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Targeted Safety Programs

Research Summary 216-1

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Executive Summary

Construction firms are realizing that the initial investment and the continuous efforts to maintain a good safety record do pay off by not only reducing injuries on the job site, but by also contributing to an "on time" and "within budget" project delivery. Conscientious construction companies generally have well developed safety programs. These companies devote financial resources to maintain the health of their work force and to prevent high medical and insurance costs. Progressive organizations, like those who make up the membership of CII, are setting their goals at not only reducing injuries, but eliminating them. This expectation is called the "zero-incident" objective.

Target safety programs are techniques or approaches employed to reduce or eliminate specific types of hazards. These programs are generally implemented by firms that are proactive about construction safety.

CII decided to go beyond simply finding good corporate programs in its latest research into safety. Having already examined safety programs to see how overall safety management has been used to pursue the zero injury objective, CII wanted to investigate implementation details of programs that are designed to prevent specific types of injuries — target safety programs. To do that, it formed the Target Safety Research Team.

The research team's goal was to answer a fundamental question, "How do construction firms and projects develop, structure, and successfully implement effective programs to prevent or to address specific types of jobsite hazards?" The study primarily focused on the procedures utilized to ensure successful development, implementation, and management of target safety programs that have effectively been implemented on commercial and industrial projects. This publication summarizes the research team's investigation and findings.

1

Introduction

When organizations begin to address safety in a formal manner, they generally implement programs designed to improve overall safety performance such as safety toolbox meetings, jobsite safety inspections, drug testing, new worker orientation, and incident investigations. It is only after an organization has established a solid foundation for its safety program that attention might focus on specific hazards. Thus, organizations that implement target safety programs are generally those with a strong safety commitment and a relatively mature safety culture.

Objective of the Study

Various research studies have examined safety programs in the construction industry to see how overall safety management is used to pursue the zero injury objective. These studies, however, have not examined the details of how specific programs are developed or successfully implemented to reduce specific types of hazards.

The focus of a target safety program can vary. A program might be focused on preventing struck-by injuries or trench cave-in accidents. Others might be focused on preventing injuries to the back, eyes, hands, or feet or those that result from falls or fatigue. Clearly, the focus can be quite diverse and is largely determined by the nature of the specific hazards that appear to be plaguing a particular project. It was the objective of this research effort to examine various target programs and identify some common elements that existed among them. If a consistent pattern could be identified, the goal was to develop a model or template by which other target safety programs could be developed and implemented.

2

Surveys on Target Safety Programs

The first step of this research consisted of a survey that was used to obtain information about target safety programs. The questionnaire asked a variety of questions about target safety programs familiar to the respondents. The questionnaire asked that the specific focus of the target safety program be described, followed by questions related to the position of the individual who championed the program. Questions were then asked about the means by which the program was developed and how it was ultimately implemented on a project site. These questionnaires were mailed to several contractors, e-mailed to others, and hand-delivered to others by members of the CII Target Safety Research Team.

Because of the active involvement of the research team in soliciting participation in the research, a total of 225 questionnaires was received in this step of the study. Upon closer examination of the responses, it was evident that some respondents did not fully understand the specific focus of the research endeavor. For example, some respondents stated that the company had recently begun to conduct weekly toolbox safety meetings, implemented an incentive program, or that drug testing was implemented. While these are generally regarded as worthwhile endeavors, it was determined that some of these replies were not responsive to the questions being asked. To maintain a focus on the features of the target safety programs, it was decided to discard responses that were not consistent with the definition that had been developed for target safety. Thus, the data analysis discarded those replies that related to programs that did not satisfy the research definition of a target safety program. This reduced the viable survey responses to 120 replies.

Prior safety studies have not examined the details of how programs are developed or successfully implemented to reduce specific types of hazards. While the safety culture of a project might be well established,

the details of the implementation of specific programs have not been extensively examined. This research captured information of program implementation through five different portions of the survey: general project information, project work force and subcontractors, project safety performance, specific safety programs, and programs implemented on past projects.

This study identified attributes that contribute to successful target safety programs. The projects employing the target safety programs were characterized as being either medium or large. The average budgeted cost of the projects was over $128 million (the median was $38.5 million). The median total construction duration was estimated to be 18 months. The median number of subcontractors on a project was 12.0 with these subcontractors undertaking 57.7 percent of the work (see Table 1).

Table 1. Descriptive Information about Projects Included in the Study

Case Processing Summary	Mean	Median	Minimum	Maximum
Cost ($MM)	$128.2	$38.5	$0.07	$2,500
Total Duration (months)	22.4	18.0	2	120
Duration to Date (months)	12.9	10.0	0	54
Estimated Project Hours (#)	827,232	253,000	375	8,000,000
Hours to Date (#)	397,840	96,000	0	4,000,000
Percent Complete	57.4	55.0	0	100
Percent Subcontracted	70.0	57.7	0	100
Number of Subcontractors	21.8	12.0	0	300
Percent Subcontracts Negotiated	15.9	5.0	0	100

The survey respondents were individuals familiar with the programs being implemented on the construction sites and represented various parties involved in the construction of the projects. Nearly 75 percent of the respondents represented contractors and most of the remaining respondents represented owners. A few respondents considered their employer's role to be that of a contractor/owner client. In terms of geographic dispersion of the projects, 98 percent (all but two) were located in the United States. One was located in Europe and another was located in South America.

Projects included in this study were constructed for both private and public owners, with nearly 70 percent of the projects for private owners (see Figure 1).

The projects included were comprised of: new construction (61 percent), renovation and expansion (16 percent each), maintenance (three percent), and other (four percent). Various forms of contracting arrangements can be employed for project delivery. The majority of the projects included in this study were undertaken utilizing the typical owner/contractor, fixed-price contract format. Additionally, some of the projects included construction management (CM) at-risk, multiple primes, design-build, CM-agency, joint venture, and direct hire contracts (see Figure 2).

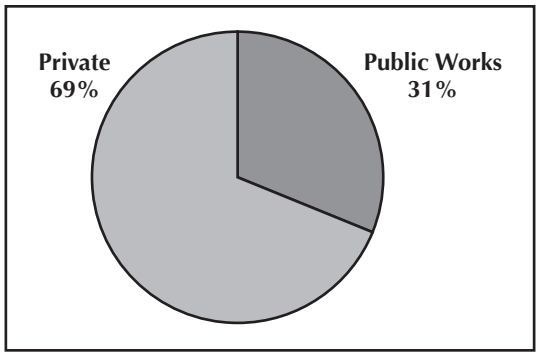

Figure 1. Type Owner: Public or Private

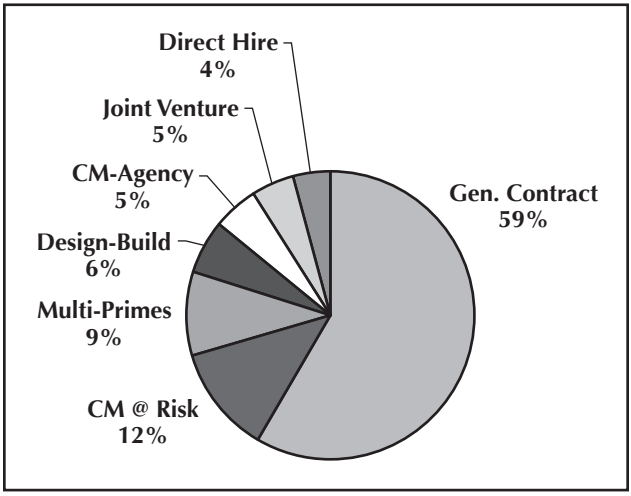

Figure 2. Type of Contracting Arrangement

Safety Performance

Safety performance is typically measured by the OSHA recordable incidence rate (RIR). RIR is determined by multiplying all OSHA recordable injuries by 200,000 and then dividing by the total work-hours. For 2004 (the most recent year for which data are available) the industry average was 6.40. For the survey respondents in this study the median RIR was 0.005 (see Table 2). Half of the projects in this study had an RIR equal to zero. It is evident that the RIR of the survey participants was much better than the industry average. The median number of lost time incidents was 0.00 while the median number of first aid cases was 5.0. The median number of full time safety personnel was 1.0. Safety performance in relation to established goals (Table 3) was: better (27 percent) and on target (39 percent) while utilizing target safety programs.

One purpose of this research was to determine how construction firms develop, structure, and successfully implement effective programs to address specific types of hazards. The research team examined contractor practices that provided the greatest success in addressing specific types of hazards. The practices were examined with a specific focus on the procedures utilized to ensure success in program implementation. For example, many programs were focused on the prevention of specific injuries or specific hazards. The programs varied in a number of ways, including the motivation to address the injuries/hazards and the manner in which they were addressed. The study examined data collected from construction firms that have devised specific programs to target specific types of hazards, whether initiated at the corporate or project level.

