Final Report

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Intervention Studies for Construction Safety and Health: A Strong Safety Program as an Injury Prevention Intervention

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A Strong Safety Program as an Injury Prevention Intervention

1. Background

It has long been recognized, essentially as a truism, that following an appropriate safety program is an essential element of injury prevention. Meridian Research, in a report prepared for OSHA, sites a Business Roundtable claim that contractors with good safety programs had only 36% as many injuries as the industry as a whole (Meridian1994). Leading contractors such as Bechtel require that all sub-contractors implement a safety and health program (LeBar 1992). The U.S. Army Corps of Engineers, which also requires that contractors implement a safety program, reported injury rates less that a quarter of the industry average for the period 1992-1996 (CPWR 1998).

The above reports indicate that large construction organizations can achieve a very high level of safety and that safety and health programs are a key component of their efforts. However, the great majority of contractors, employing a majority of crafts workers, fit into the small to medium employer range for whom the implementation of an effective safety program can be an administrative and organizational challenge.

Since 1996 CPWR has pursued a line of research into the mechanisms and impacts of the adoption of appropriate safety programs on safe work conditions and practices and on injury rates at smaller contractors. A previous CPWR study by Halperin, McDougall et al under NIOSH/CDC Grant 7-RO!CCR317873 examined the impact of introducing a minimal safety program at small carpentry contractor throughout the New England area. Dr. Halperin's team was able to demonstrate that the safety practices of the study group improved over time and that a similar improvement was not present in the control group. These improvements were attributed to improved management commitment and to the impact of site visits. The study team was not able to demonstrate an improvement in any of the measures of injury rates that they measured, due primarily to the small number of participating contractors.

The current study expanded upon Dr. Halperin's previous work by looking at mid-sized contractors in three regions and in a variety of trade sectors. Mid-sized contractors were chosen for study in the anticipation that they would have an organizational structure that could successfully manage change. Diversity of region and trade sector was incorporated to ensure that study findings would be applicable to a broad range of employers.

2. Accomplishment of Study Aims

This study assessed the effectiveness of an intervention at the organization of work level.

Aims 1-3 of the study comprised obtaining exemplary construction safety programs, determining the essential common elements of those programs, and preparing a model program that could then be tailored to replace or supplement the existing program of contractors from a wide variety of trades. A number of industry leading contractors contributed programs for review. These included Bechtel, Baugh, Jacobs, and Mortenson and programs provided by participating contractors. OSHA model programs from California and Washington were also reviewed as was ANSI A10.33-1992: Safety and Health Program Requirements for Multi-Employer Projects (ANSI 1992).

A simple model program was developed based on the reviewed models. The complexity and completeness of the program was designed to be appropriate for a mid-sized contractor. The language was kept direct and checklists were used wherever possible. Not all parts were intended to be applicable to all contractors, but rather to serve as a library from which to select appropriate sections. The model program is enclosed as Appendix I. The model was reviewed by an OSHA compliance assistance officer (comments attached to appendix I), CPWR staff, and a project safety director for a large contractor with a requirement for sub-contractor safety programs. Changes were made based upon their recommendations.

Aim 4 was to enroll twenty-one contractors into the study. This number was selected to obtain a power (1-beta level) of 0.70 if recordable injuries and observed hazard rates each declined by 20%. Although exhaustive efforts were made to achieve this objective it was possible to enroll only twelve contractors of which nine wee able to make worksites available for auditing. Despite the small number of contractors enrolled, statistically significant reductions in hazard levels were observed. Injury statistics will not be available for analysis until early in 2005.

Contractors were recruited to represent diverse trade specializations and regions. This was done to reduce the possibility a demonstration of effectiveness within a narrower group of contractors which might not be readily transferable to a the broader industry. The contractors who agreed to participate in this study had, with one exception, been in doing business for a number of years and had well established administrative structures, an existing safety plans, and an expressed desire to improve their safety performance. The principals in the one company that was newly formed were highly experienced construction managers. All participating contractors were union employers. A coded list of participating contractors is found in table 1.

Aim 5 called for introducing a tailored program at participating contractors. The tailored program excluded those elements that were not applicable to the contractors work. The program and a site audit form was discussed in detail with a principal or senior manager at each contractor and the with the significance of each item related to the type of work that their company performs. It was

the option of each contractor, as the legally responsible party, to incorporate as much, or as little, of the program as they deemed appropriate.

A critical element in achieving implementation of program improvements was to help the contractor distinguish between an active safety program and a safety program document. Many contractors had excellent safety program documents on file. These documents were typically prepared by a consultant or trade organization with the company's name added by word processor. These documents, including copies in the field, usually show no sign of being opened for field use. In CPWR's opening and subsequent conversations with contractors, study staff emphasized that effective safety programs are an active part of how a company does business, not just a reference book. This message was reenforced during site visits by pointing out how identified hazards could impact safety and job performance.

Aim 6 called for visiting six worksites for each contractor after the intervention period. As shown in Table 2, an average of 5.5 visits were made. The objective during the baseline phase had been tree visits, which, as shown in table 2, was achieved or exceeded at all but one contractor.

3. Study and Results

3.1 Protocol

A copy of the study protocol is enclosed as Appendix II. The protocol was designed to ensure objective ratings and inter-observer consistency. In practice, all observations were performed by one member of the team (Cameron), ensuring that a very high level of rating consistency was maintained.

The evaluation of administrative practices, including safety planning, hazard communication, and fall protection planning, was dropped early in the study because changes in this area clearly exceeded most of the participating contractors ability to make meaningful changes during the study period.

3.2 Site Audit Form

The protocol is used in conjunction with a site audit instrument (Appendix III).

Halperin's team evaluated only four indicators of safety performance - hardhats, safety glasses, hearing protection and ground fault circuit interrupters. The current study looks at a much broader range of indicators. The items on the site audit form are limited to directly observable conditions or practices and are those judged in the safety literature to be the most critical to site safety. Program staff explained to each contractor that the items listed on the site audit form were not an exhaustive list of required safety and health practices and that compliance or non-compliance with the audit criteria did not correspond directly with OSHA compliance or non-compliance nor did compliance with the listed items ensure that the worksite was hazard free.

The audit instrument is divided into seven sections corresponding to program areas identified by OSHA as the most highly correlated to injury causation/prevention. The first section, Administrative, was not utilized after the baseline period due to the significant difficulty experienced by contractors in achieving compliance with proper practices of hazard analysis and fall protection planning. Sections 2 and 3, housekeeping and personal protective equipment use, included many of the most common hazards and controls. Good control of these areas also maintains an overall atmosphere of worksite discipline that supports efforts in other areas. The final four sections - electrical, falls, struck-by, and caught-in - correspond to those items included in OSHA's focused inspection program for construction. They were chosen by OSHA and by CPWR because control failures in these areas account for 90% of construction fatalities and serious injuries (OSHA 1994).

3.3 Site Audit Procedures

Site audits and audit reports were considered to be an integral part of the intervention and as the principle method for raising awareness of the reasons behind program elements.

Access to worksites was always coordinated through the contractor's main office. Lists of working jobsites, superintendents /foremen and contact cell phone numbers were obtained the week prior to planned site visits. Contractors were not told which sites would be visited not exactly when site visits would occur during the week. Although the process used to identify sites for observation provided some warning to the contractor and site superintendent/foreman that a site visit was imminent, the warning was believed to be sufficiently non-specific have resulted in little "pre-inspection" alteration of worksite conditions and practices. Any warning effect would have likely diminished over time as superintendents and foremen had repeat visits because observation results were reported to the contractor as grouped data that did not specifically identify individual sites or managers. Because of the anonymity provided to the superintendent/foreman there was little possibility for any negative consequences and thus little motivation to disrupt their always hectic schedule to make adjustments for a visit.

Upon accessing each worksite, the observer coordinated with the site superintendent, informing him or her of the purpose of the visit, and offering the opportunity to accompany the observer during the audit. In most cases a superintendent or foreman did accompany the auditor for at least part of the site tour.

After gaining entry to the site, the observer walked the entire site, attempting to identify every present instance of conditions or practices that met the audit criteria. All observed instances were noted on the audit sheet (Appendix III) in the appropriate category with a filled circle indicating a compliant condition or practice and an x indicating a non-compliant condition or practice. Only directly observed (not reported) conditions or practices were rated. Particular attention was paid to noting compliant conditions which in many cases were reflected in the absence of a hazardous condition (e.g. an absence of loose tools and scrap material at an individuals work location). An objective of making ten observations for each sub-category was seldom met but an effort was

made to obtain the greatest achievable number of observations by extending the duration of the visit and/or by making a second pass through the area to look for new instances. Particular attention was paid during repeated observations to avoid rating previously observed items.

3.4 Data Reduction

At the end of the visit the number of "safe" conditions or practices noted for each sub-category was divided by the total number of observation for that sub-category to derive a ratio of safe conditions/practices. The ratios for each sub-category with observations (without regard to the number of instances observed) were then averaged to derive a category ratio. For fall related conditions where sub-sub-categories were used, higher level averages were derived in the same manner. Finally, the numerical averages of all categories for which there were observations were averaged, without regard to the number of observations made in each category, to obtain a site average. Calculation of average ratios for an observation period, however, were derived by first averaging across sub-categories and then taking an average of those averages. This practice often resulted in an average ratio slightly different from that which would have been obtained from averaging site averages. Cross category averaging was adopted to reflect the philosophy that safety is first owned at the company, rather than the site level.

3.5 Reporting

Observation results were reported to the company's site representative and to a principal or senior manager as an integral part of the program implementation process. An immediate and brief oral site exit report was made at the end of each visit to the site representative. The site exit report highlighted the most significant positive and negative findings. The report provided an opportunity for the observer to illustrate how the safety program was or should have been implemented at his or her site.

At the end of the baseline period, and when three or more site visits had been made during the intervention period, a written report, (an example of which is enclosed as Appendix IV) was prepared for each contractor's principal or senior manager. The report provided two forms of feedback.

1. An overview of the contractor's observed safe work practice/condition status with a comparison to other observed contractors, and
2. Details on salient safe and unsafe conditions and practices.

These two forms of feedback were provide to encourage to contractor to think of safety as consisting of the control of definable conditions and practices that could be quantitatively measured and managed. Reports were discussed with each contractors principal or senior manager and suggestions for improving performance were made where appropriate.

At the end of the 2004 observation period a yearly integrated report was prepared for each contractor.

4. Results

4.1 Rates of Safe Work Conditions and Practices

A summary of baseline and post- intervention ratings for each contractor is presented in Table 3

Significance levels were calculated using a t-test for paired values. Calculations for all significant results are found in Appendix VI. Pearson's method was used to calculate the correlation between baseline and intervention ratios.

Too few observations were available at contractor H to serve as meaningful indicators of that contractors performance. A total of 14 instances of conditions/practices were observed during the baseline period and 8 were observed during the intervention period. results for contractor H, as well as averages and significance levels based in part on those averages, are presented in brackets in Table 3. The corresponding non-bracketed values have been calculated excluding contractor H values and present what the researchers believe to be the truest indicators of the studies impacts. Discussions of results below exclude contractor H data unless their inclusion is specified.

The relatively high baseline ratio of safe to total work conditions/practices (0.72 to 0.93 with an average of 0.81) reflects the management experience and positive attitude of the participating contractors. Most of the participants, however, were not pleased with the safety ratio that was initially reported to them and discussed ways to improve their standing with the observer. Composite safe work ratios during the intervention period rose to an average of 0.95 (0.94 to 0.99). The average ratio increase of 0.15 (0.03 - 0.33) is significant at the .001 level. I f contractor H, which obtained a much higher ratio during the baseline period than during the intervention period, is included the significance drops to below the .10 level.

The change in the safe work ratio is even more dramatic when expressed as a reduction in unsafe conditions/practices. These ratios went from a baseline average of 0.19 to an intervention average of 0.03 - an 84% reduction in unsafe conditions/practices.

There is only a weak correlation of a contractor's final ratio to their initial ratio($r = .388$).

Ratio changes in individual categories, when averaged over all contractors were all in a positive direction and with one exception, of a similar magnitude. The exception was in the stuck-by category which went from a baseline ratio of 0.95 to an intervention ratio of 1.00, for a change of 0.05. Although this was the smallest change in absolute terms it represented a complete elimination of this class of hazards and was therefore the greatest change achievable. With the exception of Contractor H, there were only four instances (out of 51) where a contractor had a lower safety ratio for a specific category during the intervention period and 6 instances where there was no change.

Ratio changes for the categories PPE, Electrical, and Fall, as well as the sub-category of ladder, were significant at the .05 level. Ratio changes in all other categories were either not significant at the chosen level or the category contained too few corresponding ratios to calculate significance levels.

The relative initial performance levels of the individual contractors did not strong influence there performance during the intervention. Only one category, electrical, showed a relative high level of correlation ® = .70) between baseline ratios and intervention ratios. PPE, Ladders, Falls Total, and the Total Program showed only moderate correlation (r = .55 to .39) while Housekeeping showed almost no correlation r = .09.

4.2 Injury Rates

The analysis of injury rate data will not be possible until after contractors report their 2004 rate in February 2005.

5. Discussion

Clearly, among the group of contractors for whom sufficient data was collected to draw conclusions, there was an improvement in the observed work conditions and practices that was both statistically and socially significant. Although an analysis of baseline and intervention phase injury experience has not yet been possible, a reduction of 84% of non-compliant conditions and practices among observed conditions and practices -selected because of their high correlation to serious workplace injury - is a very good harbinger of success.

A pattern emerged of in how successful contractors were in implementing changes. Those elements that could be addressed through company action, such as the purchase of GFCI units or ladders, were consistently improved. Some very important improvement, such as the replacement of ladders with mechanical lifts, are not adequately measured under the study protocol since practices are shifted between categories.

Where the participating contractor worked as a sub-contractor, some hazards were beyond the direct control of the contractor. In one instance employees of contractor F were asked to work on ladders on a narrow, exposed building outcropping at about 30 feet above the ground with no fall protection. This resulted in a very low rating for that contractor's fall protection conditions (0.13) but more importantly put those workers at unacceptable risk. Contractor A, who usually serves as the general contractor, performed one observed job as a sub-contractor. On that job the overall site conditions were significantly below those that contractor A maintains of their own jobs. In this case, however, Contractor A's managers took action when notified by the observer of significant hazards, to have the general contractor make corrections.

Elements that involved worker control, such as housekeeping (post-intervention ratio 0.90) and ladder use (post-intervention ration 0.94) were less consistently improved. Two very persistent

unsafe practices were the spreading of extension cords across walking surfaces and using the top or final step of a step ladder as a standing or sitting platform. Both of these practices grow out of long ingrained trade habits and, more fundamentally, out of long accepted working conditions. Electrician, for example, sit on the tops of ladders because they must spend long hours doing overhead work that becomes very uncomfortable if done from the standing position. Cords are spread across the floor because the distribution of electric powered tools is much greater than the distribution of outlets. These hazards are controlled by some large contractors, usually with the expenditures of funds to obtain lifts or to install cord racks or trees. The fact that smaller contractors usually do not enjoy the financial resources or schedule flexibility that large contractors enjoy in part explains the difficulty that they have in changing these practices. It does not, however, make the practices less hazardous.

Housekeeping presents a different challenge - one of job management. Tools, materials and waste are constantly being placed in the work area. Contractors can manage part of the problem by providing sufficient laborer support and waste containers for efficient cleanup. Another part of the solution, however, lies in training and motivating individual trades workers to maintain a well ordered individual work area. This can be done, but achieving this kind of change requires a long term commitment on the part of a contractor and his or her field management staff to ingrain good work practices. This is particularly difficult in a business where few of ones employees are permanent staff and where many employees on a job are sub-contractor employees. In light of these difficulties, it is impressive that these contractors improved housekeeping ratios from 0.72 to 0.88 ($p = 0.021$), a 57% reduction in hazardous conditions.

One critical area of hazard control - work planning - was not significantly improved. Three contractors did take action to implement planning tools which may prove to be beneficial, those tools had not been deployed early or deep enough to be evaluated.

6. Conclusions

6.1 Successes

This study has demonstrated that specific unsafe conditions and practices reduced, and replaced with safe work conditions and practices, through a process that involves the introduction of an enhanced and active safety program through a relatively intense and continuing interaction with a contractors management chain at the company and field levels. Early improvements were more prevalent in those program areas that could be improved through the purchase of appropriate equipment but were also present in areas that involve human interaction.

Success was not limited to one region or trade sector, but was consistent across trades and regions. Only the insufficiently sampled contractor H failed to achieve an intervention phase safe work ratio of better than 0.90. These successes, however, may not be as easily achieved by smaller or less motivated employers.

Instituting safety program changes at the worksite requires ongoing management commitment. Not all contractors are as competent or motivated as those that the researchers were fortunate to work with. However, by focusing on the most critical safety element in a contractors regular work, and by breaking the safety process down into specific observable conditions and practices, more typical company and site managers (superintendents and foremen) could be better empowered to guide safety improvement and institutionalization. A simple safety plan that is well executed is far better than an elaborate plan that seldom if ever leaves the bookshelf.

6.2 Limitations

It was a major disappointment that the critical area of safety planning was not broadly improved, perhaps because this is a high level skill for field managers (superintendents and foremen) whose training and experience typically has not included this type of activity. The skills needed to effectively plan safe work go beyond the information provided in a course such as the OSHA 10 hour or even 40 hour classes. Skills in analysis, organization, and people management must also be included. It is critical that the apprenticeship and journey person training programs look for ways to provide advanced skills in safety and health planning and supervision.

6.3 Future Research

An important confirming test of safety program effectiveness is the measurement of injury rates during baseline and intervention periods. That analysis will be performed as 2004 data becomes available. It is likely, however, that injury reduction will be a lagging indicator of change, as contractors continue to learn about works best for them.

It is hoped that another critical question, the persistence of change, which can only be determined by continuing observation, will be addressed by a continuation of the current study.

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Table 1 : Characterization of Participating Contractors.

Contractor	Trade Sector	Region	Job Types Observed
A	General	East Coast	Commercial: new and renovation
B	General	East Coast	Commercial: new and renovation
C	General	West Coast	Commercial, Institutional, ultra-high-end residential: New and renovation
D	General	West Coast	Institutional, Commercial: New and renovation.
E	Insulation	Mid-West	Institutional, Commercial: New and Renovation.
F	Dry-wall	Mid-West	Commercial: New
G	Painting	Mid-West	Commercial: Renovation
H	Specialty interiors	Mid-West	Commercial: Renovation
I*	Specialty interiors	West-Coast	Commercial: New

* Observed during the baseline phase only. Data is not reported

In addition to the above contractors, a Mid-West interiors contractor and two West-Coast roofing contractors did not have work available for observation during either phase of the study.

Table 2: Number of Site Visits by Contractor and Study Phase

Contractor	Baseline Site Visits	Post-Intervention Site Visits
A	5	11
B	7	6
C	6	5
D	4	4
E	3	8
F	4	6
G	3	2
H	2	2
I	3	
Total	37	44

Table 3 : Pre and Post Intervention Safe Work Condition/Practice Compliance Rates

Hazard/ Control Area	Contractor										
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**Ave**	**p**	**r**
Housekeeping											
Baseline	0.71	0.76	0.74	0.64	0.89	0.43	0.64	(0.96)	0.69 (0.72)		
Post-intervention	0.92	0.80	0.73	0.92	0.96	0.81	1.00	(.75)	0.91 (0.89)		
Change	0.20	0.04	-0.01	0.28	0.07	0.38	0.36	(-0.19).	0.22 (0.17)	.021 (.058)	.09
PPE											
Baseline	0.51	0.72	0.85	0.55	0.94	1.00			0.76		
Post-intervention	0.87	0.91	1.00	1.00	1.00	1.00			0.96		
Change	0.36	0.19	0.15	0.45	0.06	0			0.20	.038	.4946
Electrical											
Baseline	0.69	0.80	0.78	0.78		0.77	1.00	(1.00)	0.80 (0.83)		
Post-intervention	0.97	1.00	1.00	0.99	0.92	0.98		(0.78)	0.98 (0.95)		
Change	0.28	0.20	0.22	0.21		0.21		(-0.22)	0.18 (0.12)	<.001 (0.101)	.70

* insufficient data to calculate

Hazard/ Control Area	Contractor										
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**Ave**	**p**	**r**
Falls											
Protective methods											
Baseline		1.00	0.50	0.00		1.00			0.50		
Post-intervention	0.95	1.00	1.00			0.13			0.77		
Change	-	0.00	-	-		-0.87			-0.44	*	*
Ladders											
Baseline	0.79	0.59	0.59	0.69	0.86	1.00	0.88		0.77		
Post-intervention	0.95	0.88	0.75	1.00	0.91	0.98	0.90		0.91		
Change	0.16	0.29	0.16	0.31	0.05	-0.02	0.02		0.17	.017	.546
Scaffold											
Baseline	0.75	0.78	0.60		1.00	1.00	0.88		0.84		
Post-intervention	-	-	1.00	1.00		1.00	0.73		0.93		
Change	-	-	0.40	-	-	0.00	-0.15		0.09	*	*
Falls Total											
Baseline	0.77	0.75	0.56	0.35	0.93	1.00	0.88		0.71		
Post-intervention	0.89	0.94	0.92	1.00	0.92	0.70	0.75		0.87		
Change	0.12	0.15	0.38	0.65	-0.01	-0.30	-.07		0.16	.026	.504

Hazard/ Control Area	Contractor										
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**Ave**	**p**	**r**
Struck-by											
Baseline	1.00	0.88	0.75	1.00	1.00	1.00	1.00		0.95		
Post-intervention	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00		
Change	0	0.12	0.25	0.00	0	0	0		0.05	0.25	
Caught-in											
Baseline	0.78								0.78		
Post-intervention	0.95	1.00	1.00	1.00					0.99		
Change	0.17	-	-						0.21	*	*
Total Program											
Baseline	0.78	0.79	0.74	0.66	0.87	0.84	0.88	(0.96)	0.79 (0.82)		
Post-intervention	0.96	0.95	0.94	0.99	0.96	0.98	0.91	(0.77)	0.95 (0.95)		
Change	0.18	0.16	0.20	0.33	0.09	0.14	0.03	(-0.19)	0.15 (0.11)	.001	.388

Final Report Addendum

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I Background

This intervention study evaluated safety performance and injury incidence rates at mid-sized construction contractors before and after the introduction of an upgraded safety program and structured monitoring of worksite conditions and practices. Two measures of effectiveness were used: the ratio of safe work conditions and practices, and the incidence of recordable and lost-time injuries.

We have previously reported statistically significant reductions in the ratio of unsafe workplace conditions and practices. Participating contractors achieved a 71% reduction in the ratio of working conditions and practices which were not compliant with the standards specified in the model program. Reductions in five of six sub-classifications were statistically significant. In the sixth classification the reduction in the rate of non-compliance was not statistically significant due to the limited room for improvement between the pre-intervention 95% compliance level and the post-intervention 100% compliance level.

A full report of the studies background, aims, design and initial results was submitted in December 2004. Analysis of injury data was delayed pending the completion of the post intervention year and the compilation and transmittal of injury and hours worked data.

II Accomplishment of Aim

The aim of this aspect of the study was to determine whether the implementation of an upgraded safety program and periodic external monitoring would result in a significant reduction in OSHA reportable and/or lost time injuries within the two year period from the beginning of program implementation and monitoring site visits. The current analysis of injury outcomes, although showing large reductions in injury rates, does not have sufficient statistical power to demonstrate that these changes have not occurred by chance.

III Study Methods

OSHA 300 logs and other records were provided by six participating contractors. A seventh contractor declined to provide records. The OSHA 300 logs were used to determine the number of OSHA recordable injuries (ORIs) and lost time injuries (LTIs) reported during a two-year pre-intervention period and a two year intervention/ post-intervention period. Injuries that resulted in a job reassignment were treated as lost-time injuries. The number of hours worked at each contractor was determined from their OSHA 300 logs for 2003 and 2004 and directly from the contractors for earlier years. Three contractors were unable to provide injury data for some or all of the pre-intervention period. OSHA recordable injury rates (ORIRs) and lost-time injury rates (LTIRs) were calculated by dividing the injury incidence numbers by the hours worked and multiplying by 200,000 to determine the rate per 100 full-time employees.

IV Results

Injury and hours worked data extracted from contractor reports is shown in Table I.

Four participating contractors (contractors C, D, E, and F) provided injury and hours worked data for both the pre and post intervention period. For the pre-intervention period these contractors reported 834,960 hours worked, 47 recordable injuries (ORIR of 11.3) and 15 lost time injuries (LTIR of 3.6). During the intervention and post-intervention periods the group report 570,159 hours worked, 18 recordable injuries (ORIR of 6.3) and 9 lost time injuries (LTIR) of 3.2). The recordable injury rate was thus reduced by 45% and the lost-time injury rate by 11%. The post-intervention LTIR was strongly influenced by the inclusion of five job reassignments due to eye injuries at one contractor.

Two contractors from this group reported 83% of the hours worked during the pre-intervention period and 75% of the hours worked during the intervention/post intervention period. Both of these contractors reduced their injury rates markedly, with a reductions in their combined ORIR from 8.6 to 3.9 (55%) and in their combined LTIR from 3.4 to 0.9 (74%). Neither of the other two contractors from this group reduced their injury rates. Contractor D reported the same number of injuries (3 recordable and 1 lost-time injuries) in both the pre-intervention and intervention/post-intervention periods. However, due to fewer hours worked during the latter period the contractor's injury rates increased by 62%. The experience of contractor C is skewed by the reporting of five job reassignments due to eye injuries. Reassignments are counted as lost-time injuries, resulting in a 43% increase in both recordable and lost-time rates for this contractor..

A paired students t test did not show a statistically significant reduction in injury rates for this group of four contractors ($p = 0.58$).

Two additional contractors were not able to report pre-intervention hours or injuries. Reported hours worked for these contractors totaled 625,151 during the intervention/post-intervention period. They reported 6 recordable injuries (ORIR of 1.9), and 3 lost-time injuries (LTIR of 1.) These rates are well below the intervention/ post-intervention rates reported by the other four contractors.

Discussion and Conclusion

The intervention was designed to facilitate a reduction in those working conditions and practices likely to cause serious injuries from falls, electrocutions, entrapments, and being struck by flying, projected or falling objects. Housekeeping and Use of personal protective equipment were also targeted as key elements of general workplace safety. The intervention did not directly aim to reduce strains, cuts and contusions, or puncture wounds.

Table II presents the pre-intervention and intervention/ post-intervention injury incidences by category for all contractors. Insufficient data was available to characterize two pre-intervention injuries and one intervention/post-intervention injury. Two categories of reported injuries are closely correlated to the intervention: fall-related injuries and eye injuries. Fall related injuries dropped from four to zero, a result consistent with the observed previously reported 59% reduction in non-compliant fall-related conditions and practices among all contractors. The eye injury incidence rate fell only 21%. Neither of these reductions in injury rates was statistically significant. Injury rates for strains, cuts and contusions, and puncture wounds were markedly reduced although the reductions were not found to be statistically significant due to the small number of incidents and an uneven distribution of injuries among the contractors. Injury rate reductions in these two categories may reflect an increased overall awareness of safety.

Although this study did not establish statistically significant reductions in injury rates, the socially significant reductions in injuries experienced was encouraging and generally consistent with the statistically significant finding, reported earlier, that unsafe conditions and practices were reduced among these contractors.

Table I

Pre and Post Intervention OSHA Recordable (ORI) and Lost-Time Injury (LTI) Levels and Rates by Contractor

	Pre-Intervention				Intervention/Post-Intervention			
Contractor	**2001**		**2002**		**2003**		**2004**	
	ORI (ORIR)	**LTI (LTIR)**	**ORI (ORIR)**	**LTI (LTIR)**	**ORI (ORIR)**	**LTI (LTIR)**	**ORI (ORIR)**	**LTI (LTIR)**
A					**2 (2.3)**	**1 (1.1)**	**0 (0)**	**0 (0)**
B					**0 (0)**	**0 (0)**	**4 (5.8)**	**2 (2.9)**
C			**2 (10)**	**2 (10)**	**1 (5.1)**	**1 (5.1)**	**5 (24.2)**	**5 (23.2)**
D	**3 (9.77)**	**1 (3.1)**	**0 (0)**	**0 (0)**	**1 (3.7)**	**0 (0)**	**2 (9.5)**	**1 (4.7)**
E	**4 (3.1)**	**3 (2.1)**	**3 (3.7)**	**1 (1.2)**	**1 (1.3)**	**0 (0)**	**1 (1.7)**	**0 (0)**
F	**21 (22.8)**	**7 (7.6)**	**14 (19.7)**	**1 (1.4)**	**5 (10.4)**	**2 (4.2)**	**2 (3.9**	**0 (0)**
		ORI (ORIR)	**LTI (LTIR)**			**ORI (ORIR)**	**LTI (LTIR)**	
Contractors C-F		**47 (11.3)**	**15 (3.6)**			**18 (6.3)**	**9 (3.2)**	
All Contractors						**24 (4.0)**	**12 (2.0)**	

Table II

Pre and Post Intervention Levels of OSHA Reportable Injuries for all Contractors by Type of Injury

Injury Type	Pre-intervention		Post intervention		% Injury Reduction	p value
	ORI	(ORIR)	ORI	(ORIR)		
Fall Related	4	(1.1)	0	(0)	100%	p = 0.27
Eye Injuries	5	(1.4)	7	(1.1)	21%	p = 0.72
Strains	13	(3.1)	2	(0.4)	85%	p = 0.13
Cuts and Contusions	20	(5.7)	3	(0.5)	91%	p = 0.38
Puncture Wounds	3	(0.8)	1	(0.2)	75%	p = 0.18

Appendix I

U.S. Department of Labor

Occupational Safety and Health Administration
Calumet City Area Office
1600 167th Street, Suite 9
Calumet City, IL 60409-5445
PHONE (708) 891 - 3800 FAX (708) 862 - 9659
Website www.osha.gov

January 14, 2003

Mr. Buck Cameron
Research and Evaluation Specialist
The Center to Protect Workers' Rights
7016 46th Ave SW
Seattle, WA. 98136

Dear Mr. Cameron:

I was very pleased to meet you at Soldier Field a few weeks ago, and I hope you enjoyed accompanying the partnership team as they conducted their monthly audit. I'm sure you will agree that the Soldier Field Renovation is an interesting project, made more challenging by the time and space limitations at the worksite. I've also been very pleased with the level of cooperation that all parties have demonstrated. From the perspective of organized labor, Michael O'Neill, Richard Murphy and Thomas Kavicky deserve a lot of credit.

Thank you for the opportunity to review the model safety program the CPWR is currently developing. This is an important undertaking, as OSHA continues to believe a safety program that documents the policies, expectations and duties of everyone associated with a project is a major component of the comprehensive effort needed to reduce injuries and illnesses in the construction industry. As you know, the construction industry continues to be a major source of workplace injuries, illnesses and fatalities, so safety in this area is a topic that cannot get too much attention.

As requested, I've included comments and suggestions on ways the model program may be strengthened, but overall I think your draft program is an excellent start.

Section 1 - Company Safety Policy:

I was very pleased your model program included a statement by the president of the company. A strong statement such as this helps emphasize the commitment to safety must come from top management. The program this statement introduces includes many safety rules that go beyond OSHA's standards, most notably in the areas of confined space entry and fall protection. Overall, the company safety policy may be strengthened if it includes a statement that the OSHA regulations are considered to be "minimum" standards, and the company may adopt safety rules that "go above and beyond" OSHA requirements.

Safety Program
XYZ Builders

wilsonjones.

Table of Contents

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December 30, 2002

XYZ Builders
123 Security Drive
City of Destiny, WA 90909

Subject: XYZ Builders Safety Policy

To All XYZ Builders Employees:

Safety is an integral part of XYZ Builders' business operation; injuries are not. I take safety very seriously and I expect every member of the XYZ team to take safety seriously. This Safety Policy outlines how we will work safety. Compliance with this policy by supervisory and trades personnel is a condition of employment.

Every member of the XYZ team has specific responsibilities for maintaining work site safety. I will lead the safety effort by establishing safety goals and auditing safety performance. I will provide the right people, equipment and schedule to do the job safely. I will personally check worksites each month to ensure that the highest standards of safety are maintained. I will hold every superintendent and foreman responsible for maintaining a safe workplace and every trades worker responsible for their safe work practices.

Superintendents will plan, communicate and check safe work practices. They will perform a job safety analysis and complete a job safety packet for each job. Work will not begin on any phase of a job until the superintendent has identified the safe way to do the job and has communicated that information to all effected trades people. Where other contractors are on site, the superintendent will coordinate his or her planning with the corresponding superintendents or foremen. Special conditions, such a confined space entry and trenching, will be planned in accordance with OSHA standards. The superintendent will also ensure that Material Safety Data Sheets are available on site for all chemicals to which employees may be exposed and will personally ensure that every effected trades worker is made aware of the hazards, warning signs of overexposure, and control methods for all potentially hazardous exposures.

Foremen will maintaining a safe workplace and will ensure compliance with the job safety plan. They will regularly inspect the work site and safety related equipment and will brief the crew daily on current job activities and related safety conditions. Foremen will respond promptly when a crewmember has safety related questions or has identified a potentially uncontrolled hazard. Foremen will plan and conduct weekly toolbox training meetings and will initiate an investigation of any injury or unsafe incident. Both foremen and trades workers are responsible for continually noticing and correcting or reporting safety hazards. The foreman will assure that reliable corrections are made. Hazards are everyone's responsibility -- No hazard will be left uncorrected.

Trades workers are responsibly for reporting to work physically and mentally ready to work safely. They must know and follow all applicable safe work practices and must properly use all required tools and safety equipment. Each trades worker will plan his or her own work following safe work rules and will ensure that they have the right tools, the necessary knowledge, and a secure work location before beginning any task and will keep all work areas kept free of an unsafe accumulation of scrap or trash.. They will correct or control any hazard before beginning work. No task is so crucial that it may be done unsafely.

Trades worker will take part in all scheduled safety briefings and training and will ask questions if they do not understand anything. They will inform their foreman of any unsafe condition that they cannot immediately correct and will notify other workers in the area before they create a potentially hazardous exposure. Trades workers will wear protective equipment as required. All injuries will be reported to the foreman immediately.

At XYZ Builders we work as a team. We meet our responsibilities to each other to plan for and communicate about safety, and to look for and correct hazards. That's not just the right way – at XYZ Builders it's the only way.

Take Care

I.M. Patron
President
XYZ Builders

2

Safety Responsibilities

Each member of the XYZ Builders team has a specific role to play in ensuring that we work safely in a safe workplace. In addition, every employee and every supervisor is responsible for obeying all safety rules, for using all required safety equipment, and for fixing or reporting any unsafe condition.

Contractor's Responsibilities

Establishes the company safety policy

Annually

- Sets the safety goals
- Audits the injury/illness log
- Posts the injury log in February
- Reviews safety performance with all managers and foremen
- Provides the right safety equipment
- Purchases/rents only safe equipment
  - Ladders of the right type, strength, and length
  - Sequential trip nail gun
  - Double-insulated, grounded tools
  - Drills, saws, grinders, jackhammers etc. with "dead-man" switches
  - OSHA compliant personal fall protection equipment
  - Low- noise powered equipment

Quarterly

- Leads the Company safety meeting

Monthly:

- Visits each site to check safety
  - Audits ladder safety
  - Audits the fall protection program
  - Audits GFCI on all outlets
  - Audits nail gun safety
  - Audits chemical safety inventory and MSDSs
  - Audits fall protection equipment condition and use
  - Audits other protective equipment use
- Reviews the investigation of all-lost time accidents

Each job

- Approves job hazard analysis/ control plan
- Approves the fall protection plan
- Provides competent/qualified persons as required
- Ensure that workers are trained in:
  - General worksite safety

- Ladder safety
- Fall protection program
- Electrical safety
- Nail gun use
- Emergency response
- Chemical hazards

Foreman's / Superintendent Responsibilities

Pre-job:

- **Be first aid/CPR qualified**

- **Perform and document a job hazard assessment and control plan**

Train all workers on the safety plan
Plan for the right equipment for the job
Plan for housekeeping and waste disposal
Ensure that competent persons will be present when required

- **Plan and Perform Chemical Hazard Communication**
  - Inventory chemicals.
  - Obtain MSDSs for all chemicals that you'll use.
  - Read MSDSs. Inform your crew of all hazards and proper control methods.

- **Plan Electrical Safety**
  - Determine the location and voltage of all power lines on the site.
  - Train all crafts workers on electrical safety
  - Ensure that qualified electricians are available for any electrical work
  - If 10' distance can not be maintained from all power lines (35' if over 5,000 V) at all times, have the power company shut off or insulate the line
  - Contact the power company before digging.

- **Plan for Fall Protection**
  - Determine fall protection needs
  - Prepare site-specific fall protection plan
  - Plan for anchorage points
  - Train crafts workers on fall protection plan, fall protection equipment, and safe ladder use.
  - Secure ladders of the right number, type, length, and strength of ladders for the planned work.

- Ensure the use of only ladders with non-slip footing

- **Plan Housekeeping**
  - Arrange for an adequate number of trash collection containers.
  - Arrange for trash chutes
  - Arrange for clean up time

Weekly:

- Hold and document a crew safety meeting
- Inspect all safety related equipment
- Inspect all ladders for wear; destroy broken ladders.
- Inspect all fall protection equipment
- Update fall protection plan with qualified person
- Identify controlled access zones (CAZ) and persons permitted to enter

Daily:

- Brief your crew in the morning – point out any special safety hazards
- Have all safety hazards that you find, or that are reported to you, fixed immediately
- Ensure that the worksite is well lighted
- Have materials delivered as close as possible to where they will be used
- Check for safety hazards produced by other trades on site. Have hazards fixed or controlled
- If other trades use chemicals, ensure they have MSDSs. Brief your crew on the hazards
- Ensure that skirted plugs are used on equipment operated above 300V
- Have any digging within 4' of power lines done by hand
- Guard any temporary lights within 7' of the work surface
- Ensure the repair of all safety related defects immediately or remove from service. Require lock out before repair, if applicable.
- Ensure the immediate guarding or covering of:
  - Wall openings less than 39" above working surface
  - Floor opening and holes
  - Stairs (hand rail and stair rail)
- Spot check
  - Protective equipment use
  - Ladder set up and use
  - Scaffold set up and use

    - Equipment and site for safety hazards/housekeeping
    - Tools and cord sets for insulation and grounding
    - Elevated work areas for guarding
    - Trenching for shoring
    - Mobile equipment for backup alarm, seat belt, lights, fenders or mud flaps
    - High noise sources for isolation
    - PFP equipment. Discard any that is damaged, worn, or that has arrested a fall

  (If nail guns are used)

- Do not permit "bounce nailing"
- Only allow trained workers with a current operators card to use powder actuated tools
- Ensure that powder actuated tools are locked in a container when unattended

Crafts Workers Responsibilities

Pre-job

- Understand the company safety program and sites-specific safety plan
- Understand:
    - Electrical safety
    - Fall protection
    - Safe ladder use
    - Use of protective equipment
    - Tool selection and use
    - Ladder selection and use
    - Chemical safety

Daily

- Report to work physically and mentally ready
- Follow all safety rules – all the time
- Do not wear loose or dangling clothing or jewelry
- Wear/use all required safety equipment
- Keep your area clean and dispose of trash properly.
- Use only grounded or double insulated tools. Never attach a 2-prong adapter to a 3-prong cord
- Use only GFCI protected outlets
- Inspect tools and electrical cords for insulation and grounding; remove from service if damaged
- Do not work on electrical systems or operate equipment unless qualified.
- Protect electrical cords:
    - Do not staple, hang, or nail.
    - Do not immerse in water
    - Protect from vehicle traffic
- Never remove round plug from power cords

- Check your tools:
  - Wrenches for sprung jaws
  - Impact tools for mushroomed heads
  - Wood handled tools for splinters, cracks, or loose heads
  - Keep sharp tools sharp
- Remove damaged tools from service
- Select, inspect, and set up ladders correctly

Task

- Know how to do the task safely. If you don't know – ask!
- If you need help – get it!
- Check that you have the right tools for the job.
- Check that you have the right PPE
- Know the hazards of any chemicals in your area. Use the right protective equipment.
- Check your work area for secure support and footing before beginning the task.
- Make sure that tools or materials are not going to fall or fly at you. Correct any hazard you find before beginning the task. Report any hazard you can't correct to the foreman.
- Follow the fall protection plan. Inspect and use fall protection whenever working above 10'.

3

Communication Planning

1. New Hire Orientation

2. Hazard Communication Program

3. Safety Meeting Program

Worksite Safety Communications

Responsibilities for Leading Communications

Effective communication is needed to ensure that everyone has the information and training needed to work safely. It is the Superintendent's responsibility to develop and communicate hazard and control information to all XYZ employees on site. It is the foreman's responsibility to maintain on-going two-way communication about hazards with the general contractor, other subcontractors on site, and his/her crew.

Weekly Toolbox Safety Meeting

The foreman schedules meetings for a regular time, preferable at the beginning of the week, and leads the meetings. Meetings are planned for 10-15 minutes. All crafts workers are required to attend and participate. Time will be provided for craft worker input. A record of attendance and the topics covered will be filed in the site safety book and a copy forwarded to the office.

A topic for a brief training (5 – 10 minutes) will be pre-selected by the foreman in consultation with crewmembers. Safety issues affecting the crew, hazards of planned work, any accidents or incidents since the last meeting, and a review of project safety performance will be discussed.

Daily Briefing

The foreman will meet daily with all crafts workers before work begins to brief them on the days planned activities and to alert them to any particular safety hazards and controls. Crafts workers are encouraged to ask questions to ensure that they understand the expected hazards.

Hazard Reporting

It is everyone's responsibility to report hazards that they cannot immediately correct. Crafts workers will report hazards to their foreman. Foremen will ensure the prompt correction of hazards and will report those that he or she cannot correct immediately to the XYZ Builders safety coordinator or to the responsible contractor.

New Hire Safety Orientation

New employees must participate in a New Hire Orientation before they may begin work on any XYZ project. The purpose of the orientation is to ensure that the employee understands all company safety requirements and practices. The superintendent is responsible for orienting each new employee.

The following information has been conveyed to me:

- ❑ The company safety policy
- ❑ How to obtain, use and care for personal protective equipment.
- ❑ How to perform initial job assignments safely
- ❑ How to work safely with hazardous materials
- ❑ Actions to take in an emergency
- ❑ How to report injuries
- ❑ Blood Borne Pathogen training
- ❑ Location of first aid facilities
- ❑ How to report unsafe conditions

Before starting work I have been trained on:

- ❑ Chemical hazards
- ❑ General site safety
- ❑ The Site-Specific Fall Protection Plan
- ❑ Ladder safety
- ❑ Electrical safety
- ❑ Tool safety

I know that is my right to:

- ❑ Have a safe workplace
- ❑ Ask questions if I don't understand how to do a job safely
- ❑ Get help if I need it
- ❑ Report safety hazards and have them corrected

I know that it is my responsibility to:

- ❑ Report to work physically and mentally ready
- ❑ Attend weekly safety meetings and daily briefings

- ❑ Wear a hard hat and safety glasses at all times
- ❑ Wear appropriate clothing, including substantial ankle-supporting boots, at all times.
- ❑ Wear hearing protection in high noise areas
- ❑ Replace floor coverings and handrails immediately after entrance or exit.
- ❑ Inspect all electrical equipment and cords daily before use. Ground Fault Circuit Interrupters (GFCI) are mandatory on all jobs
- ❑ Maintain housekeeping in my area
- ❑ Correct or report any safety hazard that I observe
- ❑ Report any injury immediately to my foreman

Employees Signature

All information in this orientation checklist were explained to me.

Name_____

Signature_____

Date _____

Supervisor's Signature

I explained all items in this orientation to the employee

Name_____

Signature_____

Date _____

Hazard Communication Program (Hazcom)

The Hazcom program affects anyone who works with or around potentially hazardous chemicals. This program is intended to inform all supervisors and employees of potential chemical hazards from products used by any contractor at this worksite.

Hazardous Materials Inventory

A listing of all hazardous materials brought on site by XYZ builders is contained in the MSDS section of the job safety book located in the job trailer.

Labels

All containers received at this site and all secondary containers used at this site will contain a label listing the hazards of the contents. Do not attempt to use a chemical that is not readily identifiable. Chemicals can be transferred to unlabelled containers only for the immediate use of the person making the transfer.

Material Safety Data Sheets (MSDSs)

An MSDS for each chemical brought on site by XYZ Builders is contained in the MSDS section of the job safety book that is located in the job trailer. Other contractors may bring materials on site and are required to have MSDS on site for those products. Copies of those MSDSs may be obtained through the XYZ foreman.

Employee Training and Information

The job foreman will train all employees on the identity, use location, and hazards of all chemicals to which they may be exposed on this job. This includes those chemicals used by other contractors. Training will include safety hazards, symptoms of overexposure, short and long term health effects, and emergency response information.

Hazardous Materials Inventory

Job: _____ Foreman_____

Page No.__1__

Product	Manufacturer	Date Listed

Page No.____

Product	Manufacturer	Date Listed

Sample Letter for Requesting a Material Safety Data Sheet (MSDS)

Use with WAC 296-800-170

This sample form letter shows what information you need to include when requesting Material Safety Data Sheets (MSDSs) from a manufacturer or distributor. You can use this sample as a guide to develop your own form letter.

Sample Form Letter

Date of your request
Name of manufacturer/distributor you need the MSDS from
Their address
City, state, zip code
Their fax number if you make this request by fax

Subject: Material Safety Data Sheet Request (MSDS)

Please send us the (MSDSs) for the following product(s):

(1)

(2)

(3)

Our business needs the MSDS(s) listed above to comply with the Chemical Hazard Communication Standard, WAC 296-800-170. Please make sure that the MSDS(s) you send us meet the requirements of the Manufacturers, Importers and Distributors Hazard Communication Standard, WAC 296-62-054 (equivalent to 29 CFR 1910.1200, OSHA Hazard Communication Standard).

Thank you for your immediate response.

Sincerely,

Your name
Your company's name
Business address

Sample Labels for Hazardous Chemical Containers

Use with WAC 296-800-170

The sample labels on the following page show the type of information you must list on containers of hazardous chemicals. You can copy and use these labels or you can make your own.

Be sure your labels contain the following information:

- Name of Chemical
- Physical Hazards
- Health Hazards, Target Organs or Systems
- Optional information, such as Personal Protective Equipment or Safe Handling

After you've finished typing or writing in your information, print the labels. Then, cut out the individual labels and apply them to your hazardous chemical containers.

Chemical Labels

Use with WAC 296-800-170 Employer Chemical Hazard Communication

Name of Chemical

Physical Hazards

Health Hazards, Target Organs or Systems

Optional Information, such as Personal Protective Equipment or Safe Handling

Name of Chemical

Physical Hazards

Health Hazards, Target Organs or Systems

Optional Information, such as Personal Protective Equipment or Safe Handling

Name of Chemical

Physical Hazards

Health Hazards, Target Organs or Systems

Optional Information, such as Personal Protective Equipment or Safe Handling

Name of Chemical

Physical Hazards

Health Hazards, Target Organs or Systems

Optional Information, such as Personal Protective Equipment or Safe Handling

Name of Chemical

Physical Hazards

Health Hazards, Target Organs or Systems

Optional Information, such as Personal Protective Equipment or Safe Handling

Name of Chemical

Physical Hazards

Health Hazards, Target Organs or Systems

Optional Information, such as Personal Protective Equipment or Safe Handling

Material Safety Data Sheets

Safety Meeting Program

Safety Meeting Program

Safety meetings are an essential opportunities to discuss issues related to safety. Quarterly company safety meetings allow the president and key supervisors to review their progress toward achieving a safe workplace. Weekly site safety meetings allow the superintendent and foremen to inform their crews of ongoing safety issues, to review recent incidents, and to plan for upcoming work. Short training sessions that are keyed to the ongoing work are part of every weekly safety meeting. Daily safety briefings ensure that all crewmembers are aware of planned activities, risks and preventive measures.

Meeting Planning and Documentation

Company safety meetings are called quarterly by the President and are attended by all superintendents, foremen, and union representatives. Weekly safety meeting are called at the job level by the superintendent and are attended by all foremen and crafts workers. Daily safety briefings by the foremen are an integral part of the morning briefing.

Minutes of the quarterly safety meetings will be prepared and distributed to all attendees and posted on company bulleting boards. Minutes of weekly safety meetings will be prepared and posted on the site bulleting board for one week and then retained in the site safety book. A copy will be sent to the office. All minutes will be retained for one year.

Quarterly Company Safety Meeting

This meeting is scheduled and led by the President of XYZ Builders. The past years injury log will be reviewed and objectives for improved safety performance will be set at the first quarterly safety meeting of each year. The objectives of the meeting are:

- To identify and resolve recurring safety problems;
- To share information about hazards and safe work practices;
- To review recent safety audits;
- To review recent accidents and incidents in order to identify and their causes and prevent reoccurrences.

Weekly Site Safety Meeting

This meeting is scheduled and led by the superintendent. The objectives of these meetings are:

- To identify and resolve current site safety problems;
- To share information on current or upcoming site-specific hazards and related safe work practices;
- To review any site safety audit or accidents since the last meeting;
- To recognize outstanding safety performance when applicable
- To provide safety training related to current or planned work.

Daily Safety Briefing

This briefing is a required part of the morning job briefing and will inform workers about any new or unusual work activity in the area, any new chemicals that will be used, and any associated risks and protective measures.

SAFETY MEETING NOTICE

DATE: _____

TIME: _____

PLACE:

_____

_____

Safety Meeting Attendance

Job_____ Date:_____

Superintendent_____

	Name Printed	Signature	Craft	Company
1				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19				

Weekly Safety Meetings Minutes

Date: _____ **Job**

Location:_____

Meeting Leader_____

Agenda:

1. Review of previous meeting minutes

   Corrections

   _____
   _____
   _____
   _____

2. Unfinished business from last meeting

   _____
   _____
   _____
   _____
   _____

3. Serious hazards reported during this time period. Report the nature of the hazard, the immediate corrections made, and when made, and any site-wide fixes and date made or planned.

   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

4. Describe any serious injuries or near misses during the last meeting and what corrective actions have been taken to eliminate the root causes.

5. Other safety related topics discusses.

Job-Site Safety To Do List

Job Location: _____
Foreman: _____
Page No. _____

	Action	Person Assigned	Due	Completed
.				
.				
.				

4

Job Safety Packet

Prior to beginning any project, the superintendent will prepare and file a pre-job safety packet with the office. The packet includes:

- A Job Hazard Analysis and Site Specific Safety Plan that includes:
  - Job hazard analysis
  - Electrical safety plan
  - Housekeeping plan
  - Emergency response plan
  - Fire prevention plan

- A Hazard Communication Plan
  - Chemical inventory
  - MSDS file

- Special hazard plans as needed for:
  - Confined space entry
  - Use of powder actuated tools
  - Trenching

- Fall Protection Work Plan

Job Safety Analysis (JSA)

Pre-task planning is the key to injury free work. Identifying hazards and planning how to control them before work begins greatly reduces the chances of accidents occurring. This JSA guide will help you plan the work of your crew. After approval, it will become part of your job safety packet. You should use this analysis in orienting your crew to safe work practices.

How to do a Job Safety Analysis

Step 1. Most jobs can be broken down into steps. List each step in the first column of the form, giving enough information to describe the step. Only break the job down into the number of steps that are useful for identifying hazards and training employees.

Step 2. After you have listed all the job steps, go back and look at each step for hazards or potential hazards, and list them in the second column. Assume that there is no personal protective equipment being worn, even if you plan to require protection. Be sure that you have listed all significant hazards.

Step 3. For each hazard identified in step 2, ask the question "Can we change the way this job is done to eliminate this hazard?" Answers might include using shields, rearranging the work, or using fall protection. Write down your solution in the third column, opposite the hazard.

Step 4. If you are not satisfied that all identified hazards are controlled, contact the office for assistance.

Step 5. Plan for the controls called for in your plan. Be sure they are in place before beginning that work.

Step 6. Orient everyone in your crew to the safety plan.

JOB SAFETY ANALYSIS WORKSHEET 2

Job_____ Location_____ Paqe _____

Prepared by: _____ Approved by: _____

Date: _____

Sequence of basic job steps	Potential injuries or hazards	Recommended safe job procedures

JOB SAFETY ANALYSIS WORKSHEET 2
(continuation sheet)

Job_____ Location_____ Paqe _____

Date: _____

Sequence of basic job steps	Potential injuries or hazards	Recommended safe job procedure

JOB SAFETY ANALYSIS WORKSHEET 2
(continuation sheet)

Job_____ Location_____ Paqe _____

Date: _____

Sequence of basic job steps	Potential injuries or hazards	Recommended safe job procedure

Electrical Safety Plan

Job Location: _____

Foreman: _____

Date: _____

Power line Location	Voltage	Required Clearance	Deactivated? (date)

Jobs for which a qualified electrician will be required

_____

_____

_____

_____

_____

_____

Power Company Contact Number _____

Housekeeping Plan

Will XYZ builders be required to provide:

- ❑ Manpower for Cleanup? No Yes
  - How many _____
  - How often? _____
  - For how long? _____
- ❑ Trash containers No Yes
  1. Number _____
  2. Size _____
  3. Location _____
- ❑ Debris chutes No Yes
  1. Number _____
  2. Length _____
  3. Location _____
- ❑ Waste Disposal No Yes
  1. Amount _____
  2. Frequency _____

All XYZ Builders crafts workers are responsible for the segregation, collection and removal of the trash and debris that they produce unless other specific arrangements are made for trash removal. All crafts workers are responsible at all times for keeping walking and working surfaces in their work area free from an unsafe buildup of trash or debris.

Fire Prevention

The Foreman is responsible for implementation and enforcement of the fire prevention plan. Fire protection activities must be emphasized during all phases of construction.

Fire prevention requirements include:

- Avoid the accumulation of flammable rubbish. Remove trash from inside buildings at least daily. Burning of rubbish is prohibited
- All open flame devices and furnaces must have an attendant unless the device is equipped with combustion safety controls.
- Store combustible materials properly and away from incompatible materials and away from construction shacks or buildings.
- All empty propane, acetylene, oxygen and butane gas cylinders must be removed from buildings, marked empty (MT) and securely stored in an upright position.
- No spray painting or application of flammable chemicals within 50 feet of a possible ignition source.
- Maintain access to the site for fire apparatus and exit routes for personnel at all times.
- Smoking is permitted only in designated areas, and never inside buildings.

Fall Protection Work Plan

The foreman and crew assigned to any job are the most knowledgeable about the specific fall hazards of that job. The Fall Protection work Plan was designed for the foreman to use in preparing an activity-specific fall protection plan with his or her crew. A fall protection plan must be prepared any time an activity exposes workers to a fall of six feet or more. Having workers involved in the plan results in increased cooperation and compliance on the project.

After the Fall Protection Plan has been completed, a copy is forwarded to the office for review and modifications directed if necessary. A copy is kept on site in the Site Safety Plan Folder.

A monitor system can only be used after a thorough review and approval by the president of XYZ Builders.

General Requirements	A visual inspection by the user of all fall prevention equipment is required daily or before each use. A weekly inspection of all fall prevention equipment by the foreman is required weekly.
Overhead protection	Warning signs, barricades, and warning tape must be posted to caution workers of existing hazards. All floor openings must be covered with wood or metal. Debris nets or covered walkways will be used when that protection is needed.
Rescue Plan	If fall arrest systems are used, a rescue plan must be attached to the fall protection plan.

Fall Protection Work Plan

Job_____ Location_____ Paqe _____

Analysis prepared by: _____ Date: _____

Analysis approved by: _____ Date: _____

Fall Hazards	Type of Fall Protection	Specify Location

Fall Protection Plan Training Record

All employees are to receive instruction on the proper use of fall protection devices and the site-specific fall protection plan before they begin work. Workers attending this training will sign below.

Job Location _____

Foreman _____

Employee	Date

5

On-site Safety Guidelines

1. Foreman's Daily Safety and Health Checklist
2. Equipment Operator Certification
3. Scaffold Checklist
4. Cranes, Hoists and Rigging
5. Lockout/Tagout/Tryout
6. Confined Spaces
7. Trenching

Competent/Qualified Persons

Certain uniquely hazardous work situations require specific knowledge and experience and strict adherence to specific safety regulations. A knowledgeable person may be required to design and/or oversee worksite conditions or devices. These situations include trenching, confined space entry, asbestos work, scaffold erection and work at heights. Information provided here must be used under the guidance of a competent person. Certain designs must be developed by a qualified person.

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Qualified means one who, by possession of a recognized degree, certificate, or professional standing, or who be extensive knowledge, training and experience has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.

Foreman's Daily Safety and Health Checklist

1. Basics

- ❑ Safety briefing held
- ❑ Fire extinguishers marked and clear
- ❑ Emergency numbers posted and legible
- ❑ First aid kit fully stocked
- ❑ Qualified first aider present
- ❑ Temporary heating devices safe and ventilated
- ❑ Hazards from other trades known and controlled
- ❑ Lighting adequate in work areas
- ❑ Chemical hazards identified and controlled
- ❑ Noise controlled/ hearing protection used

2. Housekeeping and Sanitation

- ❑ Work areas generally neat
- ❑ Waste and trash regularly disposed
- ❑ Waste container present and used
- ❑ Trash chute in place if over 20" drop
- ❑ Walking areas clean and clear
- ❑ Adequate potable water available
- ❑ Sanitary facilities available and clean

3. Electrical

- ❑ GFCI in place and used
- ❑ Terminal boxes covered
- ❑ Cords protected and in good condition
- ❑ All live electrical lines identified
- ❑ 10' clearance to all equipment, scaffolds

4. Hand Tools

- ❑ Power tools wiring and grounding in good condition
- ❑ Hand tools in good condition
- ❑ Sequential trip nail guns only

5. Ladders

- ❑ Right length
- ❑ Secure
- ❑ Good condition
- ❑ Securely set up
- ❑ Climbed/ worked from safely

6. Fall Hazards

- ❑ Fall protection plan being followed
- ❑ Harness properly used where required
- ❑ All floor and wall openings covered
- ❑ Rebar capped
- ❑ No tripping hazards

7. Mobile Equipment

- ❑ Mechanical equipment safe checked
- ❑ Vehicular traffic controlled
- ❑ Spotter used when visibility restricted

Equipment Operator Certification

XYZ employees will operate transporting or elevating equipment (e.g. forklifts, scissor lifts, boomlifts) only after being trained and certified in its safe operation by a knowledgeable instructor.

General Precautions

- Check for and thoroughly read the operator's manual.
- Know and do not exceed the operating capacity of the equipment.
- Perform a walk-around inspection for unsafe conditions, such as:
  - Loose pins
  - Damaged tires
  - Leaking hoses or lines
  - Low fluid levels
  - Loose control levers
  - Damaged or missing seat belts
  - Damaged or missing lights
  - Damaged or missing operation instruments
  - Inoperative backup warning horn
  - Missing fire extinguisher
- Red tag and report any machine that is not fully functional or safe.
- Wear seat belts where provided
- When leaving the equipment, shut off the master switch and engage the parking brake, if provided.

Surface Hazards

Before moving through any area, check for and clear surface hazards, such as:

Covered opening
Holes, ditches and depressions,
Protrusions, such as piping
Uneven surfaces
Clutter and trash

Beware of surfaces covered with visqueen, tarps, plywood etc. Surface hazards may be hidden!

Stability and Travel

- Look in the direction of travel before and during movement.
- Back down grades when carrying a load.
- Sound horn when turning around blind corners.
- Watch for overhead obstructions.
- Do not operate elevating equipment near power lines
- Never override a "dead man" foot pedal.
- Never operate a lift on a slope greater that 5%
- Do not operate at the edge of a trench.

Extensions

- Do not use ladders, planks or other devices to extend the reach unless properly tied off to an independent anchorage point. Do not climb on a platform railing.
- Never attach a boom, basket, ladder assembly or other device to that might compromise the center of gravity of the equipment.
- Do not use a forklift to elevate workers unless a man-lift basket is installed. Do not permit additional crew members to enter a raised boomlift.
- When raising a load:
    - Make sure the equipment is on firm ground
    - Check for overhead obstructions
    - Check for adequate clearance and headroom
    - Use a signal person when lifting into an obscured vision situation such as over the edge of a building
    - Keep the load centered
    - Ensure that the lift platform is secured and that no cords, leads or hoses are hanging.

Operator Training Certification

I have been instructed and trained in the safe operating procedures for

_____ on _____.
Type of Equipment Date

_____
Signature

I _____acknowledge that
Instructors Signature

_____ is qualified and authorized
Employee's Name

to operate _____. _____
Equipment Type Date

Scaffold Safety Rules

1. General

   Before starting work on a scaffold, inspect it for the following:

   a. Are guardrails, toeboards, and planking in place and secure?

   b. Are locking pins at each joint in place?

   c. Are all wheels on moveable scaffolds locked?

2. Do not attempt to gain access to a scaffold by climbing on it (unless it is specifically designed for climbing) – always use a ladder.

3. Scaffolds and their components must be capable of supporting four times the maximum intended load.

4. Any scaffold, including accessories such as braces, brackets, trusses, screw legs, ladders, etc., damaged or weakened in any way, must be immediately repaired or replaced.

5. Scaffold planks must extend over their end supports not less than 6 inches nor more than 12 inches, unless otherwise specifically required.

6. Scaffold platforms must be at least 18 inches wide unless otherwise specifically required or exempted.

7. Where persons are required to work or pass under the scaffold, scaffolds shall be provided with a screen between the toeboard and guardrail, extending along the entire opening. The screen must be made of No. 18 gauge U.S. Standard wire, ½ inch mesh or equivalent protection.

8. All scaffolds must be erected level and plumb, and on a solid footing.

9. Do not change or remove scaffold members unless authorized.

10. Do not allow workers to ride on a rolling scaffold when it is being moved. Remove or secure all materials and tools on deck before moving.

11. Do not alter any scaffold member by welding, burning, cutting, drilling, or bending.

Scaffolding Checklist

Company: Inspected by: Date:

Location of Scaffold: Competent Person:

Employee safety depends on the proper erection and safe use of scaffolding. Know how to inspect a scaffold for proper erection. The following items should be visually checked prior to working from scaffolding on a daily basis.

		Yes	No	NA
1.	Have personnel been trained in the safe use of this equipment?			
2.	Is the footing of the scaffolding sound and rigid, capable of supporting the necessary weight? (Unstable objects such as bricks or blocks must not be used for support.)			
3.	Did competent persons erect, dismantle, or move the scaffold?			
4.	Are the scaffold and its components capable of supporting at least 4 times the intended load?			
5.	Are guardrails 2" x 4" (or equivalent), 42" high top rail, and 21" high mid rail, with supports not to exceed 8"? (Could a 19 inch sphere pass through each opening?)			
6.	Were weakened or damaged scaffold components immediately repaired or replaced?			
7.	Is the maximum span for 2" x 12" scaffold planks 8 feet?			
8.	Do all scaffold planking or platforms extend over their end support at least 6" but no more than 12", and are they secured from movement?			
9.	Is there an access ladder or other safe access?			
10.	Is there overhead protection provided on a scaffold exposed to overhead hazards?			
11.	Is the wire rope used for suspended scaffolds capable of supporting six times the intended load?			
12.	Are handrails, mid rails, and toe boards installed on all open sides and ends of platforms, more than 4 feet above the ground or floor?			
13.	Are all scaffold surfaces smooth, free from slivers, nail heads and other protrusions?			
14.	Are the poles, legs, and uprights of the scaffold plumb and rigidly braced to prevent swaying and displacement?			
15.	Is the scaffold properly braced by cross-bracing or diagonal braces, or both, for securing vertical members together?			
16.	Where uplift may occur, are vertical members locked together by pins or other equivalent suitable means?			
17.	Is the scaffold securely guyed or tied to a building or structure when the height exceeds four times its minimum base dimension?			

Scaffolding
Checklist

		Yes	No	NA
18.	Are sills properly placed and of adequate size? (12" x 12" minimum)			
19.	Have screw jacks been used to level and plumb scaffold instead of unstable objects, such as concrete blocks or loose bricks?			
20.	Are base plates and screw jacks in firm contact with sills and frame?			
21.	Is scaffold level and plumb?			
22.	Has scaffold been tied to structure at least every 30 feet in length and 26 feet in height? (minimum)			
23.	Have free-standing towers been guyed or tied every 26 feet in height or 4 times the base width?			
24.	Have brackets and accessories (wheel locks) been properly placed with all brackets, putlogs, tubes and clamps, and nuts and bolts tightened?			
25.	Is the scaffold free of makeshift devices or ladders to increase height?			
26.	Are working level platforms fully scaffold planked between guardrails?			
27.	Are toe boards installed properly?			
28.	Have hazardous conditions been provided for, such as wind loading, or possible washout of footings?			
29.	If the work platform is over 4 feet off the ground or floor and standard handrails are not being used, is the width of the work platform 45" or greater?			
30.	If the work platform is over 4 feet off the ground or floor, standard handrails are not being used, and the width of the work platform is less than 45", are employees tied off 100% of the time?			
31.	In the above situation, are employees using a full body harness with a 6-foot double-locking snap-hook lanyard that is secured to a structural member that can withstand a 5000-pound load?			
32.	If the scaffold is erected below or next to electrical power lines, have precautions been taken to keep the scaffold and all possible tools being used at least 10 feet from the power lines? If so, please list precautions taken below this checklist.			
33.	If scaffold is erected in high traffic areas, such as route for forklifts, have precautions been taken to prevent collision? If so, please list precautions taken below this checklist.			
34.	If scaffold is erected near an excavation or on a permanent elevation, have precautions been taken to prevent the scaffold from collapsing into the excavation or from falling off the elevation? If so, please list precautions taken below this checklist.			
35.	If the scaffold is draped with visqueen, tarps, nets, or plywood guard rails, the scaffold shall be engineered to withstand potential wind loads.			

Cranes, Hoists, and Rigging

Safe Crane Operating Procedures

1. Keep crane, boom lines and loads at least 10 feet away from electrical power lines.
2. Do not exceed the manufacturer's rated capacity listed on the load chart inside the crane cab.
3. Check that the crane is set up on solid footings and outriggers are fully extended. Tires must be off the ground when making picks.
4. Barricade around counterweight swing area.
5. Avoid swinging loads over workers heads. Use tag lines.
6. Use safety latches on all crane hooks.
7. Do not ride the crane's hook or load.

Crane Operation

The superintendent is responsible for ensuring that manufacturer and regulatory requirements are met in the operation and servicing of cranes, and for the selection and training of operators. Only trained and designated personnel may operate cranes, boom lifts and other hoisting devices.

Cranes may be operated by:

1. Designated operators who are trained, qualified and assigned to a piece of equipment.
2. Trainees under the direct supervision of the designated operator.
3. Maintenance and test personnel who are trained and qualified to operate the equipment.

Operator Requirements

1. The operator must read and understand the Operators and Maintenance Manual supplied with the crane.
2. The operator must be skilled and experienced in the operation of cranes and must be thoroughly familiar with the controls, power system, and capabilities of the specific model.
3. Operation of the machine must at all times be in accordance with the capacity charts, rigging drawings, and wire rope chart applicable to that machine.
4. booms, jibs, and pendants must be properly assembled and maintained as described in the Operator and Maintenance Manual.

5. The machine must receive regular maintenance and inspection as outlined in the Operator and Maintenance Manual
6. The machine must not be operated in an out-of-level position.
7. Operators must make thorough daily visual inspections and report deficiencies and defective parts should be replaced before the crane may be used.
8. Operators must practice good housekeeping on cranes.
9. Only one person should give standard crane signals at a time.
10. Operators must never leave the crane when a load is suspended.
11. Cab engines must never be left running.
12. Attachments used with cranes must not exceed manufacturer's recommendations.
13. A hydraulic crane boom must be telescoped equally at all times.
14. Hydraulic cranes must not be traveled with a load.
15. Use only pendant lines purchased from the crane manufacturer.
16. Handle all booms with nylon slings.
17. Booms must be repaired in accordance with the manufacturers recommendations. A mechanic certified in crane repair must perform all repairs.
18. Use only wire rope recommended by the crane manufacturer.
19. Wire rope is taken out of service when:
    a. When a running rope has 6 randomly distributed broken wires in one lay or has 3 broken wires in one strand of one lay.
    b. When 1/3 of the original of the original diameter of the outside wire has worn away.
    c. When kinking or crushing results in distortion of the rope structure.
    d. When there is evidence of heat damage.
    e. When standing ropes, such as pendants, have more than one broken wire.

Traveling a Crane

1. When traveling a crane, the load block must be tied back to the machine's rotating bed.
2. When rigged with more than one line, the unused lines must be tied back.
3. When traveling crawler cranes up and down slopes, a tractor must be used as an auxiliary brake.
4. A signal person must be used when traveling or maneuvering in tight quarters.
5. The use of two or more cranes for a single pick is not recommended. If this is necessary careful planning is mandatory. It is best to use cranes of the same manufacturer, size, model, and rigging.

Rigging Safety

All employees engaged in rigging must be trained in safe rigging procedures. All rigging operations must be planned and supervised by competent personnel to ensure that the best methods and suitable equipment are used. Preplanning the lift from start to finish eliminates many of the hazards.

Points to remember:

1. Determine the load weight before rigging.
2. Know, and do not exceed, the safe working load of all the rigging equipment (visible tag found on rigging).
3. Inspect all equipment before using it and destroy defective equipment.
4. If there is any doubt about the safety of affected personnel during the lift, immediately discontinue the rigging or hoisting operation.
5. Keep the load directly below the boom point or upper load block.
6. Keep hoist lines on suspended loads plumb, with load freely suspended. If the hoist line is not plumb at all times a side load can occur, causing stresses for which the equipment is not designed. Structural failures can result without warning.
7. The operator may refuse to pick any load he/she feels is unsafe.

Sample
Critical Lift Checklist

Basis for critical lift:

(a) Load exceeds 80% of load chart

or

(b) Load exceeds 50% of load chart, and failure would endanger existing facility or equipment.

(c) Two crane picks

The following information shall be provided to Project Superintendent 24 hours prior to the lift"

Notification Date: _____ Date of Lift: _____

Contractor: _____

Superintendent: _____

Crane Operator: _____

Location of Lift: _____

Description and Total Weight (in lbs.) of Item to be lifted: _____

Type and Size of Crane:

Boom Length: _____ feet Boom Angle: _____ degrees

Radius: _____ feet Jib Used: Yes ___ No ___

Allowable Load (attach copy of crane's load chart) _____ (in lbs.)

Clearance between Boom and Load: _____ feet

Clearance to Surrounding Facilities: _____ feet

Any obstructions in path of load (if Yes – describe) _____

Crane Attachments:

	Weight (in lbs.):
Jib	_____
Main Block	_____
Auxiliary Block	_____
Main Hoist Cable	_____
Auxiliary Hoist Cable	_____
Rigging	_____
Miscellaneous	_____
Item to be Lifted	_____
Total Weight of Lift (in lbs.)	_____

Capacity of Chokers: Straight Lift: _____ in lbs.

Angled Lift: _____ degrees _____ in lbs.

Type of Soil Conditions: _____ Hard _____ Soft _____ Fill Dirt

Mats or Cribbing Required: ___ Yes _____ No

Approved by

Project Superintendent: _____

Name

Lockout/Tagout/Tryout

When to use LTT

When maintenance, repair, or relocation of machinery is necessary, turning off or unplugging machinery does not provide adequate protection for employees working on or with that equipment. Serious accidents can occur when someone mistakenly thinks that the machine or energy source is safely turned off. These rules provide for assured control of machine or equipment activation.

Attaching locks and tags to equipment

Before any work begins on any equipment, the main control switch must be locked and tagged in a de-energized position. An attempt must be made to operate the effected piece of equipment to ensure the correct power source has been disabled.

If the contractor is not the general contractor add:

The superintendent will obtain a copy of the general or higher-level contractor's lock out program, if available, and will:

1. Ensure that all aspects of the plan are at least as protective as the XYZ plan.
2. Provide training for all effected foremen and trades workers

If the contractor is acting as the general add:

All subordinate contractors will be required to follow the XYZ procedure.

When placing or removing locks and tags, follow these steps:

1. The employee obtains a "DO NOT OPERATE" tag and a lock. The employee then signs the tag.
2. Enter the lock and tag number, date, employee's name, foreman's name, and switch description.
3. Each employee attaches a numbered and assigned lock and tag on the proper control switch. After tags and locks are in place, an attempt is made to activate the equipment to determine that the correct power source is locked out.
4. When more than one lock is attached, a multiple lock adapter is used to ensure that the switch cannot be activated until all locks have been removed.

Removing locks and tags from equipment

When authorized employees have completed work on the equipment, these steps must be followed to remove locks and tags:

1. Inspect the area to verify that all tools have been removed from the equipment. Notify all affected persons that the equipment is to be restarted.
2. Each employee removes his or her own lock.
3. The locks are then returned to the lock board or other authorized storage area. Both the lock and the tag are signed off in the log.

Only the superintendent is authorized to remove another person's lock and only in an emergency or in the absence of the employee. The lock may be removed under the direction of the superintendent only after a safety inspection has been conducted.

Confined Space

Definition:

A confined space must:

- Be large enough for personal entry
- Have limited means of entry and exit
- Not be designed for continuous occupancy

Classification of Confined Spaces:

- Non-permit required confined spaces do not contain potential hazards
- Permit required confined spaces are hazardous to enter and require special safety precautions before and during entry

Signage

All access opening to confined spaces must be posted with signage indicating that they are confined spaces.

Confined Space Entry Requirements

All permit required confined spaces must have:

- A retrieval system
- A competent person assigned to:
  - Monitor workers inside the space
  - Operate the retrieval system
  - Remain as an outside base for the communication system required in all confined spaces

Job Hazard Analysis

A job hazard analysis form must be completed and all personnel involved in the entry trained by the foreman on the hazards associated with the entry and the work to be performed. A permit must be completed and posted prior to entry.

Testing for Hazards

All necessary testing, safety requirements, and assembling of personal protective equipment is completed prior to entry into the confined space. A competent person must perform the monitoring for oxygen, carbon monoxide, hydrogen sulfide and lower explosive limit. Results of this testing must be documented. If toxins are detected during monitoring, ventilation must provide at least 5 complete air changes and the space retested with acceptable results before workers may enter the confined space.

Ventilation, Entry, and Monitoring

Provided that no toxins are found in the gas monitoring process, ventilation is established and workers are allowed to enter the confined space. A positive communication system is established between the crew in the space and the person assigned to monitor outside the entrance. Under no circumstance may the monitor leave their station while any person is inside the confined space. The monitor may have no other duties other then monitoring. The monitor must be trained in communication skills in addition to safety measures should and emergency arise. Continuous testing must be performed by placing a continuous reading device in the space on or near the workers.

Should a hazardous atmosphere is found to exist in the confined space at any time, (indicated by testing or the monitoring alarm sounding) workers will exit the space and a minimum of five air exchanges of ventilation provided prior to retesting. Ventilation will continue until atmospheric conditions are acceptable. All air testing must be documented.

Emergency Conditions

If a confined space occupant requires emergency aid the monitor must immediately active the retrieval system. <u>The monitor must not enter the confined space at any time.</u>

Upon Completion

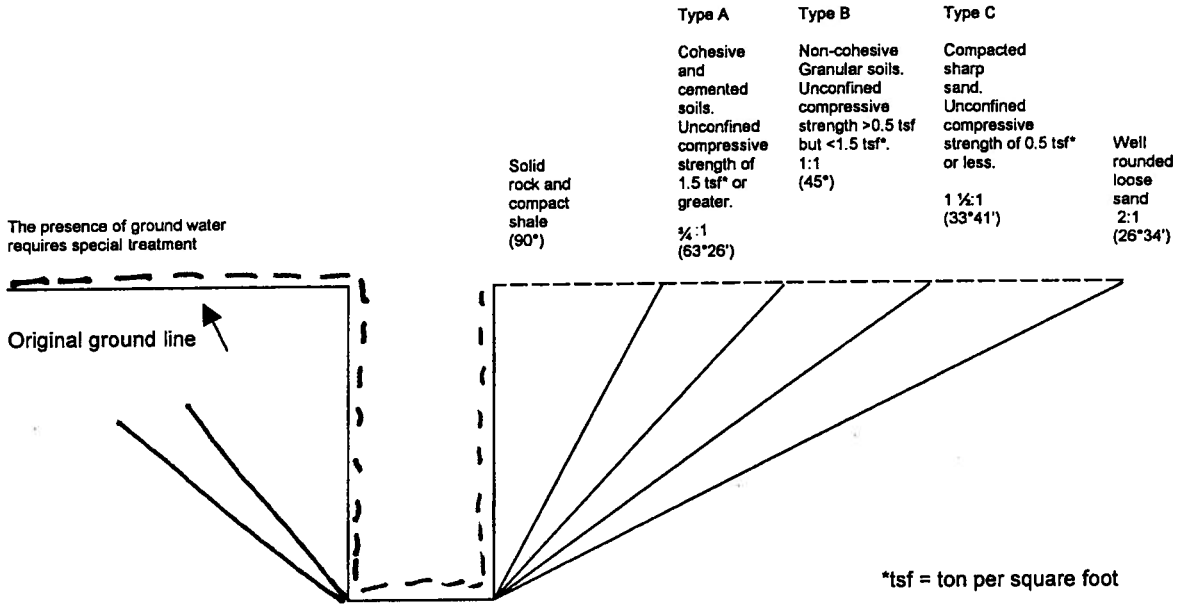
Upon completion of all work in the confined space, the space is sealed and posted with confined space signage. All entry documentation must be kept on file for one year.

Trenching and Excavating

1. The determination of the angle of slope and design of the supporting system shall be based on careful evaluation of pertinent factors, such as:

    a. Depth and/or cut/soils classification
    b. Possible variation in water content of the material while excavation is open
    c. Anticipated changes in materials from exposure to air, sun, water, or freezing
    d. Loading imposed by structures, equipment, or overlaying or stored material
    e. Vibration from equipment, blasting, traffic, or other sources

Approximate Angle of Slope
For sloping of sides of excavations



2. Walkways or bridges with standard railings **must be provided** when employees or equipment are required to cross over excavations.

3. The walls and faces of all excavations in which employees are exposed to danger from moving ground **must be guarded** by a shoring system, sloping of the ground, or some other equivalent means.

4. **No person must be permitted** under loads handled by power shovels, derricks, or hoists.

5. **All employees must be protected** with personal protective equipment for the protection of the head, eyes, respiratory system, hands, feet, and other parts of the body.

Motorized vehicles and equipment

1. Do not ride on motorized vehicles or equipment unless a proper seat is provided for each rider.
2. Always be seated when riding authorized vehicles (unless they are designed for standing).
3. Do not operate any motorized vehicle or equipment unless you are specifically authorized to do so by your supervisor.
4. Always use your seat belts in the correct manner.
5. Obey all speed limits and other traffic regulations.
6. Always be aware of pedestrians and give them the right-of-way.
7. Always inspect your vehicle or equipment before and after daily use.
8. Never mount or dismount any vehicles or equipment while they are still in motion.
9. Do not dismount any vehicle without first shutting down the engine, setting the parking brake and securing the load.
10. Do not allow other persons to ride the hook or block, dump box, forks, bucket or shovel of any equipment.
11. Each operator must be knowledgeable of all hand signals and obey them.
12. Each operator is responsible for the stability and security of his/her load.

6

Emergency Response

Emergency response training

All crafts workers must be briefed on the emergency response plan, including the Blood Borne Pathogen Policy and must know the identity of the currently certified and willing first aid providers on site before beginning work. Training must include the location of emergency numbers, telephones, and first aid supplies.

The Superintendent will ensure that the following medical resources are available on all XYZ Builders' jobsites. These resources include:

- Occupational medical clinics within a reasonable transport time from the job site. The name and location of the facility will be posted.
- All XYZ Foremen and supervisors must carry current first aid and CPR certification.
- A list of all currently certified and willing first aid providers on the site to be posted on the bulletin board.
- First aid supplies in accordance with OSHA regulations.
- Confirmed that emergency transport will be available by calling "911" and post a "call 911" poster on the bulletin board and in other conspicuous locations. If 911 service is not available the foreman must confirm alternative emergency transportation and post the access number.

When an injury occurs on site the foreman will:

- Assess the seriousness of the injury
- Stabilize the condition of the injured person as much as possible
- Send someone to call for help
- Have a runner stationed at the entrance to the site and place other runners at key points along the route as needed to guide emergency medical personnel to the proper location.
- Notify the office of the injury

Transportation

- The foreman will transport or arrange transportation for employees with non-emergency injuries to and from the medical facility.

- All seriously injured persons will be transported using "911" or pre-arranged alternative professional emergency medical services

Injury management

Conditions that require emergency medical assistance are listed below. Other conditions may also require emergency assistance. Emergency medical care is required if the person:

- Is unconscious or disoriented
- Is unable to walk
- Is trapped in machinery or debris
- Has a head injuries
- Has a crushing injuries
- Was injured by electricity
- Has fractures or possible fractures
- Has dislocated joints or possible dislocations
- Was injured by a chemical release or accident
- Has experienced a fall from elevation
- Has been burned causing blistering or worse
- Has difficulty breathing or has chest pains
- Responds with intense or unexpected symptoms following a seemingly minor injury.

Non-referred medical care

Any employee who obtains outside medical treatment for an on the job injury or illness must report the injury and the name of the attending physician to his/her foreman not later than the first workday following the treatment.

Medical Recordkeeping

The following reports must be completed, filed, and maintained:

- Supervisors Report of Accident

- Employer's First Report of Injury

- OSHA Injury and Illness Log

Accident Investigation

All incidents that result in injuries or illnesses being treated by a physician must be thoroughly investigated by the foreman and superintendent. In addition, first aid cases and near misses that could have resulted in serious injury must also be investigated. The president of XYZ Builders will review the accident investigation reports of all lost time accidents. All accident reports will be reviewed at the monthly safety meeting.

The purpose of accident investigation is to identify contributing causes so the future incidents of a similar nature can be prevented. Investigations should be directed toward fact finding, not fault finding. If all the facts involved in an accident are known, it should be possible to determine what actions are necessary to prevent injury to other employees with similar duties or exposed to similar conditions.

The XYZ Builder's Accident investigation form must be used to guide the accident investigation. The accident investigation should begin as soon as possible after the emergency has been resolved.

Emergency Information

For Fire Call_____

For Medical Call_____

1St Aid Providers on Site

_____

_____

_____

_____

_____

1St Aid Supplies location(s)

_____

_____

_____

_____

Incident Investigation Report

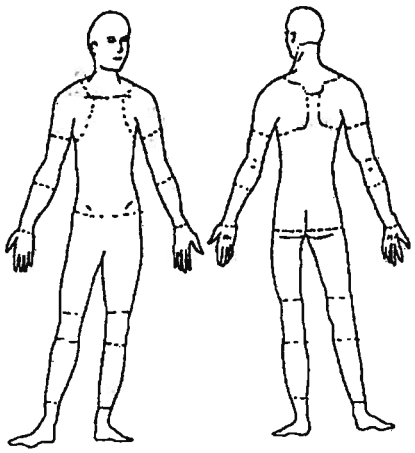
Instructions: Complete this form as soon as possible after an incident that results in serious injury or illness. (Optional: Use to investigate a minor injury or near miss that *could have resulted in a serious injury or illness.*)

This is a report of a: ❑ Death ❑ Lost Time ❑ Dr. Visit Only ❑ First Aid Only ❑ Near Miss	
Date of incident:	This report is made by: ❑ Employee ❑ Supervisor ❑ Team ❑ Final Report

Step 1: Injured employee (complete this part for each injured employee)

Name:	Sex: ❑ Male ❑ Female	Age:
Department:	Job title at time of incident:	

Part of body affected: (shade all that apply)



Nature of injury: (most serious one)
- ❑ Abrasion, scrapes
- ❑ Amputation
- ❑ Broken bone
- ❑ Bruise
- ❑ Burn (heat)
- ❑ Burn (chemical)
- ❑ Concussion (to the head)
- ❑ Crushing Injury
- ❑ Cut, laceration, puncture
- ❑ Hernia
- ❑ Illness
- ❑ Sprain, strain
- ❑ Damage to a body system: (e.g.: nervous, respiratory, or circulatory systems)
- ❑ Other _____

This employee works:
- ❑ Regular full time
- ❑ Regular part time
- ❑ Seasonal
- ❑ Temporary

Months with this employer

Months doing this job:

Step 2: Describe the incident

Exact location of the incident:	Exact time:

What part of employee's workday? ❑ Entering or leaving work ❑ Doing normal work activities ❑ During meal period ❑ During break ❑ Working overtime ❑ Other

Names of witnesses (if any):

Number of attachments:	Written witness statements:	Photographs:	Maps / drawings:

What personal protective equipment was being used (if any)?

Describe, step-by-step the events that led up to the injury. Include names of any machines, parts, objects, tools, materials and other important details.

Description continued on attached sheets: ❑

Step 3: Why did the incident happen?

Unsafe workplace conditions: (Check all that apply)
- ❑ Inadequate guard
- ❑ Unguarded hazard
- ❑ Safety device is defective
- ❑ Tool or equipment defective
- ❑ Workstation layout is hazardous
- ❑ Unsafe lighting
- ❑ Unsafe ventilation
- ❑ Lack of needed personal protective equipment
- ❑ Lack of appropriate equipment / tools
- ❑ Unsafe clothing
- ❑ No training or insufficient training
- ❑ Other: _____

Unsafe acts by people: (Check all that apply)
- ❑ Operating without permission
- ❑ Operating at unsafe speed
- ❑ Servicing equipment that has power to it
- ❑ Making a safety device inoperative
- ❑ Using defective equipment
- ❑ Using equipment in an unapproved way
- ❑ Unsafe lifting by hand
- ❑ Taking an unsafe position or posture
- ❑ Distraction, teasing, horseplay
- ❑ Failure to wear personal protective equipment
- ❑ Failure to use the available equipment / tools
- ❑ Other: _____

Why did the unsafe conditions exist?

Why did the unsafe acts occur?

Is there a reward (such as "the job can be done more quickly", or "the product is less likely to be damaged") that may have encouraged the unsafe conditions or acts? ❑ Yes ❑ No
If yes, describe:

Were the unsafe acts or conditions reported prior to the incident? ❑ Yes ❑ No

Have there been similar incidents or near misses prior to this one? ❑ Yes ❑ No

Step 4: How can future incidents be prevented?

What changes do you suggest to prevent this injury/near miss from happening again?

❑ Stop this activity ❑ Guard the hazard ❑ Train the employee(s) ❑ Train the supervisor(s)

❑ Redesign task steps ❑ Redesign work station ❑ Write a new policy/rule ❑ Enforce existing policy

❑ Routinely inspect for the hazard ❑ Personal Protective Equipment ❑ Other: _____

What should be (or has been) done to carry out the suggestion(s) checked above?

Description continued on attached sheets: ❑

Step 5: Who completed and reviewed this form? (Please Print)

Written by: Department:	Title: Date:
Names of investigation team members:	
Reviewed by:	Title: Date:

7

SAFETY FIRST with…
Worksite Hazards

Contractor

Annually

- Audit the injury/illness log.
- Post the injury log during February.
- Review safety performance with all managers and foremen.
- Set safety goals.

Monthly:

- