees' safety knowledge, ability, and hazard control needs, training and equipment were provided. To encourage proactive safety behavior, employees were empowered to raise and report safety concerns and to recommend solutions. The company also leveraged personal knowledge, skills, traits, and styles. For example, an internal worker, who was passionate, conscientious, and driven, was appointed the Safety Manager despite lacking formal safety education and experience. Burke and Litwin (1992) claim that the match between assigned work tasks and employees' skills and abilities is critical (Burke

and Litwin, 1992). In studies of smaller firms, workers were found to possess inadequate safety skills (Champoux and Brun, 2003; Barbeau et al., 2004).

Performance, both intermediate and outcome indicators, begot improved safety performance. Leading and lagging indicators continually reflected the state of safety for leaders and managers, who were paying attention to mission and goal achievement. OSHA SHARP certification served as an endorsement of the company's low-injury status.

e.   Change Readiness Factors

Organizational readiness was essential to the achievement of low rates of injury and illness. The case looked for safety improvement opportunities by soliciting feedback from employees, managers and Safety Committee members. They acted on those opportunities by prudently devoting staff, time and monetary resources. Their persistent pursuit of safety improvement, which exemplifies organizational learning, fueled a shared safety improvement mindset. "The success of an intervention, that intends to change an organization, is primarily related to the level of readiness among the population in which the change is being implemented" (Stevens, 2013). Stevens (2013) proposed that change readiness is a dynamic, rather than a static state. At the organization level, readiness is akin to organizational learning – "a continuous process that enhances the collective ability to accept, make sense of, and respond to changes in the internal and external environment" (Wall, 2011).

Individual readiness was prompted by the context of the organization, especially leader and management commitment to safety, the nature and persistence of core processes, and fulfillment of individuals' knowledge and skill needs. In the case, as evidenced by periodic safety misbehavior, iterative readiness was a vulnerable commodity. In occupational safety and health, individual readiness is akin to motivation. In a study of safety and health program participation, Kvorning et al. (2015) found context of participation to be relevant. In a series of intervention studies, Hedlund

418

et al. (2015) concluded that higher motivation was associated with a high level of participation, frequency of participation, and management-mandated interventions. Stevens (2013) surmised "that readiness likely plays an important role throughout the change process," rather than at one particular time (i.e., implementation). He acknowledged the recurrent need to continually foster readiness as changing conditions impact employees' safety-ready thoughts, feelings, and actions.

f.   Processual Factors

The process of change in the case organization was marked by a series of chronological events and smaller cycles of repetitive safety activity. When considered in total, evidence from this study indicated that the case achieved exemplary safety performance, over time, through the dynamic action of an external-to-internal and top-to bottom system of factors. This notion contradicts traditional approaches to safety, which favor changes at the group- and individual-levels of the organization, such as safety support staff, core safety processes, management practices, and individual safety tasks.

Strengths and Limitations

Strengths and limitations were apparent in the research design and methods. In this section, both are discussed in relation to study quality.

A.   Research Strengths

1.   Design Strengths

The exemplar case study; retrospective and appreciative approaches; and systems framework were all research design strengths. This was the first known study of safety and health performance that combined these elements.

The single case design, which emphasizes the use of one case to deeply study a phenomenon of interest, enabled thorough understanding of the factors that contributed to the company's achievement of safety excellence. The design was strengthened by employing an exemplar case. By

definition, exemplars are not typical or representative cases, they are uniquely able to display the phenomenon under investigation, which lends credibility to findings and conclusions (Yin, 2014). In this study, the case was indeed exemplary as evidenced by improvements in the safety program and dramatically lower TRC and DART rates across the research timeframe. Exemplary status was affirmed the company's achievement of sustained OSHA SHARP certification. Beyond exemplary status, the case was a receptive participant, who accommodated on-site data collection and willingly shared private, at times difficult, information.

Appreciate inquiry (AI), as a design, which focuses on positive questioning rather than problem-oriented questioning, was well-suited this study's inquiry into successful safety and health performance (Cooperrider and Whitney, 2005). AI excels at finding 'what works', and in this study, AI enabled the discovery of a system of success-producing factors, including markets-customers, safety strategy, organizational readiness, and work unit climate. At the time of data collection, especially during interviews, the positive nature of questions fostered trust between subjects and the researcher, even when difficult topics like injuries, violations, and fatality were raised.

Though not a true strength, the retrospective design, owing to the large quantity of historic documents and the proximate research timeframe, preserved validity. The exemplar case had recently undergone a successful safety transition, and data were collected within five years of the transition's onset. Consequently, proximity lessened recall bias and increased the availability of knowledgeable subjects and relevant documents.

This research may have been the first to employ a systems-based conceptual framework from the field of organization development (Burke and Litwin, 1992). Whereas the case design provided the means for in-depth research, the systems model set wide bounds for data collection. Because the investigation sought to identify a range of safety success factors across all organization

levels, and because the investigation found a range of factors, the systems model contributed to study credibility.

2.   Methods Strengths

The methods chosen for the study, specifically mixed methods, multiple sources, phased data collection, units of analysis, and research support personnel, also enhanced study findings.

Regarding mixed methods, this research is one of few occupational safety and health performance investigations that used qualitatively-dominant mixed methods. Mixing was employed for two of thirteen constructs – work unit climate and performance. For both constructs, qualitative data were abundant and shed light on aspects of work unit climate and performance that were not quantitatively measurable, such as perceptions about worker competence and intermediate indicators of performance. Mixed methods enriched the data for both constructs and served as a secondary mode of data corroboration or refutation.

The use of multiple sources was a methodologic strength. Data were obtained from five different sources – CIRs, Work Unit Climate survey, interviews, documents, and field notes – six sources, if documents were separated by their public and private origin. Documents were an unanticipated strength. Originally intended to be a lesser data source, Safety Meeting Notes, five years-worth, disclosed key safety personnel and the company's perpetual readiness to identify and correct safety problems. The credibility of the evidence improves when similar findings are found in different sources.

Given the use of multiple sources, phased data collection enabled the researcher to incrementally understand the case and solicit the most relevant information. The first data, collected from CIRs, oriented the researcher to terminology, job titles, safety activities, dates, and pivotal events. Awareness facilitated interview rapport and probative questioning. Interview participants, in turn, offered names of potentially useful documents; this aided document collection.

Another methodologic strength was the use of units of analysis for data stratification. During data collection, stratification preserved level-specific perspectives. For example, the perspectives of executives were different than perspectives of individual workers. During the analysis phase, units of analysis facilitated data integration.

The study's credibility was also enhanced by research personnel, including a two-person English-Spanish translator team and a second, experience qualitative data coder, who substantially agreed with the researcher's code assignments (kappa=0.72) (Landis and Koch, 1977).

B. Research Limitations

Limitations were apparent in the research design and methods.

1. Design Limitations

Despite the strengths of the single case design, retrospective and appreciative approaches, and the systems framework, limitations were also apparent.

This study's single case design limited the transferability of the findings. Unlike multiple case studies, single case studies are very specific and suffer from lack of analytic corroboration. In this investigation, for example, the exemplar experienced a shift in corporate ownership, appointed an internal worker as Safety Manager, and devised a comprehensive safety incentive program to drive change. This context is unlikely to be repeated in other organizations; however, other organizations do undergo change – they have leaders, they may employ a Safety Manager, and they may implement motivational core processes. Consequently, the broader lessons and theories of change that relate to leaders, managers, and core processes, for instance, can be transferred to other organizations (Becker 1991; Ragin, 1987; Yin, 2014). This study's conceptual lessons and theories can be extended, at minimum, to mid-sized OSHA SHARP businesses in federal OSHA states.

In this retrospective investigation, recall bias and reporting bias threaten the credibility of data retrieved through CIRs, the Work Unit Climate Survey, and interviews. Regarding the former,

subjects may erroneously remember events, and regarding the latter, participant might, either knowingly or unknowingly, report selective information or withhold information. In this study, recall and reporting biases were likely encountered. For example, for the same event, some subjects reported different dates, and for sensitive information, such as the 1998 worker fatality and the corporate strategic plan, details were withheld. Recall bias was offset by employing a proximate retrospective timeframe and by using multiple sources to corroborate data. Appreciate approaches and multiple sources offset reporting bias.

Even so, appreciative data collection methods, may have compromised credibility. Specifically, the study's focus on positive experiences may have led to an overly optimistic view of change; questioning may not have solicited negative change events. The use of appreciative inquiry may also explain the scarcity of divergent perspectives. Because the study was oriented to what worked, subjects may have been less likely to mention contradictory perspectives. In this study, the limitations of AI were offset, to a degree, by recording both negative and positive events. Due to time limitations though, the researcher did not actively seek negative perspectives.

The systems framework was also a limitation. The large number of *a priori* constructs in this study's conceptual model may have curbed the discovery of more detailed findings. In other words, a broad focus on the whole may have lessen the depth of investigation. Even though this unforeseen limitation was not offset, future investigations could examine, in greater detail, a focused piece of the system. Other constructs would still emerge.

2.   Methods Limitations

Study participation, data sources, and coding were the principle methodological weaknesses in the investigation. Most concerning was significant under-representation of the Spanish-speaking workforce, which comprised 40% of the case workforce. Fewer than 5% of Spanish speaking subjects participated in this study. Low participation rates may be attributable to lack of eligibility,

personal choice, peer influence, literacy, or legal status. This group of workers may have had different perspectives on the company's safety improvement transition; however, because nearly all Spanish-speaking employees worked in production, this limitation only impacted individual-level data. This limitation was offset in four ways: 1) by providing Spanish language study information and data collection instruments, 2) by collecting data across work shifts, 3) by offering data collection instruments in a noticeable location, and 4) by providing a Spanish interpreter for interviews.

Critical Incident Reports, as a data source, were a methodologic limitation. Because CIRs were offered to all screen-positive workers, the researcher anticipated CIRs to be a principle source. However, due to low study participation and subjects' tendency to submit terse statements, CIRs yielded little data. This limitation affected the quantity, not the quality, of gathered data. Further, CIRs did not limit data collection from other sources. Despite this limitation, CIRs were useful as a preliminary data collection tool.

The interview guide, as a data collection tool, provoked little storytelling about cultural facets and personal and work unit perceptions. For this reason, interview-generated findings about culture, individual readiness, and work unit climate may have been cut short.

Missing documents potentially compromised study quality, too. Several documents of interest were either non-existent or were not provided to the researcher (TABLE LV, Appendix O). Those documents included strategic plans, Annual Operating Plans, Board of Director's meetings; and 2008 OSHA inspection detail. Had those documents either existed or been provided, additional or different leadership and external environment factors, for example, may have been identified. This limitation primarily affected organization-level data.

Finally, qualitative coding, as a limitation, may have led to misclassification of text segments. Even though construct definitions were distinctly written, narrative data were ambiguous, and

coding decisions were challenging. Often, multiple major codes applied to a text segment, and often, either a few words or the verb tense triggered the application of one code over another. To counter this limitation, a second coder was involved. In addition, the researcher, who read all quotations at least three times for major coding, minor coding, and summarizing, adjusted codes as inconsistencies were identified.

Other Insights

The findings of this study prompted questions about the reasons that businesses undertake safety and health change and the practicality of the conceptual framework.

A.   Reasons for Pursuing Exemplary Performance

This investigation did not ask *why* medium-sized businesses choose to pursue exemplary occupational safety and health performance. This question is worthy of future research. Even so, data from four constructs – external environment, leadership, performance and hazards-risks – appeared relevant to the inquiry.

The pursuit of lower injury rates may have been spurred by factors in the external environment, including regulation, fees and penalties, markets and customers, and recognition. High-injury companies, in particular, attract OSHA enforcement (OSHA, n.d. e)) and audit violations, citations and financial penalties may prompt businesses to improve safety conditions. Change may also have been prompted by high worker's compensation fees and medical costs, which are consequences of high injury rate. In this exemplar, market share drove improvement; that may be the case for other mid-size employers. Another possible reason for the pursuit of performance excellence is recognition, which supports the marketing of product and services and fuels organizational pride.

Leaders may drive safety improvement for a number of reasons. Evidence from this study showed that the poor state of safety was a tangible threat to operations, finances, and markets. Knowing this, leaders may choose to make safety an improvement priority.

Performance, too, may be a reason that businesses pursue safety improvement. High injury rates are associated with OSHA inspections, high insurance and medical costs, and threats to market share. To avert the organizational hardship, business may pursue programmatic change.

The hazards-risks construct emerged from the data. Even though hazards-risks was not relevant to this study's research questions, hazards-risks may drive businesses to pursue safety performance excellence. Hazards, which are inherent to some industrial classifications, increase the risk of occupational injuries and illnesses. Risk, in turn, threatens operations, markets, and profit.

B.   Revised Conceptual Model

As mentioned in the Research Strength's section of chapter 5, this study's conceptual framework successfully guided the collection of data about all constructs. The research process, though, illuminated some practical shortcomings of the framework. To reflect actual study experiences, the theory of change was revised.

Four modifications were incorporated into a revised model. First, the emergent hazards-risks construct, which reflected the hazards of custom manufacturing, was added. Hazards were not linked to any organization level. Rather, they were linked to the industrial classification and they colored all functions at the company. As such, the hazards-risks construct was depicted as a cautionary yellow back-drop for the internal organization.

Second, because construct boundaries were not as discrete or distinct in practice as in theory, boundaries were rounded, softened, and presented as overlapping. Constructs that seemed separately defined at the study's outset, overlapped in practice, and definitions were challenging to operationalize.

426

Third, because not all constructs appeared to play equivalent roles in the company's achievement of low rates of injury and illness, constructs were emphasized or deemphasized according to their influence. That said, and importantly so, all constructs played some role. In this study, the external environment, leadership, mission and strategy, organizational readiness, structure, and management practices constructs appeared to be the major levers of change. Conversely, given the infrequent mention of work unit climate, that construct played a lesser role. The graded influence of these constructs is displayed in Figure 36 by shaded construct borders. More influential constructs have darker borders, and less influential construct borders appear lighter.

Last, the cycle of time, which was shown as a single cycle in the original model, is more accurately diagrammed as cycles of time. At the company, there were simultaneous daily, weekly, monthly, and annual cycles of safety activity which propelled forward movement. Here, time was used literally, and cycles of time should not be confused with quality improvement cycles or organization learning, even though time is also a factor in those phenomena. Organization learning, in this study, was part of the organizational readiness construct.

