MANAGING INDUSTRIAL CONSTRUCTION SAFETY IN SOUTHEAST TEXAS

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ABSTRACT: The construction industry on average has a higher rate of occupational injury than most other industries. However, steps can be taken to reduce worker risk through the effective management of controllable factors. These controllable factors can be managed through an aggressive safety program with emphasis on hazard awareness, safer work practices, and employee involvement. While the initial cost impact to a company to establish a sound safety program can be substantial, the long-term benefits can lead to overall cost savings that may outweigh the costs of implementation and management. This paper highlights some of the areas addressed by Mason Construction, Inc. in the establishment of its safety program. Mason is a merit shop contractor with approximately $15 million annual revenue in the civil sector of the petrochemical industry of southeast Texas. Through the use of quantifiable data and multiple examples from this case study, it is shown that the benefits attributable to a strong safety program outweigh the costs of the program itself.

INTRODUCTION

An increased awareness of safety and the hazards specifically related to the construction industry has been observed over the last seven to 10 years (Hinze 1991, 1992). This awareness may be directly attributed to an increased education in occupational safety and health as well as increased voluntary compliance with the Occupational Safety and Health Administration (OSHA) regulations. Additional interest in OSHA is especially prevalent in the industrial construction sector. In particular, spiraling medical costs associated with accidents have led to an increased awareness of safety in industrial construction.

This is especially noticeable in southeast Texas within the narrow confines of the petrochemical industry, which is the backbone of the economic base of the region. Owing to the efforts of OSHA and concerned individuals in the industry and community, there has been a measurable increase in the awareness of the hazards inherently related to construction work in this marketplace. More recently, through voluntary compliance and increased owner involvement, coupled with internal budget restraints faced by OSHA, efforts have been made by OSHA to offer owners incentives to create and manage a safer workplace. In response, contractors have been required to meet the requirements of the changing times or to pursue business in other than the petrochemical marketplace.

By OSHA offering incentive programs like the Voluntary Protection Plan (VPP) and Star Status, the petrochemical market has become a much safer environment in which to work. This is not entirely attributable to the efforts of OSHA. Through the efforts of the owners to meet or exceed OSHA requirements on a voluntary basis, contractors have begun to police themselves by implementing strong safety programs that emulate those set forth by OSHA and the plant owners. Those contractors who have been unwilling, or unable for whatever reason, to comply with the guidelines passed along to them have had to find work in markets outside the petrochemical industry.

The construction industry historically lags behind all other industries in adapting and accepting changes in technology and procedures by an average of five to seven years (Warszawski and Sangrey 1985; Ionnou and Liu 1993). This is nonetheless noticeable in the acceptance of mandated safety awareness and safe work procedures. While many changes have occurred in recent years regarding safety awareness and safety compliance, not all these changes came about graciously. Many, while acknowledging some of the benefits of a more safety conscious workforce, point to possible decreases in productivity. However, current thinking appears to be that the objectives of increasing safety and productivity are not in conflict. Nevertheless, additional burdens have been placed on management to administer the safety guidelines that must be adhered to in order to meet regulatory guidelines.

While possible decreased production and additional work for management may be some of the side effects of the more stringent safety guidelines adhered to in today's construction industry, these negative effects can readily be countered and overcome.

INCREASED EMPLOYEE INVOLVEMENT

This paper discusses the approach utilized by Mason Construction, Inc. in the establishment of its safety program. Mason is a merit shop contractor with approximately $15 million annual revenue in the civil sector of the petrochemical industry of southeast Texas. Mason was also a 1997 recipient of the Construction Industry Safety Excellence (CISE) Award, which was presented by the National Business Roundtable. Mason was one of only 11 companies in the nation to win this prestigious award.

Currently, most of the refineries and chemical plants in southeast Texas are requiring contractors to have and maintain an experience modification rating (EMR) of 1.0 or less to be eligible to work within their facilities. This requirement has forced many contractors such as Mason to pay closer attention to their workers' safety by implementing stringent and all-inclusive safety programs. The first author has been involved with the necessary changes in work procedures to implement a comprehensive safety plan as well as the administration of that plan.

Specifically, the principal manner in which Mason has overcome the management burden is through increased employee involvement in all phases of site safety. It is generally known that employees are often more aware of hazards in the workplace than are employers (Koehn and Surabhi 1996). By involving the employee in the safety process, more commitment is gained from the employee. This additional commitment may be attributable to the employee's desire to execute something which he or she has developed or assisted in developing. This

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type of involvement enables the employee to gain a sense of ownership and increased responsibility. The establishment of safety committees, made up of all levels of craft expertise, who conduct periodic site safety evaluations of their work site and confer with management at regularly scheduled meetings has helped place an emphasis on safety at the employee level. The safety committee helps promote accident prevention and safe work habits within their work areas. This committee is also able to assist the company safety officer in investigating any reported deficiencies in their work area. The same personnel perform inspection tours of their work sites to determine if safety rules are being observed, good housekeeping is maintained, protective devices and equipment are used appropriately, and hazardous or dangerous areas such as open excavations are properly posted and barricaded. Committee members also regularly make recommendations for improving company safety through their input and ideas regarding modifications to standard work procedures or company safety guidelines.

Additionally, all employees are urged to watch out for one another, and veteran employees are especially encouraged to assist newly hired personnel in performing tasks safely. Experienced workers are less likely to be involved in a work-related accident than are inexperienced workers (Saari and Lahtela 1981). This simple safety practice may lead to a decrease in occupational accidents within this industry.

REDUCED LABOR TURNOVER RATES

Another factor in jobsite accidents within the construction industry is the high employee turnover rate associated with this type of work. Construction companies seldom maintain a stable base of employees (Helander 1991). This may be directly attributable to the all too common boom and bust cycles within the industry. This is also reflected within the petrochemical industry in southeast Texas. Because of the high daily costs to plant owners, which are associated with a facility or unit shutdown, much work is performed on a heavily manned turnaround basis with multiple crews. These multiple crews, working in shifts, sometimes work 24 hours a day to complete work in as timely a manner as is humanly possible. While this leads to more safety concerns, it also creates periods of high employment followed by abrupt layoffs at project completion. The high employee turnover rate makes it more difficult for workers to adjust to a constantly changing work environment with different demands set by varying work conditions and by different employers.

In an effort to reduce this problem, Mason has striven to maintain a stable employee work base. One way in which this has been accomplished is through a detailed daily and weekly analysis of companywide manpower requirements. By strategically moving personnel from one job to another (e.g., working smaller crews in noncritical areas when manpower is required elsewhere) the overall workforce is kept to a minimum. This close coordination of personnel and projects keeps the overall company manpower relatively uniform while varying the number of personnel at any given work site to meet the current demand at that site.

This method of managing projects and personnel is performed by a management team that administers all ongoing projects. It effectively removes control of manpower from the field level, where the focus is a single project, and places it at a level where the overall benefit of the company and all ongoing projects is brought into perspective. This process is effective only with sound communication and involvement by all members of the management team. It should be noted also that there is a downside to this form of management. Clients often dislike having workers removed from their jobsite to perform work elsewhere and more demand is placed on managers to effectively coordinate this type of activity. Additionally, this form of project management may be unrealistic for larger contractors or for contractors whose projects are not in close proximity to one another.

Using this approach to management is in direct contrast to the general philosophy of the construction industry, where a job is outfitted with a set crew size that remains assigned to that project even though the daily or weekly variance in workload may not require the level of manpower committed to that project. However, this alternative approach of maintaining an overall uniform workforce and varying the number of craftsman at a given jobsite has allowed Mason to maintain a more stable employee work base of long-term employees.

While this has not been easily accomplished, the long-term benefit of retaining employees pays off in increased employee safety awareness, reduced training costs, and a workforce with employees who know what is expected of them and who know what to expect of others around them. This type of environment creates a safer and more productive workplace.

GOOD HOUSEKEEPING PROCEDURES

A further reduction in the occurrence of jobsite accidents may be achieved by an increased awareness of good housekeeping procedures. This policy has been adopted by Mason Construction and is stressed at all levels, from management to labor. Site superintendents closely follow the policing of their sites not only for safety reasons but also for increased productivity and client satisfaction. Performance of housekeeping procedures is monitored by the company safety representative and the employee safety committee. Areas of negligence, as well as areas of exceptional performance, are addressed at regularly scheduled safety meetings and in superintendent meetings, with emphasis on an increased awareness for the safety of all involved as well as the potential for increased productivity.

This procedure has been enhanced over the past several years through Mason's involvement on several projects with Bechtel Corp. Bechtel jobsites incorporate a variety of safety-related procedures. Safety councils involving members of Bechtel's organization, contractor employees, and owner's representatives meet regularly to discuss jobsite safety issues, including evaluation of good housekeeping performance by its on-site contractors.

EMPLOYEE SAFETY TRAINING

Increased employee safety training has come in all forms. Several voluntary employee training programs have been implemented by Mason, including a safety orientation for new hires that involves a general overview of the company and its safety procedures and accomplishments, a video on company policies, review of the employee handbook, and a formal test over areas deemed of particular importance. This orientation is designed to impress upon new employees the importance of safety in the workplace and the need for their commitment to safety to ensure that the company remains a safe organization.

Mason further offers training in the safe operation of heavy equipment and potentially hazardous hand tools, requiring operators to be certified for the equipment that they utilize and to maintain with them an operator certification card for equipment that they are authorized to operate.

Further training provided by Mason includes instruction on first aid and CPR, proper usage of fire extinguishers, proper lifting procedures and techniques to reduce the chance of back injury, and training in excavation safety. Other forms of employee training involve site-specific safety training when required by unusual or irregular circumstances, process management safety, and other safety training as mandated by

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regulatory commissions for certain forms of work. Each Mason employee also attends generic and site-specific safety training as mandated by the owners and administered by the Industrial Safety Training Council (ISTC) prior to going to work within any petrochemical facility.

PRECONSTRUCTION AND WEEKLY SAFETY REVIEWS

Further safety measures for employees include a preconstruction site review that covers potential areas of concern for jobsites involving process or other hazards to employees. Utilizing a standardized checklist, this site review is completed by the superintendent during a preconstruction site visit conducted with the appropriate plant personnel (e.g., unit operators and plant safety personnel) before mobilization to the jobsite. Any areas of potential hazard or of particular concern can thus be reviewed and addressed prior to beginning work on the job. This information is then relayed to the employees on that project prior to the performance of any on-site work. This ensures that employees are made aware of the hazards inherent in a particular project.

Additionally, weekly "tool box" safety meetings are held by each site superintendent for particular crews. A specific, prearranged safety topic is discussed as well as any potential hazards or hazardous conditions specific to that superintendent's jobsite. Employee involvement is the key here. It is very important that each employee be an active participant in these meetings so that all involved may get the full benefit of the meeting. Superintendents encouraging group participation are able to maintain a safer work site as a consequence of increased employee awareness. Some superintendents rotate the responsibility of discussing the chosen safety topic of the week among the personnel in their crews. This increases the awareness of the employees as to the importance of the material being covered. Attendees and subject matter discussed are annotated on a weekly safety meeting form and returned to the main office for review by the safety director and management. After review this information is filed for future reference, and employee attendance is recorded.

SAFETY EQUIPMENT

The use of appropriate safety equipment has also been standardized in an effort to further reduce worker injury. For work within the refineries and chemical plants, a fire-retardant outer garment (Nomex) is required to be worn by all employees. Further guidelines include the regular use of hard hats, safety glasses, and heavy leather work boots. Steel-toed boots are recommended for all employees, but not mandated. Gloves, face shields, hearing protection, and other safety equipment are available to employees for their use should conditions warrant.

COST BENEFITS OF REDUCED WORKER ACCIDENTS

The reduction in worker accidents seen by Mason Construction, Inc. has been substantial since the inception of its current safety program, implemented in 1992. This reduction in accidents has led to lower incidence rates, a lower (EMR), reduced worker's compensation insurance rates, and a decrease in monetary losses from legal fees associated with worker's compensation claims. Additionally, reduced loss time has led directly to increased productivity. As previously addressed, the additional safety requirements placed on employees in the construction industry may have a tendency to affect worker productivity; however, any reduction in loss time has at a minimum countered any possible losses in production.

The incidence rate, based upon OSHA recordable injuries, standardizes a method by which to compare the safety performance among companies and industries of various sizes. In calculating the incidence rate, a basis of 200,000 man-hours is established from 100 employees working full time for one year (40 hours per week for 50 weeks). This basis assists in reducing the ratio of incidences to man-hours worked to a smaller, more manageable figure. From this, a standardized ratio is calculated by multiplying the number of OSHA recordable injuries experienced by a company by 200,000 man-hours and then dividing by the number of man-hours worked by that company.

Since implementation of its comprehensive safety program in 1992, which received further enhancement and development in 1994, Mason Construction, Inc. has enjoyed an overall decreasing incidence rate, which has fallen from 7.75 in 1992 to a rating of zero in 1996 (Table 1). Comparatively, the industry average for SIC code 162 (Heavy construction, except highway) under which Mason Construction is categorized was 11.4 in 1992 and had decreased only slightly to a low of 9.4 in 1995 (Table 2) with no data yet published for 1996 (Bureau of Labor Statistics 1997).

In recent years owners in the petrochemical marketplace have placed an increasing emphasis on the importance of contractors having and maintaining low incidence rates and having a low EMR. Currently, most of the refineries and chemical plants in southeast Texas are requiring contractors to have and to maintain an EMR of 1.0 or less to be eligible to work within

TABLE 1. Company Safety Data

Safety Item (1)	Yearly Safety Data 1992 (2)	1993 (3)	1994 (4)	1995 (5)	1996 (6)
Overall OSHA recordable incidence rate	7.75	2.96	4.39	1.67	0
Number of lost workday cases	1	2	1	0	0
Number of lost days	90	230	7	0	0
Lost workday incidence rate	1.29	1.48	0.88	0	0
Number of restricted workday cases	1	1	2	1	0
Number of restricted workdays	1	22	12	2	0
Number of recordable accidents	6	4	5	2	0
Number of recordable illnesses	0	0	0	1	0
Number of doctor-visit first aid cases	n.a.*	16	8	6	3
Number of fatalties	0	0	0	0	0
Total manhours for year	155,000	270,500	228,000	240,177	217,000
Experience modification rating (EMR)	1.14	0.89	0.69	0.63	0.48

*Not applicable.

TABLE 2. Comparison of Company Incidence Rate with Industry Average

SIC code (1)	Company/industry (2)	Yearly Incidence Rates 1992 (3)	1993 (4)	1994 (5)	1995 (6)
162	Mason Construction, Inc.	7.75	2.96	4.39	1.67
162	Heavy construction, except highway	11.4	10.5	9.8	9.4
150	General building contractors	12	11.3	10.7	9.6
170	Special trade contractors	13.5	12.6	12.3	10.9
—	Construction (all)	12.9	12	11.5	10.4

Note: Incidence rate for Mason Construction for 1996 was zero (0). Industry data not available for 1996.

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their facilities. This requirement, which strikes contractors on the bottom line, has forced many local contractors to pay closer attention to their workers' safety by implementing stringent and all-inclusive safety programs. Contractors, such as Mason Construction, who have wanted to continue working within the petrochemical marketplace have made the necessary changes in their work procedures and have implemented safety plans to meet or exceed the requirements of the owners. Contractors who did not want to change or who did not see the importance of the issue are now limited in their ability to work in the petrochemical area of southeast Texas. Removed from bid lists by owners, the list of preferred contractors within the confines of the petrochemical market has become quite short in some instances. This decreased number of contractors has led to restricted competition for industrial work. This limited competition for work is at least partially attributable to higher margins of profit for work within the petrochemical industry. While the benefits of this increased profit are not easily quantifiable, they should be recognized as potential additional revenue that is at least indirectly linked to an emphasis on safety in construction.

The EMR impacts the magnitude of the premiums paid for insurance, which are predicted on estimates of expected losses for the average employer in approximately similar work classifications. The premium is adjusted for the loss experienced over the three years previous to the applicable insured period while specifically excluding loss experienced during the immediately preceding year. A good record, or low EMR, thus leads to the reduced insurance costs. In general, states have established a baseline EMR of 1.0 from which insurance companies establish the rates charged for their coverage (rates stem from a relativity rate set by the state). Mason Construction, Inc. falls in the state category 3719 (oil and steel erection) by the nature of its primary work performed and the locations where its work is performed.

Directly affected by the EMR is the cost of worker's compensation insurance, with further potential savings in the form of discretionary schedule credits for low loss ratios. These loss ratios are a function of premiums paid in and losses paid out. In today's competitive insurance market, insurance companies are willing to generate these schedule credits for clients with low loss ratios, and thus of lower insurance risk, to maintain their customer base. Direct savings recognized by Mason on premiums paid for worker's compensation insurance because of a decreasing EMR have been $331,906 since fiscal year 1993. Further discretionary savings arising from a low loss ratio have been $241,400 for the same period (Table 3). These savings are calculated on the basis of variance from an EMR of 1.0. An EMR variance above 1.0 would be considered a loss or additional cost while a variance of EMR below 1.0 is recognized as savings in premiums paid. While there have been individual carrier decreases in insurance rates, as well as a decrease in the relativity rate set by the state of Texas, the savings calculated here exclude these "across the board" reductions in insurance premiums and reflect only the savings resulting from a decreased EMR from the adjusted baseline of 1.0.

Indirectly affected by a lower EMR is general liability insurance. This indirect effect comes in the form of discretionary credits offered because of lower anticipated worker's compensation claims from potential losses. Savings in premiums paid by Mason Construction, Inc. resulting from these indirect costs have been $81,000 for the fiscal period 1993 to 1997 (Table 3).

Further cost savings stemming from reduced worker accidents include a reduction in legal expenses incurred. With a reduction in employee accidents, worker's compensation claims have fallen, as have legal claims brought against Mason

TABLE 3. Company Savings in Worker's Compensation Insurance and General Liability

EMR[a] and variance/area of savings (1)	Yearly Data 1992 (2)	1993 (3)	1994 (4)	1995 (5)	1996 (6)
EMR	1.14	0.89	0.68	0.63	0.48
EMR variance from baseline (1.0)	−0.14	0.11	0.32	0.37	0.52
Direct savings on premiums	$0	$36,000	$118,526	$88,108	$89,272
Discretionary savings (schedule credits)	$0	$72,350	$88,154	$52,054	$28,842
Indirect savings on general liability	$0	$0	$7,000	$29,000	$45,000
Annual savings	$0	$108,350	$213,680	$169,162	$163,114

Note: Average annual savings for period = $163,577; total savings for period = $654,306.
[a]Experience modification rating.

TABLE 4. Breakdown of Safety-Related Costs

Category (1)	Yearly Costs (dollars) 1992 (2)	1993 (3)	1994 (4)	1995 (5)	1996 (6)
(*a*) General safety costs					
Supplies and equipment	37,951	30,581	44,100	46,118	7,950
Nomex expense					31,546
Safety training		14,040	14,723	23,465	19,008
Medical/drug testing		12,217	6,893	10,458	7,225
Worker's compensation expense		2,088	7,216	1,677	0
Subtotal	37,951	58,926	72,932	81,718	65,729
(*b*) Safety program costs					
Awards and incentives				5,190	11,410
Safety personnel/consulting		20,000	20,000	38,026	82,426
Subtotal	0	20,000	20,000	43,216	93,836
(*c*) Miscellaneous					
Legal expense	7,500	0	14,637	18,473	9,987
Subtotal	7,500	0	14,637	18,473	9,987
Total costs associated with safety	45,451	78,926	107,569	143,407	169,552

Construction, Inc. by injured employees. This reduction in legal action has resulted in decreased costs for legal defense. As may be seen in Table 4, the company has had a reduction in legal expenses from a peak of $18,473 per year to a forecast cost of $1,400 for the current fiscal year, an expected savings of $17,073 in the current fiscal year alone.

Additional revenue gained through a reduced EMR comes from work performed within the petrochemical industry itself. The previously mentioned requirement of an EMR at or below 1.0 to perform work within this industrial sector of southeast Texas has played a key part in revenue returned against the costs of implementing and maintaining a strong safety program. Since reducing its EMR to below 1.0, due partly to the safety awareness of its supervisory personnel, Mason has performed $3.35 million worth of work in three petrochemical facilities in which it was at one time unable to work due to having an EMR above 1.0. It must be recognized that this total volume of work may not be directly attributed to Mason's safety program. The company probably would have pursued work in other markets had it not been performing industrial work in these facilities. It should, however, be noted that the profit margin within the petrochemical industry, due to its stringent safety guidelines and thus reduced level of competitive bidding, is higher than in other markets in which Mason

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may have performed work during this period. Of the $3.35 million of work mentioned above, it is safe to assume that based upon average profits in the petrochemical market versus average profits in the more competitive commercial market, Mason Construction, Inc. generated approximately $300,000 (Table 5) of additional income over this period than would likely have been generated in work outside of the petrochemical industry. This additional profit may be attributable to its increased safety performance and ability to perform this volume of work within the petrochemical industry in lieu of having to pursue work in other markets.

Overall, since the inception of Mason's current safety program the company has spent roughly $545,000 (Table 4) on safety-related issues. Of this, approximately $177,000 was directly spent on the implementation and management of its safety program. Total returns stemming from the safety program and reduced worker accidents have been approximately $956,000 since 1992, with approximately $654,300 of this savings from insurance premiums alone. (Savings to insurance premiums noted here and discussed previously exclude all mandated reductions in rates by the state due to its change in relativity rate applied in 1997 and additionally exclude individual carrier rate decreases implemented in 1996 and 1997.) This averages to an overall annual cost benefit of $82,200 (Table 6) per year. In particular, the ratio of the dollars returned to each dollar invested in safety may be calculated to be 1.754. In evaluating only the direct costs of the company's safety program versus the total return in savings on insurance premiums and returned revenue, an annual average cost benefit is found to be $155,800 per year (Table 7).

TABLE 5. Specific Revenue Generated Since Reduction In Incidence Rate

Facility (1)	Yearly Revenue (dollars) 1992 (2)	1993 (3)	1994 (4)	1995 (5)	1996 (6)
Orange, A	0	48,272	2,695,282	454,500	35,322
Beaumont	0	0	0	0	2,209
Orange, B	0	0	0	116,585	0
Gross revenue	0	48,272	2,695,282	571,085	37,531
Estimated profit differential*	0	4,344	242,575	51,398	3,378

*Total estimated profit differential = $301,695. Estimated profit differential is calculated on average profit margin for industrial work less an average profit margin for same value of commercial work that is assumed would have been performed during this period had company not been doing this portion of industrial work.

TABLE 6. Cost/Revenue Comparison for Fiscal Period 1992–96

Area of cost/revenue (1)	Annual Cost/Revenue Data (dollars) 1992 (2)	1993 (3)	1994 (4)	1995 (5)	1996 (6)
General safety costs	37,951	58,926	72,932	81,718	65,729
Specific safety program costs	0	20,000	20,000	38,026	82,426
Total safety costs	37,951	78,926	92,932	119,744	148,155
Insurance premium savings	0	108,350	213,680	169,162	163,114
Estimated profit generated	0	4,344	242,575	51,398	3,378
Total savings and revenue	0	112,694	456,255	220,560	166,492
Total annual differential	−37,951	33,768	363,323	100,816	18,337

TABLE 7. Safety-Related Cost/Revenue Comparison

Category (1)	1992 (2)	1993 (3)	1994 (4)	1995 (5)	1996 (6)
Specific safety program costs	$0	$20,000	$20,000	$38,026	$82,426
Insurance premium savings	0	108,350	213,680	169,162	163,114
Annual net safety-related savings	$0	$88,350	$193,680	$131,136	$80,688

Note: Cumulative net savings for period = $493,854.

FUTURE OF SAFETY IN PETROCHEMICAL INDUSTRY

The importance placed on worker safety and awareness of safety issues by the petrochemical owners in their pursuit to achieve OSHA Star Status through participation in OSHA's VPP is at least partially responsible for the implementation of Mason's current safety program. The focus of the VPP program is to ensure safe work sites through the use of comprehensive safety programs based on employee involvement. OSHA approves facilities for this program after a thorough review of a plant's written program, intensive on-site visits and review of work site conditions, and interviews with employees at all levels. The OSHA Star is the highest level of achievement under this program. Some owners have already begun requiring contractors to have incidence rates at or below 1.0 to work within their facilities in addition to the requirement for an EMR of 1.0 or less. It is possible that owners may require plant contractors not only to have an EMR and incidence rate of 1.0 or less, but also to be VPP participants to be allowed to work within their facilities. This reasoning is based on the fact that owners, having achieved VPP or Star Status, are not subject to indiscriminate site inspections by OSHA. However, a facility may still fall under unwanted scrutiny when OSHA personnel visit a refinery or chemical plant to audit a contractor's work site if that contractor is being inspected by OSHA personnel. With this being the next apparent step to be taken by plant owners in their pursuit of safer workplaces with less outside interference, Mason has begun implementing more stringent safety procedures and guidelines in an effort to gradually reach this level before it is mandated.

Costs of gradually upgrading to this level should be less of a burden and lower overall than having to meet this type of compliance on short notice should it be required in the not so distant future. Furthermore, employees are more apt to accept and adapt to minor changes implemented into a safety program through time than they are to accept vast changes thrust upon them at short notice (Paterson 1996). Again, employee involvement is a key issue here. In most instances it is the employees who are most knowledgeable about the potential hazards peculiar to their work as well as ways to avoid these hazards. This knowledge held by the employees need only to be tapped by management. Also, with employee involvement, changes may be made much more efficiently than by forced implementation with no input from the employee.

CONCLUSIONS

In a sector of industry that generally holds a very poor occupational injury record, Mason Construction, Inc. has taken great steps toward identifying and isolating specific and controllable elements of worker safety. As of March 1997 Mason Construction, Inc. employees had worked a total of 557,770 man-hours without a lost time accident and 447,035 man-hours with no recordable incidents. This is a safety record of which Mason and all of its employees are extremely proud.

Mason Construction, Inc.'s stance on safety is summed up very clearly in its statement of safety policy:

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> The management of Mason Construction, Inc. recognizes safety as a key element in business and believes that it stands on an equal level with production. We are committed to a safety program that will provide a safe and healthful workplace. We believe that all accidents are preventable. We further recognize the fact that in a safe and healthy work environment the employee plays a very important role in accomplishing this mission. Mason Construction, Inc. seeks to employ safe, productive, and prudent workers to help accomplish this.

Specific steps taken by Mason to reduce its risk of accidents and increase worker safety include better safety management, hazard awareness through safety training and employee involvement, good housekeeping procedures, reduction in labor turnover rates, and emphasis on safer work methods and procedures.

While the startup and maintenance costs of a safety program are high, these costs can be offset by savings in insurance premiums from a lower EMR, potential increased profits, reduced legal fees, and increased productivity because of less loss time. Last, but not of lesser importance, is a safer and healthier body of workers, motivated by the fact that they are directly responsible for this safety plan under which they work and that the plan's ultimate success relies on their execution. It is a joint commitment of owners, managers, and employees that has made this a successful program for Mason Construction.

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