Target safety programs are often untried and unproven efforts that are designed to improve safety performance. As a result, smooth implementation is not assured and barriers to successful implementation may exist. The survey asked about such problems with implementation.

Table 2. Descriptive Information about Safety Performance

Case Processing Summary	Mean	Median	Minimum	Maximum
RIR	2.41	0.005	0.00	35.86
Lost Time Incident Rate	0.87	0.00	0.00	16.00
First Aid Incident Rate	25.50	11.00	0.00	400.00
Full Time Safety Personnel (#)	1.84	1.0	0	12

Table 3. Safety Performance in Relation to Goal

Safety Performance in Relation to Goal	Number	% of Total
Better	32	27.1
On Target	46	39.0
Worse	26	22.0
No Goals Were Set	7	5.9
Do Not Know	7	5.9

Major obstacles to implementation of specific target safety programs were encountered on 59 percent of the projects with target safety programs. The obstacles noted were:

- Resistance to initiative or to change (33.3 percent)
- "Old school" mentality (14.3 percent)
- Enforcement difficulties (11.9 percent)
- Difficulties in training (9.5 percent)
- Language barriers (4.8 percent)

Half of the target safety programs included in this study were initiated at the project level, while the others were initiated at the corporate level. See Table 4 for attributes of target programs.

Table 4. Attributes of Target Programs

Source of Target Program	% of Total
Developed from Scratch	37
Modified Existing Program	39
Used Existing Program As-Is	24

Champion of Program Implemented	% of Total
Corporate Level Individual	46
Project Level Individual	43
Consultant	8
Ad Hoc Committee	3

Source of Guidance Program	% of Total
Other Company Project	55
Owner	24
Insurance Carrier	15
Purchased One	6

Basic Steps to Implementation	% of Total
Education & Training	1
Person Assigned to Implement	5
Promoted the Program	13
Combination of the Three Above	81

Worker involvement in the safety process is one of the most important aspects of project safety. Many safety professionals have stated that most injuries are the result of unsafe actions or behavior, with unsafe conditions playing a minor role. With such a focus on the actions of workers being the major cause of injuries, it would appear prudent to take special notice of them. Perhaps the most significant innovations in construction safety in recent years relate to means by which workers are involved in the construction process. This is essentially based on the view that workers are not just a valuable resource to be protected, but can contribute to achieve the goal of zero accidents. Workers were involved in implementation 72 percent of the time. See Figure 3.

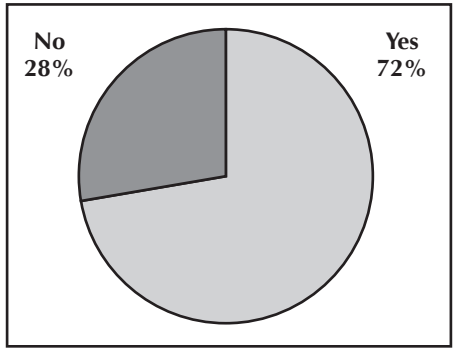

Figure 3. Workers Involved in Implementation of Safety Process

Management commitment to safety is essential to convey to others in the firm that cost, schedule, and quality do not take priority over safety. This can be demonstrated in a variety of ways. The circumstances may dictate the means that are perhaps most feasible. The motivation, which must be sincere and to the worker level, tends to come from different sources depending on the particular project, facility owner, or contractor involved. As shown in Figure 4, motivation noted in the data gathered came from various sources, including corporate mandates (27 percent), owner mandates (24 percent), unacceptable numbers of injuries (21 percent), owner and corporate mandates (13 percent), and other sources (15 percent).

The target safety programs described by respondents in the survey consisted of numerous accident prevention measures. The most dominant categories, however, were that of falls and personal protective equipment (38 percent each). Fall prevention programs were primarily focused on establishing a 100 percent tie-off for workers working at elevations above six feet. Programs on personal protective equipment were focused on encouraging workers to wear protective equipment such as gloves, eyewear, and proper clothing. Other target programs focused on training (12 percent), drug programs (two percent), lock-out-tag-out (LOTO) (two percent), hot work (two percent), scaffolding (two percent), confined space (two percent), and incentives (two percent). See Figure 5.

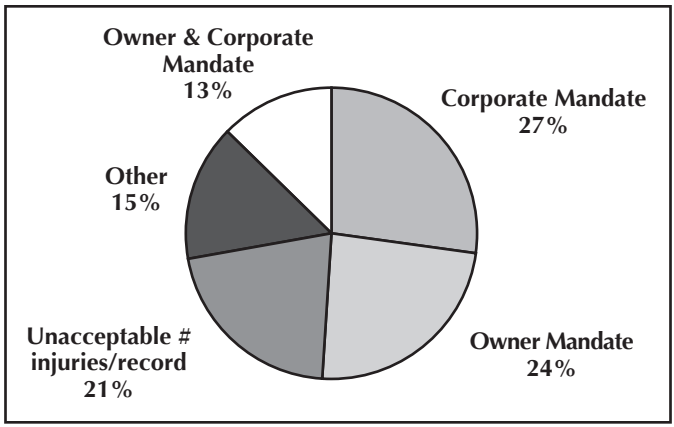

Figure 4. Sources for Program Development

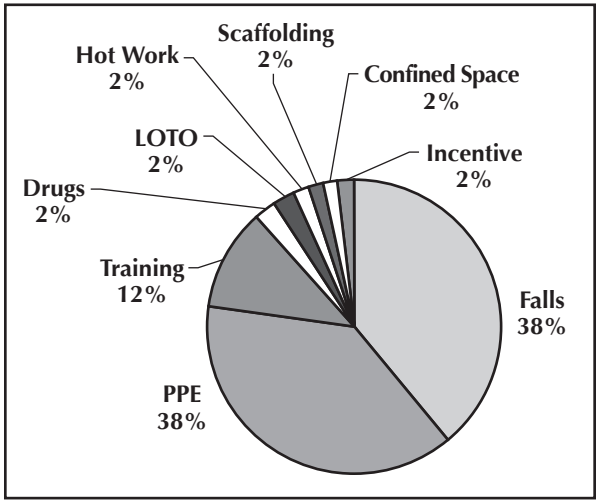

Figure 5. Focus of Target Program

3

Case Studies on Target Safety Programs

The second step of the research consisted of a series of case studies in which detailed information was obtained about target safety programs that were being implemented. The case study approach was used to capture detailed information that could not be obtained from the survey results. It was decided that the detailed information would adequately supplement the information obtained in the first phase of the research. All projects selected for the case study were identified through members of the research team, including representation from owners and prime contractors.

In conducting the case studies, various construction projects were identified. The target safety program was not identified until the researcher actually arrived on the project site. The initial party being interviewed was asked to identify a target safety program that had been developed on the project. In most instances several such programs were described briefly. The program that was most well developed or that appeared novel to the researcher was explored in greater detail. The researcher would seek information about the target program from various individuals, including the owner's representatives and various employees of the contractor, typically including the project manager, superintendent, and safety manager. The process of collecting the information generally took about three to five hours. Each site visit was focused on a single target program to avoid placing too many time demands on the site personnel.

Often specific programs and policies for implementing target safety programs were not apparent at the beginning of the interviews. Although the project safety personnel (the contact individuals) had prior awareness of the objective of the research, many did not grasp the actual intent of the research until it was fully described to them during the site visit. As a result, some of the target safety programs were not identified until the site visit was well underway or until a jobsite walkthrough was conducted.

The following were presented to all contact individuals as a guide for the jobsite interviews:

- What kind of project is this (duration of the project, number of workers, number of subcontractors)?
- Describe the target safety program in general terms.
- How did the target safety program begin?
- What were the steps that were followed to develop the Target Safety Program?
- Describe any impediments that you encountered as the program was developed and implemented.
- Was the program well received by the work force?
- Was the program successful? If so, how was success measured?
- What support did corporate management provide in order to develop and implement the program?

After a comprehensive interview with the jobsite safety manager, a jobsite tour was generally provided and shorter interviews were conducted with other project team members. By discussing the target program with various personnel (owner, general contractor, and subcontractors), a thorough understanding of the target program was developed and documentation was obtained.

Since a formal introduction of the research was made by a member of the research team, there was no reluctance to share any information about the safety efforts on site or the written descriptions of the target safety programs. Twelve jobsite visits were conducted involving introductions being made by four different construction companies and three owners. Ten case studies were chosen from the 12 projects. Two of the projects had developed effective safety processes, but did not have strong target safety programs that warranted mentioning in this study.

The target programs were selected without regard to their specific focus or emphasis. Any program that satisfied the criteria of a target safety program was included in the case studies. This resulted in a selection of

diverse emphasis areas being addressed by the target safety programs identified on the 10 jobsites that were visited. The following target areas were identified:

- The Safe Loading and Unloading of Trucks Program
- Eye Protection Program
- "Backsafe" Beginning-of-Day Exercise Program
- Housekeeping Program
- Barricade Tape Program
- Tie-Off "Beam Safe" Program
- Metal Detector Program
- Immediate Positive Reinforcement
- Behavioral Audit
- Glove Policy

After a thorough review of the 10 case studies, the research team concluded that newly created target safety programs follow a relatively similar pattern in their evolvement from initiation to final implementation. While the severity of hazards being addressed might expedite program implementation and increase worker acceptance of a new program, the overall process followed similar steps in program development in all 10 case studies. By analyzing these cases, interviewing their originators and corporate backers, and drawing from step-by-step procedures, a template (Figure 6) was created that could serve as a model for new target safety program development and implementation.

4

Target Safety Program Template

The research team identified nine steps of program development in a successful Target Safety Program. These steps have been incorporated into a template (see Figure 6). The template is intended to aid in the initiation and development of new policies based on addressing specific hazards. The steps of program development studied followed a similar pattern despite variations in the severity of the injuries or incident that sparked motivation and in the financial investment of the company in the program. The model suggests a general course of action for successful target safety programs regardless of the severity of the hazard.

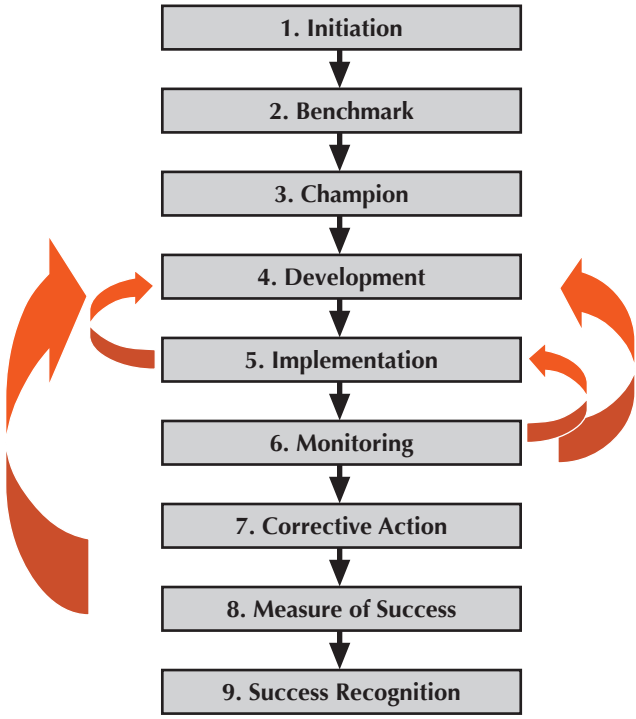

Figure 6. Target Safety Template

This template can be utilized to create, develop, and implement target safety programs regardless of trade or company size. It takes a step-by-step approach and demonstrates the steps necessary to implement target safety programs properly in order to maximize risk awareness and promote worker ownership in the program. The template analyzes the steps necessary to monitor, evaluate, and modify a target safety program to maximize program effectiveness. The different steps are described next.

Step 1: Initiation

Every program has a specific motivation for initiation. The motivation can be an increased number of specific jobsite incidents or a serious incident that sparks jobsite awareness of a severe risk. The best motivation for initiation is a proactive awareness of a current or future task that has foreseeable risks involved with completion. Safety managers, jobsite managers, and workers should be encouraged to inquire about specific risks and jobsite hazards in order to be proactive in creating target safety programs.

Step 2: Benchmark

Once the motivation for initiation is apparent, it is important to establish a benchmark to more accurately assess program success and to set goals for program implementation. Benchmarks are important as they create a starting point from which to grow and provide corporate managers solid numbers that help represent program success. Benchmarks are also important in comparing program costs with program savings in terms of financial accounting and insurance. Benchmarks are instrumental in establishing goals such as a reduction in the RIR. Establishing strong benchmarks helps safety professionals promote their programs on the jobsite and at the corporate level.

Step 3: Champion

Every successful program has a champion. Typically the champion is a jobsite safety professional. The champion may be a corporate safety manager or anyone who has the authority to initiate a target safety program

and who can take the lead in its development and implementation. It is important to encourage thoughtful analysis of jobsite risks and speaking up when these risks are recognized. Often more than one champion plays a role when corporate managers decide to support and promote the ideas of a jobsite safety professional.

Step 4: Development

It is important to properly assess a situation and discuss the best course of action before attempting program implementation. Communication is key between workers, jobsite management, and corporate management. Bringing together all parties promotes ideas for implementation and allows situations to be properly assessed, particularly where parties have different areas of expertise and whose knowledge is vital to establishing successful programs. While a severe or dramatic incident will usually expedite program initiation, it is important to develop the program systematically before attempting implementation. Programs whose project introductions are rushed do not achieve the same level of worker response as programs that are carefully planned. As seen in the template, this step of the program is constantly evolving. Implementation with effective monitoring facilitates direct feedback for the evolution of successful program development. Program champions, while typically innovative thinkers, realize that programs must be able to adapt in order to achieve maximum worker acceptance and ultimately, maximum results.

Step 5: Implementation

Similar to program development, proper communication is essential to achieve success when implementing a new program. New target safety programs mean that the "norm" that has been established to perform a specific task is being altered or adjusted in order to reduce or eliminate risk and promote a healthy work environment. While this sounds like an idea that would be accepted with open arms, adjustments in the "norms" that workers have created are typically viewed with skepticism. It is important that workers be properly informed of the identified or perceived risks. It is also important that these new changes be presented

in a positive way. Target safety programs are designed to maintain the health and safety of the workers and to ensure that all workers will be able to return to work the next day under the same capacity as when they began the project. This is begun during program development through communication. Worker feedback must be promoted for the workers to "own" the new program. Adaptation is also crucial in this step.

Step 6: Monitoring and Inspecting for Compliance

Monitoring and inspecting are critical to the success of target safety programs. It is during this step that program achievements are recognized and recorded and when safety professionals and managers have the opportunity to revise and modify the program. Through positive reinforcement of safe practices, proper communications, and established corrective measures, the professionals monitoring the program ensure the continued focus on the program's intent and the continued reduction of specific jobsite risks. This step directly cycles back into program development and implementation as a checkpoint for recognizing successes. This step also is the time when the program may need to be adjusted to promote optimal success.

Step 7: Corrective Action or Intervention

It is important that corrective actions or interventions be well established and accurately presented to the work force and jobsite managers. The intensity of the motivation for program implementation and the significance of the specific risk involved will ultimately determine the level of action needed to correct the situation. It is important to set parameters for noncompliance and to revert to what has been communicated when noncompliance is an issue. Typically when the previous steps of program development are properly completed, noncompliance is rare because worker acceptance is high. The attention put into the previous steps of development also allows for a more positive response to communication and verbal corrective action when noncompliance is an issue. Depending on the severity of the risk involved and the amount of noncompliance present, proper communication is often all that is needed to prevent

serious disciplinary actions. If issues of noncompliance escalate, it is important to carry out established corrective measures to convey the importance of the program.

Step 8: Measure of Success

It also is important to measure success accurately if the target program is going to become an established component of a broader safety program. Measuring success also aids in acceptance of the program by the workers. In addition, measuring success is a way to inform corporate components about the importance of the program. This step, along with the ability to accurately present the measures of success compared with the established benchmarks, determines whether the program grows from a job-specific to a corporate program.

Step 9: Success Recognition

As with any other success, it is important to recognize when a goal has been set, pursued, and achieved. This promotes program acceptance and helps transfer specific jobsite programs onto other projects. While the program may not be celebrated in a formal way, it can be publicized and made a permanent element within the corporate safety program.

5

Conclusions and Recommendations

The research team came to the following conclusions:

1. Target safety programs should focus on specific hazards and not on general safety issues.
2. Target safety programs should focus on hazards and not on injuries to specific body parts (hands or eyes, for example) or on specific types of injuries.
3. Corporations/projects implementing target safety programs should focus on hazards rather the injuries.
4. Target safety programs are effective in all project labor situations, i.e., union, merit shop, non-union.
5. Target safety programs can help workers recognize hazards and learn how to protect themselves from those hazards.
6. Effective target safety programs follow recognized steps identified in the Target Safety Template. Corporations/projects implementing target safety programs will usually have better success when following the Target Safety Template.
7. Target safety programs are effectively implemented on projects of all sizes and types.

The research team also makes the following recommendations:

1. Target safety programs should be employed to help projects achieve zero injuries.
2. Adopt the Target Safety Template for implementing target safety programs.

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