Figure 36: Revised Conceptual Model
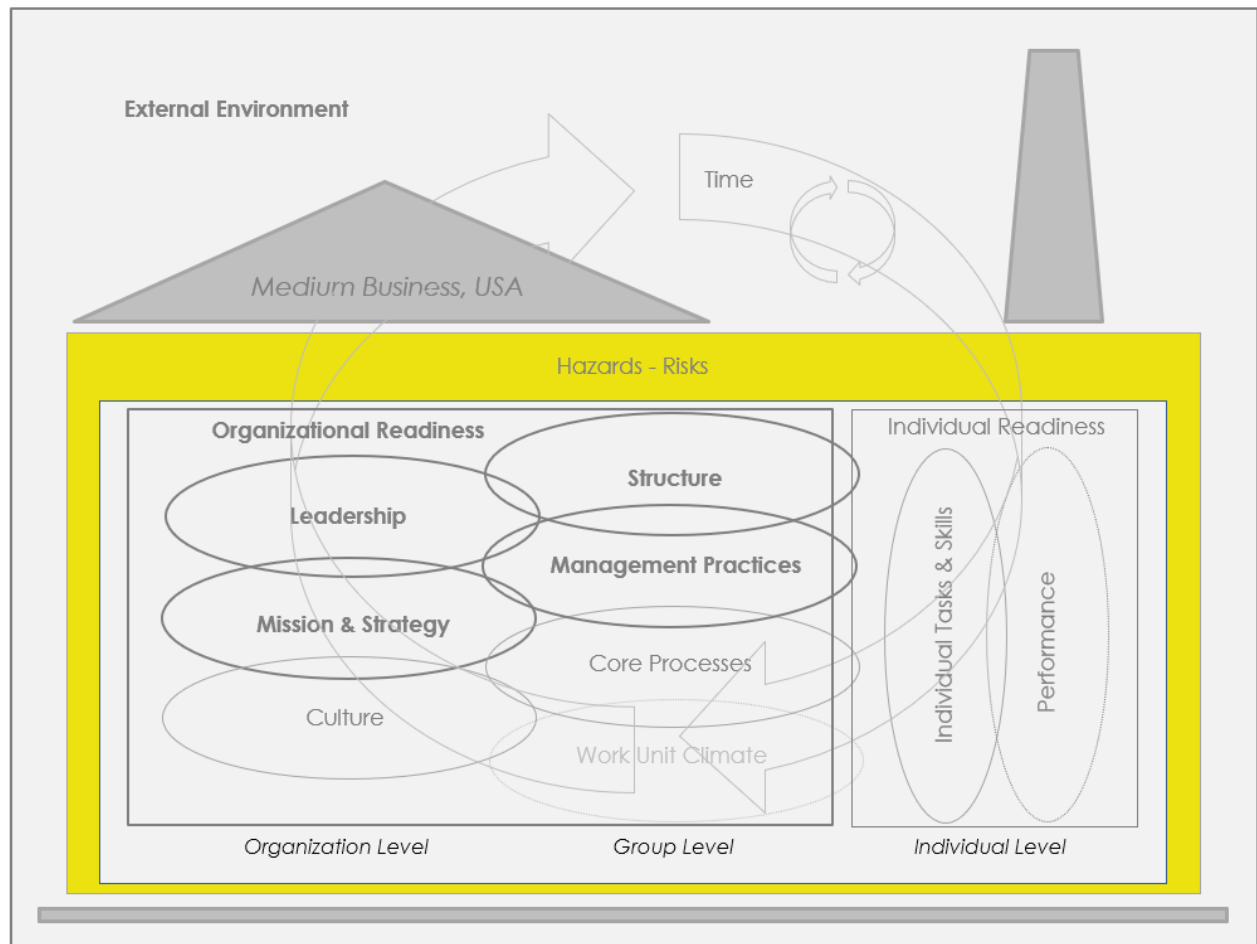
Implications for Practice and Research

The findings from this investigation, and the lessons from the design and methods, have implications for occupational safety and health practice and research.

A.   Implications for Practice

Most fundamentally, this case study affirms that performance shifts are possible. Hazardous, high-injury firms can improve their outcome safety performance in a relatively short period of time. After 15-years of waxing and waning safety effort, this case successfully implemented an exemplary safety and health program in 3 years.

This research also coaxes safety and health professionals – field practitioners, policy-makers, and educators – to think about change in a different way. There is need to think beyond piecemeal interventions, technical requirements, and even the bounded guidance of safety management systems. There is need to think about the system of factors that might influence occupational safety and health. This case study showed that a network of factors, both inside and outside the case organization, operated synchronously to produce change. For this case, lasting change was not produced by revered, but isolated interventions, like engaging a Safety Committee or implementing safety activities.

By introducing systems thinking, this study illuminated the differences between systems and management systems (SMS), which have been the dominant means of performance change over the past one to two decades. The distinction may be largely unrecognized by safety and health professionals. In addition to the theoretical differences between systems and management systems, namely open systems theory versus quality improvement theory, both embrace different change factors. Whereas SMS emphasize core processes, management practices and individual tasks and skills, they pay little to no attention to external environment, strategy, culture, individual readiness, and work unit climate factors. The latter systems factors can be leveraged in OSH practice. For example, intermediary organizations may provide coaching about safety supplies and services; field practitioners can contribute to their organization's safety strategy; or during OSHA On-Site Consultation, auditors can examine external drivers of safety change. There is an opportunity to educate OSH professionals about these differences.

From an intervention perspective, this study demonstrated that OSHA enforcement and OSHA's SHARP voluntary program, both existing interventions, were value-added. The former alerted the case to the need for change, and the latter assisted with that change.

429

New interventions are another practical implication. Interventions might target the identified levers of change (i.e., external environment, organizational change readiness, leadership, mission and strategy, structure, management practices). For example, safety education campaigns offered through Small Business Development Centers and other intermediary organizations could teach mid-sized business owners about business-related threats and opportunities. Safety managers, too, might learn about strategic safety planning. And, OSHA's Form 33 could be modified to incorporate more and diverse systems factors.

Finally, there is opportunity for safety and health professionals to explore the utility of organizational development (OD) models and techniques. Recall that the study's conceptual framework, based on the Burke-Litwin Model of Organization Development and Change was drawn from the business field of organization development. OD is a practice-based field that employs tools and techniques to diagnose and optimize organization function and performance.

B.   Implications for Research

This exemplar case study generated ideas for future research. The most apparent opportunity regards systems study of occupational safety and health using models, both similar to and different from this study's conceptual framework. Research into specific systems factors is also warranted. Factors like strategic planning and organizational and individual readiness, for example, are under-represented in OSH literature.

There is a need to better understand performance in mid-sized firms, who experience the highest TRC incidence rates of any firm size. U.S. safety and health investigators have bypassed medium enterprises in favor of smaller businesses, or they jointly study small and medium firms. For systems investigations, medium firms offer distinct advantages over larger and smaller firms. Unlike small businesses, medium firms are stable – they have outlived their risk of failure. Medium entities have sufficient business experience and functional dimension to maintain records and to

provide rich data. Mid-sized businesses also have sufficient structural development to provide multi-level perspectives and to employ specialized staff. Unlike large organizations, these firms are less influenced by politics, multi-national factors, public stock ownership and structural complexity, all of which may confound the study of the phenomenon of interest.

Future research might also address performance shifts rather than incremental performance improvement. A related inquiry regards *why* organizations pursue performance changes.

Finally, additional application of qualitative, mixed, and appreciative study designs is warranted. Even though these designs are rarely used by OSH researchers, they are better suited to practical questions and theory generation than quantitative and problem-oriented designs.

Conclusion

This study affirmed that a system of factors propelled the achievement of low TRC rates in one high-risk medium-sized firm. Even though multiple intra- and extra-organizational elements contributed to successful safety and health performance, some factors related to the external environment, leadership, mission and strategy, structure, management practices, and organizational readiness were prominent drivers.

The combined use of an inductive research design, namely a retrospective, appreciative, exemplar case study, and a systems model that was grounded in principles of organization development and change, enabled the discovery of a holistic theory of change.

This study holds practice value. Systems orientation, which is an unconstrained way of thinking and problem-solving, complements the OSH profession's preference for regulatory adherence and systematic functioning. The discovery of new change levers, especially those related to readiness, strategy, leadership, and the external environment, implies new interventions and new venues for intervention (e.g., technical associations, small business development centers, colleges).

This study also has research value. More information is needed about systems and performance in medium-sized firms. More inductive research designs are needed to answer practical and appreciate research questions and to untangle complex, real-world problems like the achievement of performance excellence.

Conflict of Interest Statement

The author had no affiliation with or involvement in any organization or entity related to this investigation. Furthermore, the author had no financial interest (e.g., honoraria; educational grants; participation in speakers' bureaus; membership; employment; consultancies' stock ownership; equity interest; expert testimony; patent-licensing arrangements), or non-financial interest (e.g., personal or professional relationships; affiliations; knowledge; beliefs) in the subject matter or materials discussed in this dissertation.

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APPENDICES

APPENDIX A

Figure 37: Conceptual Framework
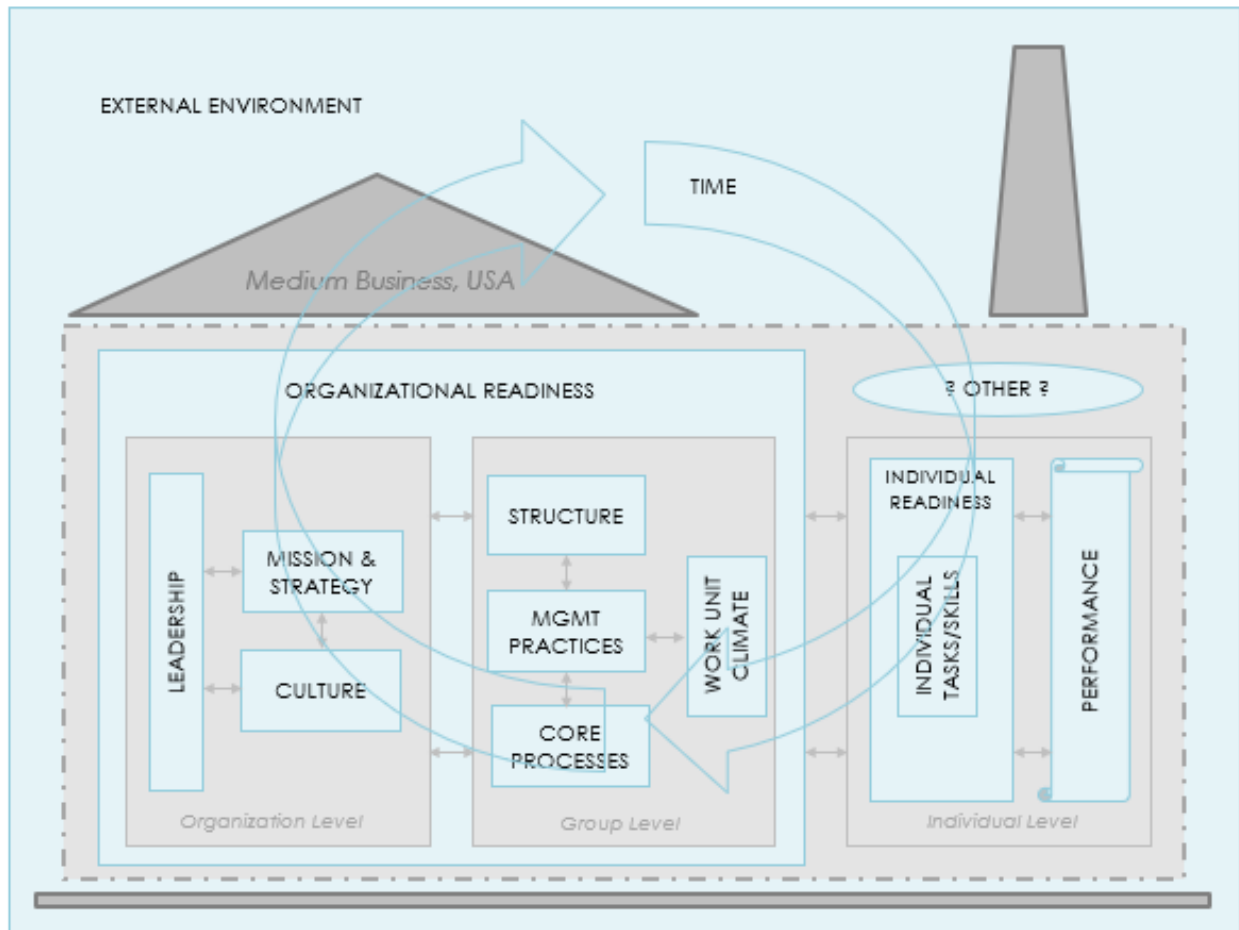
APPENDIX B

TABLE LIII: ELIGIBLE SHARP-CERTIFIED BUSINESSES IN ONE STATE

Business	Type of Business	[a]Number of Employees	Type of Industry	Initial SHARP Certification Date	SHARP Tenure
Company A	Private	187	Metal Manufacturing	2000	Continuous
Company B	Private	155	Auto Sales and Service	2016	Continuous
Company C	Private	61	Agricultural Equipment Manufacturing	2009	Continuous
Company D	Private	175	Skilled Nursing Care	2008	Continuous
Company E	Private	100	Plastic Manufacturing	2016	Continuous

[a]According to the most recent OSHA On-Site Consultation visit.

470

APPENDIX C

Telephone script for Case Engagement

Hello [*Name of OSHA SHARP Business Owner*], my name is Lisa Iverson-Leirmo. I received your name and contact information from [*Name of On-Site Consultation Contact*] in your state's OSHA On-Site Consultation Office. [He *or* She] may have mentioned that I would call.

As you may know, I'm a Doctor of Public Health Leadership student at the University of Illinois at Chicago, and I currently live in work in [redacted]. As a doctoral student, I'm conducting research about workplace safety and health. The purpose of my call is to determine your businesses' interest in participating in my study. Would you like to hear more about this?

[*If no*] That is fine - thank you for your time.

[*If yes*] Great, let's continue.

The purpose of my study is to understand how some medium-sized businesses, like yours, have created high-quality, low-injury safety and health programs. I want to understand the decisions and actions that companies have taken to develop excellent safety and health programs. Your business is one of the few nation-wide companies that has managed to do this. So, congratulations.

[*Wait for response, if any*]

So, let me tell you about my needs and your potential benefits. To conduct this study, I plan to visit your company on about 4 occasions. Since I live in [redacted], I will likely spend the full-day there. I plan to collect information in 4 ways – through written short stories, one survey, interviews, and review of relevant documents. At my first visit, I will ask the employees at your company – including you – to complete a Short Story form. This written story may take 5-15 minutes to complete. At the second visit, I plan to circulate a 16-question survey, which can be completed in 10 minutes. Also at this visit, I will look for 9 people to interview. The interviews, though, will happen at the third visit. Each interview will last about an hour. At the fourth visit, I plan to review documents that might support or refute my findings. The types of documents that I may want to see include your mission statement, policy or safety manual, safety meeting minutes, and memos about safety needs or achievements.

[*Wait for response, if any*]

I should mention that no employee will be coerced to participate – participation is entirely voluntary. This is an important point –voluntary involvement protects participants and reminds your employees that this research is separate from their jobs. In addition, employees' names will not be connected to any of the collected data. Beyond that, you can decide whether the written stories, the surveys, and the interviews should be completed during worktime or outside of worktime – breaks and lunch, for example.

[*Wait for response, if any*]

There may be benefits to your company, too. Once the research is complete, I will share a copy of my dissertation with you. You may use the information for awareness, corporate-improvement, or to complete your SHARP Self-Evaluation. If you wish, I will be happy to visit and review the results. You may also see other ways that this study's information could benefit your company.

You've heard a lot, so far. Do you have questions?

[*If no*] OK, we're almost done.

[*If yes, answer questions*] OK, we're almost done.

It is important for you to know a few more things. First, any information that your company shares with me – whether verbal and written – will be deidentified and kept confidential. Your company's information will not be shared with OSHA or any other company. And, your company's name will not appear in any reports. Second, your company's participation is always voluntary. Last, the progress of my research and the quality of my research are closely monitored by my Doctoral Committee. Before the study starts, I will give you the name and contact information of my Committee Chairperson; you may reach out to him at any time.

I think I've covered almost everything. Before any commitments are made, it might be best for us to meet in person. Would that be helpful for you?

[*If no*] Alright. Have you decided about participating in this study?

[*If participation is declined*] I certainly respect your decision, and I truly appreciate your time today. If, by chance, you change your mind, please contact me at [redacted]. Thanks again, [*Name of OSHA SHARP Business Owner*]. Good bye.

[*If participation is accepted*] That is wonderful! To proceed, I respectfully request a signed Letter of Support from the authorized person in your company.

[*If* yes] Great. Let's schedule a date that works for you.

[*Arrange date or follow-up conversation*]

Before we close, let me give you my phone number an e-mail address. My phone number is [redacted], and my e-mail address is livers3@uic.edu.   Please don't hesitate to reach out.

Thank you so much for your time and consideration today. Good bye.

APPENDIX D

<u>Research Information and Consent for Participation, English</u>

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Research Information and Consent for Participation

Occupational Safety and Health in Medium-Sized Businesses:
A Case Study of Exemplary Performance

Principle Investigator

Research Protocol Number
(University of Illinois at Chicago)

Lisa Iverson-Leirmo
School of Public Health
University of Illinois at Chicago
1603 West Taylor Street, MC 923
Chicago, IL 60612

2018-0100

Introduction

You are being asked to participate in a research study about workplace safety and health. The researcher is required to give you information about the research, describe the risks and benefits of participating in the study, and explain that participating is voluntary. This information can help you to make an informed decision. You should feel free to ask the researcher any questions.

The Researcher and the Research

The researcher, Lisa Iverson-Leirmo, is a doctoral student in the School of Public Health at the University of Illinois at Chicago. Ms. Iverson-Leirmo is studying how medium-sized businesses, like [redacted company name] create effective workplace safety and health programs that lead to fewer job-related injuries and illnesses.

Your Role as a Research Participant

The researcher is asking you to complete three documents: 1) a Short Story Worksheet, 2) a Work Unit Questionnaire, and 3) an Interview Screening Questionnaire. If you complete an Interview Screening Questionnaire, you may qualify for an interview. Each task is described next.

1) <u>Short Story Worksheet</u> - On the Short Story Worksheet, you are asked to write a brief story about something that you believe has improved safety and health in this company. This will take about 15 minutes of your time. There are no right or wrong answers, and the researcher will NOT ask your name.

2) <u>Work Unit Questionnaire</u> - The Work Unit Questionnaire asks your opinion about the workplace safety and health practices that are common in your work unit. This will take about 10 minutes of time. There are no right or wrong answers. The researcher will NOT ask your name.

Go to the next page.

3) <u>Interview Screening Questionnaire</u> - The researcher will interview several anonymous workers to learn more about safety and health at [redacted company name]. To be considered for interview, you should complete an Interview Screening Questionnaire. This will take about 5 minutes of your time.

4) <u>Interview</u> - The researcher will review your Interview Screening Questionnaire and others' questionnaires. The researcher will select interview participants that best meet pre-set criteria. If you are chosen for a 75-minute interview, the researcher will contact you. In two to six weeks from today, you and the researcher will meet for a confidential interview. The researcher wants you to feel comfortable at the interview. Before the conversation starts, the researcher will answer all of your questions. To accurately capture your thoughts and to keep the interview moving along, the researcher will audio record the interview. There are no right or wrong interview answers. To protect your privacy, your name will NOT be used. Those who complete the interview will be given a gift card of minimal value.

Risks of Taking Part in the Study

This study about positive change in workplace safety and health involves few risks to you as a participant. The main risk is loss of work time or personal time while you participate. You may also experience social risk from co-workers, who judge your choice to participate or not to participate. A third risk is the unintended release of your information to people in your business. You may also feel stress from recalling unpleasant safety and health events or unsafe conditions in a previous workplace or this workplace. There may be other risks or risks that cannot be predicted. The researcher has taken measures to minimize your risks. For example, your name will NOT appear on your Short Story Worksheet, Work Unit Questionnaire, or interview record; you may choose to complete research worksheets and questionnaires in a private location; and the researcher, alone, will collect and securely handle your information.

Benefits to Taking Part in the Study

This study about positive change in workplace safety and health offers no direct benefit to participants. However, you may feel satisfied by contributing to original research and sharing your thoughts about workplace safety and health. The researcher will benefit by fulfilling education requirements. Medium businesses and workplace safety and health professionals may benefit by learning about ways to improve on-the-job safety and health for workers like you.

Confidentiality

The information that you share will be kept private. Your information will NOT be shared with your fellow workers or managers. The researcher will take the following steps to protect your information from accidental release, tampering, or loss:

- Your name will NOT appear on your Short Story Worksheet, Work Unit Questionnaire or interview materials.
- Your worksheets, questionnaires, and interview records will be collected by the researcher.

Go to the next page.

- Your paper worksheets, questionnaires, and interview records will be stored in a locked cabinet maintained by the researcher.
- An electronic copy of your worksheets, questionnaires, and interview records will be stored on a password-protected computer maintained by the researcher.
- Only the researcher and the researcher's doctoral faculty will have access to your anonymous worksheets, questionnaires, and interview records.

In the researcher's final report, specific words or statements from your worksheets, questionnaires, or interview records may be used to demonstrate a specific point. Your name will NOT be connected to your words or statements.

Your Rights as a Research Participant

Participating in this research is voluntary. You have the right NOT to participate at all, or to STOP participating at any time. You also have the right to refuse to answer any question. If you choose not to answer a question, the researcher may not be able to use any of your responses.

Deciding not to participate will NOT result in any penalty to you, and it will NOT harm your relationship with your employer. Your decision not to participate will be kept private.

Contacts for Questions or Problems

If you have questions or concerns about this research or about participating in this study, or if you experience any problems, contact the researcher, Lisa Iverson-Leirmo, at 505-695-4381 or livers3@uic.edu.

If you have questions about the researcher, contact Doctoral Faculty Sponsor, Dr. Steven Seweryn, Clinical Assistant Professor, at (708) 699-3912 or sseweryn@uic.edu.

If you have questions about your rights as a research participant or the risks and benefits of research, contact the University of Illinois at Chicago (Office for the Protection of Research Subjects at the University of Illinois at Chicago) at 1-866-789-6215 or uicirb@uic.edu.

Your Consent as a Participant

To participate in this study, simply complete the Short Story Worksheet, Work Unit Questionnaire, and the Interview Screening Questionnaire. By completing and submitting any of these documents, you are agreeing to participate in this study. Your signature is NOT needed.

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APPENDIX E

<u>Research Information and Consent for Participation, Spanish</u>

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INFORMACIÓN SOBRE EL ESTUDIO Y CONSENTIMIENTO PARA PARTICIPAR

Seguridad y salud laboral en empresas de tamaño mediano:
un estudio de caso de desempeño ejemplar

Investigadora principal	Número de protocolo de investigación (University of Illinois at Chicago)
Lisa Iverson-Leirmo School of Public Health University of Illinois at Chicago 1603 West Taylor Street, MC 923 Chicago, IL 60612	20180100

Presentación

Se le pide su participación en un estudio sobre la seguridad y salud en el trabajo. La investigadora tiene la obligación de darle a usted información sobre el estudio, describir los riesgos y beneficios que conlleva participar en la investigación y también explicarle que su participación es voluntaria. Todo esto podrá ayudarle a usted a decidir, de una manera informada, si desea participar en el estudio. Usted no debe dudar en hacerle preguntas a la investigadora.

La investigadora y el estudio

La investigadora, Lisa Iverson-Leirmo, es estudiante de doctorado en la Escuela de Salud Pública de la Universidad de Illinois en Chicago. La señora Iverson-Leirmo estudia cómo las empresas de tamaño mediano, como [redacted company name], crean programas de seguridad y salud laboral que reducen la incidencia de lesiones y enfermedades relacionadas al trabajo.

El papel que usted desempeña como participante en el estudio

La investigadora le va a pedir que llene tres (3) documentos: 1) la *Hoja de relato*; 2) el *Cuestionario sobre las unidades de trabajo* y 3) el *Cuestionario de selección de entrevistados*. Si usted llena el *Cuestionario de selección de entrevistados*, puede que cumpla los requisitos para realizar una entrevista. A continuación se describe cada tarea:

1) <u>Hoja de relato</u>: En esta hoja, se le pide que escriba un breve relato o anécdota sobre algo que usted cree que ha mejorado la seguridad y salud laboral en esta empresa. Esta tarea le tomará aproximadamente 15 minutos. No hay respuestas correctas ni incorrectas, y la investigadora NO va a preguntarle su nombre.

2) <u>Cuestionario sobre las unidades de trabajo</u>: En este cuestionario, se le pide su opinión sobre las prácticas de seguridad y salud laboral que son comunes en su unidad de trabajo. Esta tarea le tomará aproximadamente 10 minutos. No hay respuestas correctas ni incorrectas. La investigadora NO va a preguntarle su nombre.

3) <u>Cuestionario de selección de entrevistados</u>: La investigadora entrevistará de forma anónima a varios empleados para saber más sobre la seguridad y salud laboral en [redacted company name]. Si usted desea ser considerado para una entrevista, deberá llenar el *Cuestionario de selección de entrevistados*. Esta tarea le tomará aproximadamente 5 minutos.

4) <u>Entrevista</u>: La investigadora revisará el *Cuestionario de selección de entrevistados* que usted llenó y el de los demás participantes. Después seleccionará aquellos participantes que mejor cumplan ciertos criterios preestablecidos. La investigadora se comunicará con usted si lo selecciona para la entrevista de 75 minutos. En un plazo de entre dos y seis semanas a partir de hoy, usted y la investigadora se reunirán para una entrevista confidencial. La investigadora desea que usted se sienta cómodo durante la entrevista. Antes de comenzar, ella contestará cualquier pregunta que usted tenga. Para poder capturar fielmente los pensamientos que usted exponga y para no interrumpir el progreso del diálogo, la investigadora grabará la entrevista. No hay respuestas correctas ni incorrectas. Para proteger su privacidad, NO se usará su nombre. Aquellas personas que completen la entrevista recibirán una tarjeta de regalo de valor modesto.

Los riesgos de participar en el estudio

Este estudio sobre los cambios positivos en la seguridad y salud en el trabajo presenta pocos riesgos a usted como participante. El riesgo principal es la pérdida de su tiempo laboral o personal como resultado de completar las tareas. Es posible que usted enfrente cierto riesgo social de parte de sus compañeros de trabajo, quienes quizá juzguen su decisión de participar o no. Un tercer riesgo es la divulgación accidental de su información a los empleados de la empresa. También es posible que usted sienta estrés al recordar condiciones peligrosas o eventos desagradables relacionados a la seguridad y salud laboral, ya sea en trabajos anteriores o en este. Pueden existir otros riesgos imprevisibles. La investigadora ha tomado medidas para minimizar los riesgos a los participantes. Por ejemplo, el nombre de los participantes NO aparecerá en la *Hoja de relato*, el *Cuestionario sobre las unidades de trabajo* ni en los materiales asociados con la entrevista; los participantes pueden llenar las hojas y los cuestionarios en un lugar privado y solamente la investigadora se encargará de recibir y manejar la información, y lo hará de forma segura.

Los beneficios de participar en el estudio

Este estudio sobre los cambios positivos en la seguridad y salud laboral no ofrece beneficios directos a los participantes. Sin embargo, usted podrá sentir satisfacción por dar su aporte a un estudio original y por compartir sus ideas sobre este tema. La investigadora se beneficiará porque esta investigación la ayudará a cumplir con los requisitos de su programa de estudios. Las empresas de tamaño mediano y las personas que trabajan en el campo de la seguridad y salud laboral pueden verse beneficiados por este estudio al aprender cómo mejorar la seguridad y salud en el lugar de trabajo para empleados como usted.

La confidencialidad

La información que usted nos brinde permanecerá confidencial. NO se revelará a sus compañeros de trabajo ni a sus gerentes. La investigadora tomará las siguientes medidas para evitar la divulgación accidental, alteración o pérdida de la información:

• Su nombre NO aparecerá en la *Hoja de relato*, el *Cuestionario sobre las unidades de trabajo* ni en la entrevista.

- Las hojas, los cuestionarios y los materiales asociados con la entrevista los recogerá la investigadora.

- Las hojas, los cuestionarios y los materiales asociados con la entrevista se guardarán en un gabinete mantenido por la investigadora y cerrado con llave.

- Una copia electrónica de las hojas, los cuestionarios y los materiales asociados con la entrevista se almacenarán en una computadora mantenida por la investigadora y protegida con contraseña.

- Solamente la investigadora y los profesores de su programa de doctorado tendrán acceso a las hojas, los cuestionarios y los materiales asociados con la entrevista, todos los cuales se mantendrán en el anonimato.

Para ilustrar una idea en el informe final, es posible que se utilicen algunas de las palabras o comentarios específicos que se encuentran en las hojas, los cuestionarios o la entrevista. Los nombres de los participantes NO se asociarán con sus palabras o comentarios.

Sus derechos como participante en el estudio

La participación en este estudio es voluntaria. Usted tiene el derecho de NO participar, y también de TERMINAR su participación en cualquier momento. También tiene el derecho de no contestar cualquier pregunta. Si usted opta por no responder a alguna pregunta, es posible que la investigadora no pueda usar ninguna de sus respuestas.

En el caso de que decida no participar, NO habrá sanción para usted, y NO se verá perjudicada su relación con su empleador. Su decisión de no participar permanecerá confidencial.

Información de contacto si hay preguntas o problemas

Si usted tiene preguntas o dudas sobre esta investigación o sobre su participación en la misma, o si tiene algún problema, comuníquese con la investigadora, Lisa Iverson-Leirmo, al 505-695-4381 o a livers3@uic.edu.

En caso de tener preguntas sobre la investigadora, póngase en contacto con su asesor de doctorado, Dr. Steven Seweryn, Clinical Assistant Professor, al (708) 699-3912 o a sseweryn@uic.edu.

Si tiene preguntas sobre sus derechos como participante en este estudio, o sobre los riesgos y beneficios de la investigación, comuníquese con la Oficina para la Protección de Sujetos de Investigación de la Universidad de Illinois en Chicago *(Office for the Protection of Research Subjects at the University of Illinois at Chicago)* al 1-866-789-6215 o a uicirb@uic.edu.

Su consentimiento como participante

Para participar en este estudio, simplemente llene la *Hoja de relato*, el *Cuestionario sobre las unidades de trabajo* y el *Cuestionario de selección de entrevistados*. Al completar y entregar cualquiera de estos documentos, usted acepta participar en este estudio. NO se necesita su firma.

Esta es la última página.

APPENDIX F

TABLE LIV: MEASUREMENT TABLE

MEASUREMENT TABLE							
Primary Question: How do medium-sized businesses with exemplary occupational safety and health programs achieve low rates of occupational injury and illness?							
1. *What extra-organizational factors are perceived to play a role?*							
Construct	Definition	Key Words	Level	Data Sources	Data Output		
					Individual Source Analysis	Within-Source Analysis	Cross-Source Analysis
External Environment	*Any outside condition or situation that influences the occupational safety and health performance of an organization.*	Economy, customer, regulation, supplier, government, trade association, consultant, competition	Organization (O)	Critical Incident Reports, Interviews (Qu. 2-3, 6-8, 11-12), Archival Documents, Field Notes	Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
			Group (G)	Critical Incident Reports, Interviews (Qu. 2-3, 6-8, 11-12), Archival Documents, Field Notes	Coded Text, Code Report, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
			Individual (I)	Critical Incident Reports, Interviews (Qu. 2-3, 6-8, 11-12), Archival Documents, Field Notes	Coded Text, Code Report, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
2. *What organization-level factors are perceived to play a role?*							
Leadership	*Executives providing overall direction for occupational safety and health and serving as behavioral role models for all employees.*	Leadership style, top management, role model, change agent, transformational	O	Critical Incident Reports, Interviews (Qu. 2-4, 6-9, 11-12), Archival Documents,	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
			G	same	same	same	same
			I	same	same	same	same

Mission and Strategy	*Top managements believed and declared organizational safety and health mission and strategy; employees believed purpose of the organization; and how both are achieved over time.*	Vision, mission statement, strategy, strategic plan, environmental scan, goal, objective, purpose	O	Critical Incident Reports, Interviews (Qu. 2-4, 6-9, 11-12), Archival Documents,	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
			G	same	same	same	same
			I	same	same	same	same
Culture	*The collection of organization-wide overt and covert rules, values, and principles about occupational safety and health that endure and guide organizational OSH behavior.*	Signs, symbols, rituals, language, dress, values, norms, hidden beliefs	O	Critical Incident Reports, Interviews (Qu. 2, 6-12), Archival Documents,	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
			I	same	same	same	same
			G	same	same	same	same
3. What group-level factors are perceived play a role?							
Structure	*The arrangement of functions and people into areas and levels of responsibility, decision-making authority, communication, and relationships for effective implementation of the OSH mission and strategy.*	Business size, organization chart, job specialization, safety committee, safety manager	O	Critical Incident Reports, Interviews (Qu. 2, 4-8, 11-12), Archival Documents,	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
			G	same	same	same	same
			I	same	same	same	same
Management Practices	*What managers do in the normal course of events to use human and material resources to carry out the occupational safety and health strategy.*	Planning (except strategic planning), organizing, budgeting, directing, controlling, networking	O	Critical Incident Reports, Interviews (Qu. 2, 4-8, 11-12), Archival Documents,	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
			G	same	same	same	same
			I	same	same	same	same

				Critical Incident Reports, Interviews (Qu. 2, 4-12), Archival Documents,	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
Core Processes	*The standardized policies and processes, applied across the organization that facilitate occupational safety and health work.*	Policies, procedures, human resources, reward, punishment, quality, information management, technology, communication	O				
			G	same	same	same	same
			I	same	same	same	same
Work Unit Climate	*The collective current impressions, feelings and expectations that members of local work units have about occupational safety and health that, in turn, affect their safety and health relations with their boss, coworkers and work units.*	Work unit psychology (e.g., cognition, attitude, affect, commitment, perceptions), work unit relationships	O	Critical Incident Reports, Interviews (Qu. 2, 5-12), Survey, Archival Documents,	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Survey Descriptive Statistics, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables, Survey Descriptive Statistics, Survey Inferential Statistics	Code Counts, Summaries by Construct, Co-occurrence Tables, Survey Descriptive Statistics, Survey Inferential Statistics
			G	same	same	same	same
			I	same	same	same	same

4. What individual-level factors are perceived to play a role?

				Critical Incident Reports, Interviews (Qu. 2, 5-8, 11-12), Archival Documents,	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
Individual Tasks and Skills	*The employer's required behavior for safety and health task effectiveness, and the employees' skills, knowledge, and ability to safely and compliantly accomplish assigned work.*	Person-job fit, job description, fairness of compensation, individual needs, knowledge, skills, abilities, competence, personality, traits	O				
			G	same	same	same	same
			I	same	same	same	same
Organizational Performance	*The outcome or result of occupational safety and health effort and achievement.*	Injury/illness rates, productivity, profit	O	Critical Incident Reports, Interviews (Qu. 2-3, 6-8, 10-12), Archival Documents, Field Notes	Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
			G	same	same	same	same
			I	same	same	same	same

5. What is the role of change readiness?

				Critical Incident Reports, Interviews	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
Organizational Readiness	*The collective organization-level psychological state and physical capacity needed to achieve occupational safety and health change.*	Shared resolve to change, shared belief in ability to change, organizational capacity for change (e.g., financial, staffing, material), organization learning	O	Critical Incident Reports, Interviews (Qu. 2, 4, 6-9, 11-12), Archival Documents,	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
			G	same	same	same	same
			I	same	same	same	same
Individual Readiness	*The extent of an individual's cognitive and emotional inclination to accept, embrace, and adopt a specific occupational safety and health plan that intends to alter the status quo.*	Individual tendency to accept change, resolve to change, individual belief in ability to change, motivation	O	Critical Incident Reports, Interviews (Qu. 2, 6-9, 11-12), Archival Documents,	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables	Code Counts, Summaries by Construct, Co-occurrence Tables
			G	same	same	same	same
			I	same	same	same	same
6. *What is the processual relationship between these factors?*							
Time	*The progression of events from the past to the present, which may be perceived in either ordered, relative, or parallel fashion.*	Date, order, sequence, first, last, daily, annual	O	Critical Incident Reports, Interviews (Qu. 2, 4-9, 11-12), Archival Documents,	Field Notes Coded Text, Code Reports, Code Counts, Summaries by Construct, Field Notes	Code Counts, Summaries by Construct, Co-occurrence Tables, TRC Timeline, Event Timeline	Code Counts, Summaries by Construct, Co-occurrence Tables, TRC Timeline, Event Timeline
			G	same	same	same	same
			I	same	same	same	same

APPENDIX G

<u>Critical Incident Report (Short Story Worksheet), English</u>

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Short Story Worksheet

SCREENING INFORMATION

Instructions: The first four questions ask about your role in THIS COMPANY. Check ONE option for each question.

1. Right now, are you AT LEAST 18 YEARS OF AGE, or are you UNDER 18 YEARS OF AGE?

    _____18 years or older　　———▶　　*Go to question 2.*

    _____Under 18 years　　———▶　　*STOP. Place this questionnaire in the collection box.*

2. Are you employed FOR PAY in this company, or are you NOT EMPLOYED FOR PAY?

    _____Employed for pay　　———▶　　*Go to question 3.*

    _____Not employed for pay ———▶　　*STOP. Place this questionnaire in the collection box.*

3. Are you employed FULL-TIME in this company, or are you employed PART-TIME?

    _____Employed full-time　　———▶　　*Go to question 4.*

    _____Employed part-time　　———▶　　*STOP. Place this questionnaire in the collection box.*

4. What language do you speak and read MOST OF THE TIME?

    _____English　　———▶　　*Go to the next section and read the instructions.*

    _____Spanish　　———▶　　*STOP. Complete the SPANISH Short Story Worksheet.*

    _____Other　　———▶　　*STOP. Place this questionnaire in the collection box.*

WORKPLACE SAFETY AND HEALTH IMPROVEMENT

Instructions: Use sentences or phrases to express your opinion. Take time to write neatly. There are no right or wrong answers.

5. Think about workplace safety and health in this company. Think about ONE factor, from any time in the past that YOU BELIEVE has made safety and health better. That factor may be an object, event, incident, person, group of people, or something outside of this company, for example.

    In a FEW sentences or phrases, describe ONE factor that you believe has improved workplace safety and health in this company. Continue writing on the next page.

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Go to the next page.

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6.   About what YEAR did that factor BEGIN to improve workplace safety and health? …… _____

7. List some reasons why YOU BELIEVE that factor has improved workplace safety and health.

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PARTICIPANT INFORMATION

Instructions: The last set of questions helps the researcher know a little bit about you. Check ONE option for each question.

8. Which statement BEST describes your MAIN type of work in this company?

_____ I work in manufacturing or production.

_____ I work in business operations or support.

_____ I work in executive decision-making or leadership.

Go to the next page.

9. About how many YEARS have you been employed in this company?

      _____ Less than 1 year

      _____ 1 to 3 years

      _____ 4 to 7 years

      _____ More than 7 years

10. In what YEAR were you born? …… _____

11. What is your sex?

      _____ Male

      _____ Female

12. What is the HIGHEST grade or level of formal education that you have completed?

      _____ Less than high school graduate

      _____ High school graduate

      _____ Some college

      _____ College graduate

13. In your opinion, about HOW DIFFICULT was it to complete this worksheet?

      _____ Not at all difficult

      _____ A little bit difficult

      _____ Somewhat difficult

      _____ Very difficult

      _____ Extremely difficult

14. About how much effort DID YOU SPEND to complete this worksheet?

      _____ No effort

      _____ A little bit of effort

      _____ Some effort

      _____ A good deal of effort

      _____ A great deal of effort

You are finished. Thank you very much for your participation.

Please place this worksheet in the collection box.

This is the last page.

APPENDIX H

<u>Critical Incident Report (Short Story Worksheet), Spanish</u>

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Hoja de relato

La presente hoja forma parte de un proyecto de investigación realizado por una estudiante de doctorado. La participación de usted es opcional, y su empleador NO la considera obligatoria. Sin embargo, su aporte será valioso. NO ES NECESARIO DAR SU NOMBRE. Al llenar esta hoja, usted acepta participar en este estudio. Si desea conocer más sobre el proyecto y su derecho a participar en el mismo, lea el resumen Información sobre el estudio y consentimiento para participar.

DATOS DE SELECCIÓN

Instrucciones: En las cuatro primeras preguntas, se le pide información sobre el papel que usted desempeña en ESTA EMPRESA. Marque solo UNA de las posibles respuestas a cada pregunta.

1. Actualmente ¿tiene usted POR LO MENOS 18 AÑOS, o tiene MENOS DE 18 AÑOS?

   _____18 años o más ⟶ *Continúe en la pregunta 2.*

   _____Menos de 18 años ⟶ *TERMINE AQUÍ. Coloque esta hoja en la caja.*

2. Su trabajo en esta empresa, ¿es REMUNERADO o NO REMUNERADO?

   _____Remunerado ⟶ *Continúe en la pregunta 3.*

   _____No remunerado ⟶ *TERMINE AQUÍ. Coloque esta hoja en la caja.*

3. ¿Trabaja en esta empresa A TIEMPO COMPLETO o A TIEMPO PARCIAL?

   _____A tiempo completo ⟶ *Continúe en la pregunta 4.*

   _____A tiempo parcial ⟶ *TERMINE AQUÍ. Coloque esta hoja en la caja.*

4. ¿Cuál idioma utiliza MÁS para hablar y leer?

   _____Español ⟶ *Continúe en la próxima sección y lea las instrucciones.*

   _____Inglés ⟶ *TERMINE AQUÍ. Llene la versión en INGLÉS de la* Hoja de relato.

   _____Otro ⟶ *TERMINE AQUÍ. Coloque esta hoja en la caja.*

MEJORAMIENTO DE LA SEGURIDAD Y SALUD LABORAL

Instrucciones: Use oraciones o frases para expresar su opinión. Tómese el tiempo necesario para escribir cuidadosamente. No hay respuestas correctas ni incorrectas.

5. Piense en la seguridad y salud laboral en esta empresa. Escoja UN factor, de cualquier momento en el pasado, que, EN SU OPINIÓN, ha dado lugar a mejoras en la seguridad y la salud en el trabajo. Este factor puede ser, por ejemplo, un objeto, un evento, un incidente, una persona o un grupo de personas, o algo ajeno a esta empresa.

   En pocas oraciones o frases, describa el factor que MÁS ha dado lugar a mejoras en materia de seguridad y salud laboral en esta empresa. Puede seguir escribiendo en la próxima página.

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Continúe en la próxima página.

491

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6. ¿En qué AÑO, aproximadamente, SE EMPEZARON a ver mejoras en la seguridad y salud laboral debido al factor que usted mencionó? … _____

7. Escriba algunas razones por las cuales, EN SU OPINIÓN, ese factor dio lugar a mejoras en la seguridad y salud laboral de esta empresa.

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DATOS DEL PARTICIPANTE

Instrucciones: El último conjunto de preguntas ayudará a la investigadora a conocerlo un poco mejor. Marque solo UNA de las posibles respuestas a cada pregunta.

8. ¿Cuál de las siguientes alternativas describe MEJOR su trabajo PRINCIPAL en esta empresa?

_____ Me dedico al trabajo de fabricación o producción.

_____ Me dedico a la gestión de operaciones comerciales o los servicios de apoyo empresarial.

_____ Me dedico a la toma de decisiones ejecutivas o la dirección de la empresa.

Continúe en la próxima página.

9. ¿Aproximadamente cuántos AÑOS lleva usted empleado en esta empresa?

     _____ Menos de 1 año

     _____ Entre 1 y 3 años

     _____ Entre 4 y 7 años

     _____ Más de 7 años

10. ¿En qué AÑO nació usted? … _____

11. ¿Cuál es su sexo?

     _____ Masculino

     _____ Femenino

12. ¿Cuál es el MÁXIMO grado o nivel de estudios formales que usted ha terminado?

     _____ No graduado de preparatoria

     _____ Graduado de preparatoria

     _____ Algunos estudios superiores

     _____ Graduado de estudios superiores

13. En su opinión, ¿QUÉ TAN DIFÍCIL fue para usted llenar esta hoja?

     _____ Nada difícil

     _____ Un poco difícil

     _____ Algo difícil

     _____ Bastante difícil

     _____ Muy difícil

14. ¿Cuánto esfuerzo LE COSTÓ llenar esta hoja?

     _____ Nada de esfuerzo

     _____ Un poco de esfuerzo

     _____ Algo de esfuerzo

     _____ Bastante esfuerzo

     _____ Mucho esfuerzo

Ya ha terminado la hoja. Muchas gracias por su participación.

Coloque esta hoja en la caja.

Esta es la última página.

APPENDIX I

<u>Work Unit Climate Survey (Work Unit Questionnaire), English</u>

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Work Unit Questionnaire

This questionnaire is part of a doctoral student research project. Your participation is optional and NOT required by your employer. But, your input is valuable. YOUR NAME IS NOT NEEDED. By completing this questionnaire, you are agreeing to take part in this study. To learn more about the research and your right to participate, read the Research Information and Consent for Participation summary.

SCREENING INFORMATION

Instructions: The first four questions ask about your role in THIS COMPANY. Check ONE option for each question.

1. Right now, are you AT LEAST 18 YEARS OF AGE, or are you UNDER 18 YEARS OF AGE?

    _____18 years or older ———▶ *Go to question 2.*

    _____Under 18 years ———▶ *STOP. Place this questionnaire in the collection box.*

2. Are you employed FOR PAY in this company, or are you NOT EMPLOYED FOR PAY?

    _____Employed for pay ———▶ *Go to question 3.*

    _____Not employed for pay ———▶ *STOP. Place this questionnaire in the collection box.*

3. Are you employed FULL-TIME in this company, or are you employed PART-TIME?

    _____Employed full-time ———▶ *Go to question 4.*

    _____Employed part-time ———▶ *STOP. Place this questionnaire in the collection box.*

4. What language do you speak and read MOST OF THE TIME?

    _____English ———▶ *Go to the next section and read the instructions.*

    _____Spanish ———▶ *STOP. Complete the SPANISH Work Unit Questionnaire.*

    _____Other ———▶ *STOP. Place this questionnaire in the collection box.*

WORKPLACE SAFETY AND HEALTH EXPERIENCE

Instructions: The next questions ask about your work unit at THIS COMPANY. A work unit is a group of people that perform similar type of work. For each question, check ONE option that best matches your opinion. There are no right or wrong answers.

5. In your work unit, how often is the health and safety of workers a HIGH PRIORITY with management?

    _____ Never

    _____ Rarely

    _____ Sometimes

    _____ Often

    _____ Always

Go to the next page.

496

6. In your work unit, how often are MAJOR SHORTCUTS taken when worker health and safety are at stake?

    _____ Never

    _____ Rarely

    _____ Sometimes

    _____ Often

    _____ Always

7. In your work unit, how often do workers and management WORK TOGETHER to ensure the safest possible conditions?

    _____ Never

    _____ Rarely

    _____ Sometimes

    _____ Often

    _____ Always

8. In your work unit, how often are employees told when they DO NOT FOLLOW good safety practices?

    _____ Never

    _____ Rarely

    _____ Sometimes

    _____ Often

    _____ Always

9. In your work unit, how often do you FEEL FREE to report safety problems?

    _____ Never

    _____ Rarely

    _____ Sometimes

    _____ Often

    _____ Always

10. In your work unit, how quickly do NEW EMPLOYEES LEARN that they are expected to follow good health and safety practices?

   _____ Not at all quickly

   _____ Not so quickly

   _____ Somewhat quickly

   _____ Very Quickly

   _____ Extremely Quickly

PARTICIPANT INFORMATION

Instructions: The last set of questions helps the researcher know a little bit about you. Check ONE option for each question.

11. Which statement BEST describes your MAIN type of work in this company?

   _____ I work in manufacturing or production.

   _____ I work in business operations or support.

   _____ I work in executive decision-making or leadership.

12. About how many YEARS have you been employed in this company?

   _____ Less than 1 year

   _____ 1 to 3 years

   _____ 4 to 7 years

   _____ More than 7 years

13. In what YEAR were you born? …… _____

14. What is your sex?

   _____ Male

   _____ Female

15. What is the HIGHEST grade or level of formal education that you have completed?

   _____ Less than high school graduate

   _____ High school graduate

   _____ Some college

   _____ College graduate

Go to the next page.

16. In your opinion, about HOW DIFFICULT was it to complete this questionnaire?

_____ Not at all difficult

_____ A little bit difficult

_____ Somewhat difficult

_____ Very difficult

_____ Extremely difficult

17. About how much effort DID YOU SPEND to complete this questionnaire?

_____ No effort

_____ A little bit of effort

_____ Some effort

_____ A good deal of effort

_____ A great deal of effort

You are finished. Thank you very much for your participation.

Please place this questionnaire in the collection box.

This is the last page.

APPENDIX J

Work Unit Climate Survey (Work Unit Questionnaire), Spanish

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Cuestionario sobre las unidades de trabajo

El presente cuestionario forma parte de un proyecto de investigación realizado por una estudiante de doctorado. La participación de usted es opcional, y su empleador NO la considera obligatoria. Sin embargo, su aporte será valioso. NO ES NECESARIO DAR SU NOMBRE. Al llenar este cuestionario, usted acepta participar en este estudio. Si desea conocer más sobre el proyecto y su derecho a participar en el mismo, lea el resumen Información sobre el estudio y consentimiento para participar.

DATOS DE SELECCIÓN

Instrucciones: En las cuatro primeras preguntas, se le pide información sobre el papel que usted desempeña en ESTA EMPRESA. Marque solo UNA de las posibles respuestas a cada pregunta.

1. Actualmente ¿tiene usted POR LO MENOS 18 AÑOS, o tiene MENOS DE 18 AÑOS?

    _____18 años o más ⟶ *Continúe en la pregunta 2.*

    _____Menos de 18 años ⟶ *TERMINE AQUÍ. Coloque este cuestionario en la caja.*

2. Su trabajo en esta empresa, ¿es REMUNERADO o NO REMUNERADO?

    _____Remunerado ⟶ *Continúe en la pregunta 3.*

    _____No remunerado ⟶ *TERMINE AQUÍ. Coloque este cuestionario en la caja.*

3. ¿Trabaja en esta empresa A TIEMPO COMPLETO o A TIEMPO PARCIAL?

    _____A tiempo completo ⟶ *Continúe en la pregunta 4.*

    _____A tiempo parcial ⟶ *TERMINE AQUÍ. Coloque este cuestionario en la caja.*

4. ¿Cuál idioma utiliza MÁS para hablar y leer?

    _____Español ⟶ *Continúe en la próxima sección y lea las instrucciones.*

    _____Inglés ⟶ *TERMINE AQUÍ. Llene la versión en INGLÉS del Cuestionario sobre las unidades de trabajo.*

    _____Otro ⟶ *TERMINE AQUÍ. Coloque este cuestionario en la caja.*

EXPERIENCIA CON LA SEGURIDAD Y SALUD LABORAL

Instrucciones: En las próximas preguntas, se le pide información sobre su unidad de trabajo en ESTA EMPRESA. Una unidad de trabajo consiste en un grupo de personas que desempeñan tareas parecidas. En cada pregunta, marque UNA opción que mejor refleje su opinión. No hay respuestas correctas ni incorrectas.

5. En su unidad de trabajo, ¿con qué frecuencia le concede la gerencia ALTA PRIORIDAD a la salud y seguridad de los trabajadores?

    _____ Nunca

    _____ Casi nunca

    _____ A veces

    _____ Frecuentemente

    _____ Siempre

501

6. En su unidad de trabajo, ¿con qué frecuencia SE HACE CASO OMISO a las reglas cuando se trata de la seguridad y salud de los trabajadores?

_____ Nunca

_____ Casi nunca

_____ A veces

_____ Frecuentemente

_____ Siempre

7. En su unidad de trabajo, ¿con qué frecuencia COLABORAN los trabajadores y la gerencia para garantizar las condiciones laborales más seguras posibles?

_____ Nunca

_____ Casi nunca

_____ A veces

_____ Frecuentemente

_____ Siempre

8. En su unidad de trabajo, ¿con qué frecuencia se les notifica a los empleados cuando estos NO SIGUEN buenas prácticas de seguridad laboral?

_____ Nunca

_____ Casi nunca

_____ A veces

_____ Frecuentemente

_____ Siempre

9. En su unidad de trabajo, ¿qué tan rápido APRENDEN LOS NUEVOS EMPLEADOS de que hay que seguir buenas prácticas de salud y seguridad laboral?

_____ Nada rápido

_____ No muy rápido

_____ Algo rápido

_____ Bastante rápido

_____ Muy rápido

10. En su unidad de trabajo, ¿con qué frecuencia se siente usted EN LIBERTAD de denunciar problemas de seguridad laboral?

_____ Nunca

_____ Casi nunca

_____ A veces

_____ Frecuentemente

_____ Siempre

DATOS DEL PARTICIPANTE

Instrucciones: *El último conjunto de preguntas ayudará a la investigadora a conocerlo un poco mejor. Marque solo UNA de las posibles respuestas a cada pregunta.*

11. ¿Cuál de las siguientes alternativas describe MEJOR su trabajo PRINCIPAL en esta empresa?

_____ Me dedico al trabajo de fabricación o producción.

_____ Me dedico a la gestión de operaciones comerciales o los servicios de apoyo empresarial.

_____ Me dedico a la toma de decisiones ejecutivas o la dirección de la empresa.

12. ¿Aproximadamente cuántos AÑOS lleva usted empleado en esta empresa?

_____ Menos de 1 año

_____ Entre 1 y 3 años

_____ Entre 4 y 7 años

_____ Más de 7 años

13. ¿En qué AÑO nació usted? … _____

14. ¿Cuál es su sexo?

_____ Masculino

_____ Femenino

15. ¿Cuál es el MÁXIMO grado o nivel de estudios formales que usted ha terminado?

_____ No graduado de preparatoria

_____ Graduado de preparatoria

_____ Algunos estudios superiores

_____ Graduado de estudios superiores

16. En su opinión, ¿QUÉ TAN DIFÍCIL fue para usted llenar este cuestionario?

_____ Nada difícil

_____ Un poco difícil

_____ Algo difícil

_____ Bastante difícil

_____ Muy difícil

17. ¿Cuánto esfuerzo LE COSTÓ llenar este cuestionario?

_____ Nada de esfuerzo

_____ Un poco de esfuerzo

_____ Algo de esfuerzo

_____ Bastante esfuerzo

_____ Mucho esfuerzo

Ya ha terminado la hoja. Muchas gracias por su participación.

Coloque este cuestionario en la caja.

APPENDIX K

<u>Interview Screening Questionnaire, English</u>

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Interview Screening Questionnaire

This questionnaire is part of a doctoral student research project. Your participation is optional and NOT required by your employer. But, your input is valuable. By completing this questionnaire, you are agreeing to take part in this study. To learn more about the research and your right to participate, read the Research Information and Consent for Participation summary.

SCREENING INFORMATION

Instructions: The first four questions ask about your role in THIS COMPANY. Check ONE option for each question.

1. Right now, are you AT LEAST 18 YEARS OF AGE, or are you UNDER 18 YEARS OF AGE?

    _____18 years or older   ⟶   *Go to question 2.*

    _____Under 18 years   ⟶   *STOP. Place this questionnaire in the collection box.*

2. Are you employed FOR PAY in this company, or are you NOT EMPLOYED FOR PAY?

    _____Employed for pay   ⟶   *Go to question 3.*

    _____Not employed for pay   ⟶   *STOP. Place this questionnaire in the collection box.*

3. Are you employed FULL-TIME in this company, or are you employed PART-TIME?

    _____Employed full-time   ⟶   *Go to question 4.*

    _____Employed part-time   ⟶   *STOP. Place this questionnaire in the collection box.*

4. What language do you speak and read MOST OF THE TIME?

    _____English   ⟶   *Go to the next section and read the instructions.*

    _____Spanish   ⟶   *STOP. Complete the SPANISH Interview Screening Questionnaire.*

    _____Other   ⟶   *STOP. Place this questionnaire in the collection box.*

PARTICIPANT EXPERIENCE

Instructions: These questions are about your work and your experience at THIS COMPANY. Read each question and check ONE option. There are no right or wrong answers.

5. To what extent do you KNOW about workplace safety and health improvements in this company?

    _____A very small extent

    _____A small extent

    _____A moderate extent

    _____A large extent

    _____A very large extent

Go to the next page.

6. To what extent are you COMFORTABLE talking privately with the researcher about workplace safety and health improvements in this company?

_____A very small extent

_____A small extent

_____A moderate extent

_____A large extent

_____A very large extent

7. Which statement BEST describes your MAIN type of work in this company?

_____ I work in manufacturing or production.

_____ I work in business operations or support.

_____ I work in executive decision-making or leadership.

8. About how many YEARS have you been employed in this company?

_____ Less than 1 year

_____ 1 to 3 years

_____ 4 to 7 years

_____ More than 7 years

9. In what YEAR were you born? …… _____

10. What is your sex?

_____ Male

_____ Female

11. What is the HIGHEST grade or level of formal education that you have completed?

_____ Less than high school graduate

_____ High school graduate

_____ Some college

_____ College graduate

12. For contact purposes ONLY, list your name AND phone number or e-mail address. The researcher will keep your information private.

Complete Name _____

Phone or Email _____

You are finished. Thank you very much for your participation.
The researcher will contact you, if you are selected for interview.
Please place this questionnaire in the collection box.

This is the last page.

APPENDIX L

Interview Screening Questionnaire, Spanish

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Cuestionario de selección de entrevistados

El presente cuestionario forma parte de un proyecto de investigación realizado por una estudiante de doctorado. La participación de usted es opcional, y su empleador NO la considera obligatoria. Sin embargo, su aporte será valioso. Al llenar este cuestionario, usted acepta participar en este estudio. Si desea conocer más sobre el proyecto y su derecho a participar en el mismo, lea el resumen Información sobre el estudio y consentimiento para participar.

DATOS DE SELECCIÓN

Instrucciones: En las cuatro primeras preguntas, se le pide información sobre el papel que usted desempeña en ESTA EMPRESA. Marque solo UNA de las posibles respuestas a cada pregunta.

1. Actualmente ¿tiene usted POR LO MENOS 18 AÑOS, o tiene MENOS DE 18 AÑOS?

    _____18 años o más ⟶ *Continúe en la pregunta 2.*

    _____Menos de 18 años ⟶ *TERMINE AQUÍ. Coloque este cuestionario en la caja.*

2. Su trabajo en esta empresa, ¿es REMUNERADO o NO REMUNERADO?

    _____Remunerado ⟶ *Continúe en la pregunta 3.*

    _____No remunerado ⟶ *TERMINE AQUÍ. Coloque este cuestionario en la caja.*

3. ¿Trabaja en esta empresa A TIEMPO COMPLETO o A TIEMPO PARCIAL?

    _____A tiempo completo ⟶ *Continúe en la pregunta 4.*

    _____A tiempo parcial ⟶ *TERMINE AQUÍ. Coloque este cuestionario en la caja.*

4. ¿Cuál idioma utiliza MÁS para hablar y leer?

    _____Español ⟶ *Continúe en la próxima sección y lea las instrucciones.*

    _____Inglés ⟶ *TERMINE AQUÍ. Llene la versión en INGLÉS del Cuestionario de selección de entrevistados.*

    _____Otro ⟶ *TERMINE AQUÍ. Coloque este cuestionario en la caja.*

EXPERIENCIA DEL PARTICIPANTE

Instrucciones: En estas preguntas se le pide información sobre su trabajo y su experiencia en ESTA EMPRESA. Lea cada pregunta y marque solo UNA de las respuestas. No hay respuestas correctas ni incorrectas.

5. ¿Qué grado de CONOCIMIENTO tiene usted de las mejoras realizadas en esta empresa en cuanto a la seguridad y salud laboral?

    _____Muy bajo

    _____Bajo

    _____Medio

    _____Alto

    _____Muy alto

Continúe en la próxima página.

6. ¿Qué grado de COMODIDAD siente usted para hablar en privado con la investigadora sobre las mejoras en la seguridad y salud laboral realizadas en esta empresa?

      _____Muy bajo

      _____Bajo

      _____Medio

      _____Alto

      _____Muy alto

7. ¿Cuál de las siguientes alternativas describe MEJOR su trabajo PRINCIPAL en esta empresa?

      _____ Me dedico al trabajo de fabricación o producción.

      _____ Me dedico a la gestión de operaciones comerciales o los servicios de apoyo empresarial.

      _____ Me dedico a la toma de decisiones ejecutivas o la dirección de la empresa.

8. ¿Aproximadamente cuántos AÑOS lleva usted empleado en esta empresa?

      _____ Menos de 1 año

      _____ Entre 1 y 3 años

      _____ Entre 4 y 7 años

      _____ Más de 7 años

9. ¿En qué AÑO nació usted? … _____

10. ¿Cuál es su sexo?

      _____ Masculino

      _____ Femenino

11. ¿Cuál es el MÁXIMO grado o nivel de estudios formales que usted ha terminado?

      _____ No graduado de preparatoria

      _____ Graduado de preparatoria

      _____ Algunos estudios superiores

      _____ Graduado de estudios superiores

12. SOLO para fines de contacto, escriba su nombre completo y TAMBIÉN su número de teléfono o dirección de correo electrónico. La investigadora no revelará sus datos a terceros.

      Nombre completo _____

      Teléfono o correo electrónico _____

Ya ha terminado el cuestionario. Muchas gracias por su participación.

La investigadora se comunicará con usted si lo selecciona para la entrevista.

Coloque este cuestionario en la caja.

Esta es la última página.

APPENDIX M

TABLE LV: SEMI-STRUCTURED INTERVIEW GUIDE

INTRODUCTION
[*For Spanish-speaking subjects, the researcher will introduce the subject and off-site translator*]. Once again, thank you for talking with me today about workplace safety and health. You may know that my name is Lisa, and I'm a doctoral student researcher at the University of Illinois at Chicago. This interview is one source of information for my research, and your input is very important. For this interview, it is important that you understand your role and your rights as a research participant. A few weeks ago, I gave you a Research Information and Consent for Participation flyer – it looked like this. [*Researcher will display the Research Information and Consent for Participation flyer.*] I would like to remind you about some information on this sheet. [*Researcher will verbally review the Research Information and Consent for Participation with the interviewee.*] Do you have any questions about your role and rights as a research participant? [*If yes, answer questions*] [*If no*] OK. After hearing about this research and your rights as a participant, are you still willing to participate in this interview? [*If yes, go to the next paragraph.*] Alright. Let's talk about the interview itself. [*If no, clarify unwillingness to participate.*] I understand and thank you for your time. You are free to go. During our conversation today, which will last a little more than one hour, I want to hear YOUR thoughts. Please share information that you are PERSONALLY aware of – it's OK to say, "I don't know." There are no right or wrong answers. If a question is unclear, please ask me to repeat it or rephrase it. To maintain privacy, please try not to use specific names of people. Instead, you can refer to specific people as 'my co-worker' or 'my boss.' If you accidentally mention a specific name, I will keep it private.

Today, we'll be talking about workplace safety and health, which refers to the conditions of safety and healthfulness for employees in THIS workplace. The phrase 'workplace safety and health' does NOT refer to health insurance and does NOT refer to safety and health at home or in any other job that you may have. For simplicity, I might use the terms 'safety' or 'safety and health', 'but I will mean workplace safety and health in THIS workplace.

My overall goal is to understand THIS company's safety and health story. I want to know how safety and health used to be done, how it is done now, and how this company made that transition. I want to hear about specific events that, in YOUR opinion, were important and why they were important.

You've heard a lot already. Do you have any questions?
[*If no*] Very good. Let's get started.
[*If yes, answer questions*] Let's get started.

[START THE AUDIO RECORDING]

The first four questions confirm that you qualify for this interview.

Are you employed FOR PAY in this organization?
[*If yes, go to the next question*]
[*If no, STOP*]. I'm sorry, but interviewees must be paid employees. I appreciate your time today – you are free to go.
Are you employed FULL-TIME in this organization?
[*If yes, go to the next question*]
[*If no, STOP*]. I'm sorry, but interviewees must be full-time employees. I appreciate your time today – you are free to go.
Right now, are you AT LEAST 18 YEARS OF AGE?
[*If yes, go to the next question*]
[*If no, STOP*]. I'm sorry, but interviewees must be at least 18 years old. I appreciate your time today – you are free to go.
What language do you speak and read MOST OF THE TIME?
[*If English or Spanish*] Excellent, let's continue.
[*If other language, STOP*] I'm sorry, but interviewees must speak either English or Spanish. I appreciate your time today – you are free to go.
Do you KNOW about SOME workplace safety and health improvements in this company?
[*If yes, go to the next question*]

512

[*If no, STOP*]. I'm sorry, but interviewees must be aware of safety and health improvements. I appreciate your time today – you are free to go.

Are you COMFORTABLE talking privately with me about workplace safety and health improvements in this company?

[*If yes, go to the next question*]

[*If no, STOP*]. I'm sorry, but interviewees must be comfortable discussing safety and health improvements. I appreciate your time today – you are free to go.

About how many YEARS have you been employed in this company?

[*If FOUR years or more, go to the next question*]

[*If three years or less, STOP*]. I'm sorry, but interviewees must have been employed for at least four years. I appreciate your time today – you are free to go.

The next two questions are about your work.

TIME	QUESTION	CONSTRUCT	PROBES	SUBJECT
5	1. In a few sentences, tell me about your role in this company.	Demographic Information	Probe for information specific to job roles, including main type of work, job title(s), type of work, work unit or department, and length of employment in job(s) and organization.	Executives Operations Staff Production Workers
5	2. Briefly tell me about any official or unofficial safety and health roles, if any, that you've had while working here.	Demographic Information, All Constructs	Probe for information specific to safety roles, including title(s) or nature of involvement (i.e., safety committee, representative, internal auditor, emergency/HAZMAT), work unit or department, and length of involvement.	Executives Operations Staff Production Workers

That information is very useful, thank you. The next questions are about workplace safety and health IN THIS COMPANY. I want you to think back to a time when workplace safety and health was not as important to this company as it is today – a time BEFORE this company started to improve the way safety was done.

5	3. In your view, what prompted this company to begin the journey toward better safety and health?	External Environment Leadership OSH Performance Work Unit Climate	Probe for specific factors that motivated the company to improve safety, including incidents, events, and discussions. Probe for people involved, dates, and contextual circumstances.	Executives Operations Staff Production Workers
5	4. What were some of the initial steps that the company took to change safety and health?	Organizational Readiness External Environment Leadership Mission & Strategy Structure Management Practices Core Processes Time	Probe for specific examples about changes in external engagement (i.e., ISO, SHARP) and internal roles and procedures. Probe for people involved, dates, event sequences, and methods for making changes.	Executives Operations Staff Production Workers
10	5. Describe some ways in which these initial changes led to other changes in the way things were done around here.	Structure Management Practices Core Processes Work Unit Climate Individual Tasks/Skills Time	Probe for specific examples of changes in business function, including organizational structure, hiring, communication, policies, rewards and discipline, work procedures, training, and relationships. Probe for people involved, dates, event sequences, and methods for making change.	Executives Operations Staff Production Workers
I really appreciate your stories, especially the detail. The next two questions are about the difficulties that your company has faced.				
5	6. Tell me about some challenges or obstacles that this company encountered while improving workplace safety and health.	All	Probe for specific examples of challenges, both intra- and extra-organizational. Inquire about people involved, dates, event sequences, and contextual factors.	Executives Operations Staff Production Workers

514

10	7. Using specific examples, describe how this company overcame some of these problems.	All	Probe for specific responses to challenges, both intra- and extra-organizational. Inquire about people involved, dates, event sequences, and contextual factors.	Executives Operations Staff Production Workers
The next questions focus on this company's strengths. Many businesses are good at certain things, and they tap into those things to make improvements.				
5	8. What strengths or assets did this company draw upon as it moved toward better safety and health?	All	Probe for specific examples of strong organizational behaviors and practices. Inquire about people involved, dates, event sequences, contextual factors, and rationale for examples. If interviewees cannot recount strengths, probe the positive features of this company in contrast to the features of the interviewee's former employer.	Executives Operations Staff Production Workers
5	9. Tell me about specific actions that this company taken to sustain or maintain safety and health improvements.	Leadership Mission & Strategy Culture Core Processes Organizational Readiness Work Unit Climate Individual Readiness Time	Probe for specific actions that have helped the business stay on course with safety and health. Inquire about people involved, dates, event sequences, and contextual factors.	Executives Operations Staff Production Workers
5	10. Your company has made meaningful improvements in safety and health, tell me about	Core Processes Culture Work Unit Climate OSH Performance	Probe for specific outputs and outcomes of safety improvement, such as safety performance (e.g., injuries,	Executives Operations Staff Production Workers

	the impact or the consequences of these improvements.		severity), business performance (e.g., productivity, customer satisfaction, market share, profit), external interface, and employment satisfaction	
Thank you, we're almost finished. For the last two questions, I'm looking for your advice.				
5	11. First, in your opinion, what other information seems important for me to know?	All Constructs	Probe for specific examples related to the topic(s) raised. Inquire about people involved, dates, event sequences, and contextual factors.	Executives Operations Staff Production Workers
Last, I plan to look at company documents that contain information about the safety and health topics that we've discussed. Example documents are memos, policies, and meeting minutes.				
5	12. What types of documents or names of documents should I look for?	All	Probe for specific document names, dates, authors, audiences, content, and context.	Executives Operations Staff Production Workers
CLOSING				
We are finished! It has been a pleasure talking with you. If you think of any questions or additional information, please call me or send me an e-mail. [*Give interviewee a card with researcher's contact information*]. And, because your time is valuable, please accept this small token of my appreciation. [*Give interviewee a $15 gift card*]. Thank you! [STOP THE AUDIO RECORDING].				

APPENDIX N

Field Note Template

Date: _____

Reflect on participants, observations, emergent themes, data patterns and links, contradictory findings, research questions, study problems, and issues related to this study.

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APPENDIX O

TABLE LVI: DOCUMENTS OF INTEREST

Document	Interest
Safety Policies & Procedures	
Safety Management System	• Documents about [company's] approach to safety and health
Safety Manual	• Documents about safety policies and procedures
Work Instruction	• Documents about Work Instruction implementation at [company] • Requirements for completion of Work Instructions • Example Work Instruction
Safety Audit Information	• Documents about the decision to implement safety audits • Documents about the frequency, content and attendance (i.e., job titles) of audits • Example of an audit report
Safety Meeting Notes	• Documents demonstrating historic and current conduct of safety meetings • Meeting notes from all years, especially 2012 to 2015
Safety Committee Notes (if different from Safety Meeting Notes)	• Documents demonstrating historic and current conduct of Safety Committee activity • Committee notes from all years, especially 2012 to 2015
Safety Practices	
Tool Box Talks	• Documents about historic and current use of Tool Box Talks • Example Tool Box Talk
JSA	• Documents about JSA implementation at [company] • Information about JSA completion requirements • Example JSA
STOP Documents	• Documents about STOP implementation at [company] • Information about STOP requirements • Example STOP card
Tailgate Meetings (if different from Safety Meetings)	• Documents demonstrating historic and current conduct of Tailgate Meetings • Example Tailgate Meeting content
Safety Training	• Information about dates of implementation of various kinds of training • Examples of various safety trainings
OSHA Information	
OSHA Inspection Documents	• Summaries of findings and recommendations for announced and unannounced inspections
On-Site Consultation (OSHA SHARP) Documents	• Documents about communication between OSHA's On-Site Consultation Service and [company] between 1999-2018.

	• Summaries of consultation findings and recommendations (i.e., Form 33) • Documents about OSHA SHARP certification
Corporate Information	
Mission, Vision, Strategy	• Historic and current mission, vision, and goal statements • Historic and current strategic planning documents
Key Performance Indicators	• Documents about [company's] historic and current KPIs
SQDC Information	• Documents about the implementation of SQDC boards. • Documents guiding the content and utility of SQDC boards. • Example SQDC
[Capital investment firm] Documents	• Documents about the rationale for the sale of [company] to [capital investment firm] • Documents about the sale itself (to verify dates and terms of purchase related to safety) • Documents about the impact of the 2012 OSHA inspection on the sale • Information about [capital investment firm's] view of safety • Documents about historic and current safety goals that [capital investment firm] may have set or encouraged for [company] • Documents about the ventilation installation and payment
Sales/Contract Documents	• Documents about the role of safety and health related to product sales • Example of a bid/RFP requesting safety and health information • Example of a post-award document requesting safety and health information
Specific Historic Information	
Safety Policy & Program Documents	• Documents about safety and health policies and programs before 2012 (i.e., fire safety, evacuation plan).
Safety Responsibility Documents	• Information about the hiring/appointment/assignment of a responsible safety person before 2012 (i.e. HR, first safety manager) • Information about the executive role in safety before 2012
Miscellaneous Documents	• Documents about initial STOP implementation at [company] (i.e., 2009, 2010) • Any documents about safety and health decisions/actions at [company] prior to 2012

APPENDIX P

TABLE LVII: DATA SOURCE INVENTORY

Case Name		
Data Source (i.e., CIR, Survey, Interview, Document, Field Note)	Name	Unique Identifier

TABLE LVIII: A PRIORI CODE LIST AND CODING GUIDELINE

Construct	[a]Operational Definition	Key Words	Coding Guideline
External Environment	Any outside condition or situation that influences the occupational safety and health performance of an organization.	Economy, customer, regulation, supplier, government, trade association, consultant, competition	Use this code when any condition outside of the organization, such as economy, customer, regulation, government, partner, consultant, or association, is explicit or is an operating factor.
Leadership	Executives providing overall direction for occupational safety and health and serving as behavioral role models for all employees.	Traits, leadership style, top management, role model, change agent, transformation, VP, CEO, President	The Leadership code applies in all instances, both explicit and implied, where executives make decisions and act to direct the organization and behave as role models.
Mission & Strategy	Top management's believed and declared organizational safety and health mission and strategy; employees believed purpose of the organization; and how both are achieved over time.	Vision, mission statement, strategy, strategic plan, environmental scan, goal, objective, purpose, focus	Use this code when organization-level mission and strategy are operating factors. The terms vision, goal, objective, and purpose apply to this construct only when they describe organization-level phenomena.
Culture	The collection of organization-wide overt and covert rules, values and principles about occupational safety and health that endure and guide organizational OSH behavior.	Signs, symbols, rituals, language, dress, value, norm, belief	The Culture code applies in instances where there is explicit or implicit discussion of 'the way we do things around here.' This code refers to institutional rules, values, norms and behaviors, both obvious and hidden. Do not apply this code when the word 'culture' is used unless the context supports its use.
Structure	The arrangement of functions and people into areas and levels of responsibility, decision-making authority, communication, and relationships for effective implementation of the	Business size, organization chart, job specialization, champion, safety committee, safety manager	Use Structure when text refers to the physical and functional arrangement of departments, people, responsibilities, tasks, and authority. Related terms, when applied in this context, are specialization, formalization, and centralization. Apply this code to references about job title, such as safety

	OSH mission and strategy.		representative, manager, and safety committees or team.
Management Practices	What managers do in the normal course of events to use human and material resources to carry out the occupational safety and health strategy.	Planning (except strategic planning), organizing, budgeting, directing, controlling, networking	Apply this code to all situations where management of operations or line work is explicit or implied, and when management functions, such as planning, organizing, budgeting, and controlling, are factors in the situation. Do not use this code for these functions at the executive-level, such as strategic planning.
Core Processes	The standardized policies and processes (and equipment), applied across the organization, that facilitate work and occupational safety and health.	Policies, procedures, staffing level (not staffing function/arrangement, which is Structure), reward, punishment, quality, information management, technology, communication, safety controls, protective equipment	Use the Core Processes code for all references to organization-wide policies and functional processes, such as technology, communication, information management, quality, human resources, processes of work, and safety processes.
Work Unit Climate	The collective current impressions, feelings and expectations that members of local work units have about occupational safety and health that, in turn, affect their relations with their boss, coworkers and work units.	Work unit psychology (e.g., cognition, attitude, affect, commitment, perceptions), work unit relationships	Apply the work unit climate code when the work unit (the group of people who perform similar tasks or support a common activity) is explicitly or implicitly referenced, specifically when the impressions, feelings, attitudes, perceptions, and actions at the work unit level are mentioned.
Individual Tasks & Skills	The employer's required behavior for safety and health task effectiveness, and the employee's skills and knowledge to safely and compliantly accomplish assigned work.	Person-job fit, job description, fairness of compensation, individual needs, knowledge, skills, abilities, competence, personality	Use this code in all instances where employee tasks and skills and job requirements and needs are explicit and where job-person fit is an implied factor.

Performance	Performance is defined as the outcome or result of occupational safety and health effort and achievement.	Injury/illness rates, productivity, profit, effective, outcome, complete	Use the Performance code for any reference to organizational or individual performance.
Organizational Readiness	The collective organization-level psychological state and physical capacity needed to achieve specific occupational safety and health change.	Shared resolve to change, shared belief in ability to change, organizational capacity for change (e.g., financial, staffing, material), organization learning, change management	Use the code in all instances where organization-level readiness is explicit or implied, such as in situations about shared resolve to change and shared belief in organizational ability to change (e.g., getting people on-board); organization capacity to change or maintain a change (e.g., finances, staffing, supplies); and organization learning for the purposes of change.
Individual Readiness	The extent of an individual's cognitive and emotional inclination to accept, embrace, and adopt a specific occupational safety and health plan that intends to alter the status quo.	Individual tendency to accept change, resolve to change, individual belief in ability to change, motivation.	Use this code in all instances about an individual's cognitive and emotional tendency to accept, embrace, and act upon situations, either mandatorily or voluntarily.
Time	The progression of events from the past to the present, which may be perceived in ordered, relative, or parallel fashion.	Order, sequence, most important, first, last, next, process, date	Apply this code in all instances where a date is offered and an order of events or relative relationship of events is referenced. Do not apply this code when the word 'time' is used unless a date or order of events is suggested.

[a]Adapted form Burke and Litwin, 1992.

APPENDIX R

TABLE LIX: WITHIN-SOURCE DATA TABLE, CRITICAL INCIDENT REPORTS

		CIR 1		CIR 2			
Unit of Analysis							
Unique Identifier							
Review Date							
Construct	Sub Code	Summary	Count	Summary	Count	Total Count	Construct Summary
External Environment							
Leadership							
Mission & Strategy							
Culture							
Structure							
Management Practices							
Core Processes							
Work Unit Climate							
Individual Tasks & Skills							
Organizational Performance							
Organizational Readiness							
Individual Readiness							
Time							

APPENDIX S

TABLE LX: WITHIN-SOURCE DATA TABLE, INTERVIEWS

		Subject 1		Subject 2			
Unit of Analysis							
Unique Identifier							
Review Date							
Construct	Sub Code	Summary	Count	Summary	Count	Total Count	Construct Summary
External Environment							
Leadership							
Mission & Strategy							
Culture							
Structure							
Management Practices							
Core Processes							
Work Unit Climate							
Individual Tasks & Skills							
Organizational Performance							
Organizational Readiness							
Individual Readiness							
Time							

APPENDIX T

TABLE LXI: WITHIN-SOURCE DATA TABLE, ARCHIVAL DOCUMENTS

Construct	Sub Code	Document 1		Document 2		Total Count	Construct Summary
		Unique Identifier					
		Review Date					
		Summary	Count	Summary	Count		
External Environment							
Leadership							
Mission & Strategy							
Culture							
Structure							
Management Practices							
Core Processes							
Work Unit Climate							
Individual Tasks & Skills							
Organizational Performance							
Organizational Readiness							
Individual Readiness							
Time							

APPENDIX U

TABLE LXII: WITHIN-SOURCE DATA TABLE, FIELD NOTES

		Field Note 1		Field Note 2			
Unit of Analysis							
Unique Identifier							
Review Date							
Construct	Sub Code	Summary	Count	Summary	Count	Total Count	Construct Summary
External Environment							
Leadership							
Mission & Strategy							
Culture							
Structure							
Management Practices							
Core Processes							
Work Unit Climate							
Individual Tasks & Skills							
Organizational Performance							
Organizational Readiness							
Individual Readiness							
Time							

APPENDIX V

TABLE LXIII: CROSS-SOURCE DATA TABLE

		CIRs		Interviews		Documents		Field Notes			
Unit of Analysis											
Review Date											
Construct	Sub Code	Summary	Count	Summary	Count	Summary	Count	Summary	Count	Total Count	Cross-Source Summary
External Environment											
Leadership											
Mission & Strategy											
Culture											
Structure											
Management Practices											
Core Processes											
Work Unit Climate											
Individual Tasks & Skills											
Organizational Performance											
Organizational Readiness											
Individual Readiness											
Time											

APPENDIX W

Data Integration Diagram

Data Output (Cross-Source)	Construct Summary (by Unit of Analysis)	Theoretical Constructs	Research Questions

External Environment
Coded text, code counts, summaries

External Environment
(Organization Level)

External Environment
Coded text, code counts, summaries

External Environment
(Group Level)

External Environment

Secondary Question 1
(External Environment)

External Environment
Coded text, code counts, summaries

External Environment
(Individual Level)

Data Output
(Construct, Unit of Analysis)

Leadership
(Unit of Analysis)

Leadership

...

Construct
(Unit of Analysis)

Mission & Strategy

Secondary Question 2
(Organization Level Factors)

...

Culture

Structure

Management Practices

Core Processes

Secondary Question 3
(Group Level Factors)

Work Unit Climate

Individual Tasks/Skills

OSH Performance

Secondary Question 4
(Individual Level Factors)

Organization Readiness

Individual Readiness

Secondary Question 5
(Change Readiness)

Time

Secondary Question 6
(Process Relationships)

Primary Question

APPENDIX X

Letter of Information

Hello,

Thank you, again, for agreeing to participate in this doctoral study about medium-sized, private businesses with excellent workplace safety and health programs.

As mentioned in our recent phone conversation, this study will be conducted by a Doctor of Public Health Leadership student at the University of Illinois at Chicago.

The purpose of this study is to understand how medium-sized businesses create high-quality, low-injury safety and health programs. The researcher would like to learn about the decisions and actions that your company has taken to develop excellent safety and health programs.

To conduct this study, four types of information will be collected – written short stories, interviews, survey questionnaires, and documents. Ten or fewer workers will be interviewed, and each interview will last about one hour. A 10-question survey, which can be completed in 10 minutes, will also be circulated. Workers will be asked to write a short story about safety and health success; this, too, should take no more than 10 minutes. Last, documents will be gathered for researcher review. Documents of interest might include the policy or safety manual, safety meeting minutes, and organizational memos about significant safety needs or accomplishments.

There are benefits to participation. Once the study is complete, the researcher will share a copy of the finalized dissertation. The information can be used to increase and improve safety awareness; and to complete the SHARP Self-Evaluation, which may extend SHARP renewal from 1 year to 2 or 3 years.

Be assured that all information about this business, both verbal and written, will be anonymous and private. Information will not be shared with OSHA or any other company. Neither personal names nor business names will appear in any final reports. In addition, participation in this study is always voluntary and can be terminated at any time.

The progress of this research and the study quality will be closely monitored by the student's Doctoral Committee. The Committee Chairperson, Dr. Steven Seweryn, whose name and contact information appear toward the end of this document, can be contacted for any reason at any time.

To participate in this study, please read and sign the attached consent agreement.

Sincerely,
Lisa Iverson-Leirmo, MPH, PA-C
DrPH Candidate, UIC SPH

APPENDIX Y

Exemption Granted

February 1, 2018

Lisa Iverson-Leirmo, MPH
Epidemiology and Biostatistics
4950 Sombra
Los Alamos, NM 87544
Phone: (505) 500-8528

RE: Research Protocol # 2018-0100
**   "Occupational Safety and Health in Medium Business: A Case Study of Exemplary**
Performance"

Sponsors: None

Dear Lisa Iverson-Leirmo:

Your Claim of Exemption was reviewed on February 1, 2018 and it was determined that your
research protocol meets the criteria for exemption as defined in the U. S. Department of Health and
Human Services Regulations for the Protection of Human Subjects [(45 CFR 46.101(b)]. You may
now begin your research.

Exemption Period:	**February 1, 2018 – February 1, 2021**
Performance Site:	UIC
Recruitment Site:	[Redacted]
Subject Population:	Adult (18+ years) subjects only
Number of Subjects:	105

The specific exemption category under 45 CFR 46.101(b) is:
(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement),
survey procedures, interview procedures or observation of public behavior, unless: (i) information
obtained is recorded in such a manner that human subjects can be identified, directly or through
identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the
research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the
subjects' financial standing, employability, or reputation.

You are reminded that investigators whose research involving human subjects is determined to be
exempt from the federal regulations for the protection of human subjects still have responsibilities
for the ethical conduct of the research under state law and UIC policy. Please be aware of the
following UIC policies and responsibilities for investigators:

1. <u>Amendments</u> You are responsible for reporting any amendments to your research protocol that may affect the determination of the exemption and may result in your research no longer being eligible for the exemption that has been granted.

2. <u>Record Keeping</u> You are responsible for maintaining a copy all research related records in a secure location in the event future verification is necessary, at a minimum these documents include: the research protocol, the claim of exemption application, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to subjects, or any other pertinent documents.

3. <u>Final Report</u> When you have completed work on your research protocol, you should submit a final report to the Office for Protection of Research Subjects (OPRS).

4. <u>Information for Human Subjects</u> UIC Policy requires investigators to provide information about the research to subjects and to obtain their permission prior to their participating in the research. The information about the research should be presented to subjects as detailed in the research protocol, application and supporting documents.

Please be sure to use your research protocol number (listed above) on any documents or correspondence with the IRB concerning your research protocol.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact me at (312) 355-2908 or the OPRS office at (312) 996-1711.

Sincerely,
Charles W. Hoehne, B.S., C.I.P.
Assistant Director, IRB #7
Office for the Protection of Research Subjects

cc: Ronald C. Hershow, Epidemiology and Biostatistics, M/C 923
        Steven Seweryn, Epidemiology and Biostatistics, M/C 923

APPENDIX Z

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Exemption Determination
Amendment to Research Protocol – Exempt Review
UIC Amendment #1

</div>

June 22, 2018

Lisa Iverson-Leirmo, MPH
Epidemiology and Biostatistics
Phone: (505) 500-8528

RE: Protocol # 2018-0100
**   "Occupational Safety and Health in Medium Business: A Case Study of Exemplary**
**   Performance"**

Dear Lisa Iverson-Leirmo:

The OPRS staff/members of Institutional Review Board (IRB) #7 have reviewed this amendment
to your research, and have determined that your amended research protocol continues to meet the
criteria for exemption as defined in the U. S. Department of Health and Human Services
Regulations for the Protection of Human Subjects [(45 CFR 46.101(b)].

The specific exemption category under 45 CFR 46.101(b) is: 2

You may now implement the amendment in your research.

Please note the following information about your approved amendment:
UIC Exemption Period: June 22, 2018 – June 21, 2021
Amendment Approval Date: June 22, 2018
Amendment:
   Summary: UIC Amendment #1: To improve study quality, the PI proposes four research
   changes:
   1. Addition of Marisa Wishart as Key Research Personnel;
   2. Addition of a data source (publicly-available, supplemental material (i.e., articles, website
      data);
   3. Modification of data analysis (Because all submitted CIRs were concisely written, the PI
      will analyze all 27 screen-positive, complete Critical Incident Reports (CIRs), rather than
      18 randomly-selected CIRs); and
   4. Revision to data security (To accommodate data sharing with the second qualitative data
      analyst and members of the researcher's Doctoral Committee, the PI will establish and
      use a Personal U of I Box.com account.).

You are reminded that investigators whose research involving human subjects is determined to be
exempt from the federal regulations for the protection of human subjects still have responsibilities

for the ethical conduct of the research under state law and UIC policy. Please be aware of the following UIC policies and responsibilities for investigators:

1. <u>Amendments</u> You are responsible for reporting any amendments to your research protocol that may affect the determination of the exemption and may result in your research no longer being eligible for the exemption that has been granted.

2. <u>Record Keeping</u> You are responsible for maintaining a copy all research related records in a secure location in the event future verification is necessary, at a minimum these documents include: the research protocol, the claim of exemption application, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to subjects, or any other pertinent documents.

3. <u>Final Report</u> When you have completed work on your research protocol, you should submit a final report to the Office for Protection of Research Subjects (OPRS).

4. <u>Information for Human Subjects</u> UIC Policy requires investigators to provide information about the research to subjects and to obtain their permission prior to their participating in the research. The information about the research should be presented to subjects as detailed in the research protocol, application and supporting documents.

Please be sure to use your research protocol number (2018-0100) on any documents or correspondence with the IRB concerning your research protocol.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact me at (312) 355-2908 or the OPRS office at (312) 996-1711.

Sincerely,
Charles W. Hoehne
Assistant Director, IRB #7
Office for the Protection of Research Subjects

cc: Ronald C. Hershow
        Steven Seweryn

APPENDIX AA

TABLE LXIV: NUMBER OF DATA SUBMISSIONS BY SOURCE AND UNIT OF ANALYSIS

[a]Number of Submissions						
Data Type	Source	Organization Level	Group Level	Individual Level	Context	*Total*
Qualitative	Critical Incident Report	5	6	13 English 3 Spanish	n/a	*27*
Quantitative	Work Unit Climate Survey	4	6 English 1 Spanish	12 English 2 Spanish	n/a	*25*
Qualitative	Interviews	3	3	2 English 1 Spanish	n/a	*9*
Qualitative, Quantitative	Private Documents	n/a	n/a	n/a	81	*81*
Qualitative	Public Documents	n/a	n/a	n/a	14	*14*
Qualitative	Field Notes	4	4	6	6	*20*
	Total	*16*	*20*	*39*	*101*	*176*

[a]All submissions were from English speaking subjects, unless indicated.

LISA R. IVERSON-LEIRMO

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EDUCATION

Doctor of Public Health, Leadership University of Illinois, Chicago, IL *Dissertation*: Overcoming Occupational Safety and Health Disparity: A Case Study of Exemplary Performance in Medium Business	May 2019
Master of Public Health, Environmental Health University of Minnesota, Minneapolis, MN	1992
Bachelor of Science, Physician Assistant Studies University of Wisconsin, La Crosse, WI	2000
Bachelor of Science, Microbiology University of Wisconsin, La Crosse, WI	1988

ENVIRONMENT, SAFETY & HEALTH EXPERIENCE

Los Alamos National Laboratory   Los Alamos, NM

2016 –

Industrial Hygiene and Safety Professional 3
Utilities and Institutional Facilities (UI) FOD
– As recent lead of eight IH-Safety professionals, provide effective, comprehensive health and safety services to customers, including craft workers, researchers, and operations personnel.
– Recommended strategic and tactical improvements for the Exposure Assessment Program as part of an OSH Division Work Group.
– Provided technical guidance for LANL's Smart Labs™ project and authored the first Laboratory Ventilation Management Plan.
– Provided third-party evaluation of the OSH Division Biosafety Program and advised improvement in response to CDC audit findings.

1997 – 1998

Acting Section Leader
HS-5
– Provided technical direction to twenty Field Support Section industrial hygienists and technicians.
– Analyzed programmatic proposals to identify and mitigate hazards.

| 1992 – 1997 | **Industrial Hygienist** |
| | HS-5 |

- As principal IH for the Biology; Nuclear; and Chemistry, Science and Technology divisions, coordinated work for two IH technicians.
- Performed complex qualitative and quantitative risk analyses for a variety of chemical, physical, biological and ergonomic hazards.
- Achieved compliance by interpreting and implementing regulations, consensus standards, guidelines, and voluntary occupational exposure limits from multiple agencies.
- Conducted accident investigations and periodic compliance audits, and implemented corrective actions.
- As content specialist for the Biosafety and Bloodborne Pathogen programs, co-authored Biosafety and Bloodborne Pathogen policies and participated on the Institutional Biosafety Committee.
- Implemented new confined space and biological safety programs.

La Crosse County   La Crosse, WI

| 2013 | **Seasonal Hazardous Material Worker** |
| | Household Hazardous Material Facility |

- Collected, characterized, and reused, recycled, or disposed of hazardous chemical, electronic, pharmaceutical and biological materials from regional residents and commercial enterprises.

Gundersen Health System   La Crosse, WI

| 2001 – 2010 | **Industrial Hygienist** |
| | Safety Department |

- As the first IH in this 325-bed teaching hospital with 27 regional clinics, developed, implemented, and administered a line of industrial hygiene services by defining risks, uniting leaders, and drafting programs.
- Created a Lead Safety program by interpreting federal, state and local regulations; monitoring exposure; writing work documents; interacting with remediation contractors, and engaging regulators.
- Solved long-standing formaldehyde and solvent exposure problems in the laboratory and morgue by scrutinizing work practices; measuring personal and biological exposures; reconfiguring ventilation; training workers and maintenance staff; and using evidence to influence decision-makers.
- Given limited resources, innovatively used no- and low-cost program guidance, monitoring services, equipment, and control measures.
- Initiated the sharing of hazard and exposure information among the Employee Health, Occupational Health, and Safety departments.

OCCUPATIONAL HEALTH EXPERIENCE

Logistics Health Incorporated	La Crosse, WI

2013 – 2016	**Occupational Health Physician Assistant**
	Health Services Center
	– Assessed and guided the health of deployed service members in the Army, Air Force, Coast Guard, Navy and Marines.
	– Educated clients about physical and mental health risks and resources.

Gundersen Health System	La Crosse, WI

2001 – 2010	**Occupational Health Physician Assistant**
	Occupational Health Services
	– As the first departmental physician assistant, accurately diagnosed and treated work-related injuries and illnesses among regional industrial workers
	– Managed post-injury work restrictions and return-to-duty.
	– Provided preplacement examination, medical surveillance, and post-exposure care to nearly 6,000 healthcare employees.
	– Implemented lead and formaldehyde surveillance for healthcare staff.
	– Delivered literacy-appropriate injury and illness prevention and management education.
	– Achieved high patient satisfaction by establishing positive relationships and fostering interdepartmental teamwork.

ADDITIONAL EXPERIENCE

University of Wisconsin	La Crosse, WI

2011 – 2013	**Clinical Assistant Professor**
	UWL–Gundersen–Mayo Physician Assistant Program
	– As Clinical Education Coordinator in this top-rated Physician Assistant program, managed clinical year learning and internships.
	– Designed and taught graduate-level courses.
	– Directed the content, conduct and presentation of master's theses.

University of Minnesota Hospital and Clinic	Minneapolis, MN

1990 – 1991	**Laboratory Technician**
	Department of Pediatrics
	– Managed tissue cultures and viral-recombinant DNA vectors to obtain optimize conditions for oncology research.

Mayo Clinic	Rochester, MN

1988 – 1990	**Laboratory Technologist**
	Clinical Virology and Parasitology
	– Identified viral and parasitic organisms using direct microscopy, enzyme immunoassay, tissue culture, antibody fluorescence and serology.

CREDENTIALS

Q-Clearance, Department of Energy	2018 –
Certified Industrial Hygienist (ID #10553), American Board of Industrial Hygiene	2017 –
Common Access Card (CAC), Department of Defense	2013 – 2016
Certified Physician Assistant (ID #1046619), National Commission on Certification of Physician Assistants	2001 –
Lead Risk Assessor (LRA-112836), State of Wisconsin	2005 – 2012

PROFESSIONAL INVOLVEMENT

Selectee, Content Portfolio Advisory Group, American Industrial Hygiene Association (AIHA)	2014 – 2018
Member, Occupational and Environmental Medicine Committee, AIHA	2007 – 2016
Member, Healthcare Working Group, AIHA	2006 – 2013
Appointee, Health Care and Social Assistance Sector Council, National Occupational Research Agenda, National Institute for Occupational Safety and Health (NIOSH)	2009 – 2011
Chair, Occupational and Environmental Medicine Committee, AIHA	2010 – 2011
Selectee, Injury and Illness Prevention Program Task Team, AIHA	2010 – 2011
Selectee, Volunteer Group Experience Task Team, AIHA	2010
Vice Chair, Occupational and Environmental Medicine Committee, AIHA	2009 – 2010
Secretary, Occupational and Environmental Medicine Committee, AIHA	2008 – 2009
Selectee, Future Leader's Institute, AIHA	2006

HONORS AND AWARDS

SAFE Academy, ALDESHQSS Directorate, Los Alamos, National Laboratory, Los Alamos, NM	2019
High Performance Sustainable Building Award for Smart Labs™, National Nuclear Security Administration, Los Alamos, NM	2017
Outstanding Volunteer Group, Occupational and Environmental Medicine Committee, AIHA	2009 – 2011
Shining Star Award, Health Care Working Group, AIHA	2011
Honors, University of Wisconsin, La Crosse, WI	2000
NIOSH Traineeship, University of Minnesota, Minneapolis, MN	1991
Highest Honors, University of Wisconsin, La Crosse, WI	1988
Robert E. Lee Scholarship, University of Wisconsin, La Crosse, WI	1987

PRESENTATIONS AND PAPERS

Small Business Development Centers: A Pilot Exploration of Occupational Safety and Health Service Delivery in Central States. Presented April 8, 2014 at the University of Illinois at Chicago 9th Annual School of Public Health Research Forum in Chicago, IL.

Industrial Hygiene. Presented May 14, 2012 at the La Crosse Area Occupational Safety & Health Council meeting in La Crosse, WI.

Injury &Illness Prevention Program (I2P2). White Paper co-author, American Industrial Hygiene Association I2P2 Task Force, December 17, 2010.

Practical Industrial Hygiene. Presented October 23, 2001 at Gundersen Lutheran's 6th Annual Tri-State Health & Safety Seminar in La Crosse, WI.

Longitudinal Analysis of Physician Assistant Salaries. Poster presented May 1999 at the American Academy of Physician Assistant's 27th Annual Physician Assistant Conference in Atlanta, GA

Measurement of Endotoxin in an Environmentally Controlled Tom Turkey Grower Barn. Poster presented May 1992 at the American Industrial Hygiene Conference and Exposition in Boston, MA.

SKILLS

Proficient in Microsoft® Office (Excel, Outlook, PowerPoint, Word)

PROFESSIONAL AFFILIATION

American Industrial Hygiene Association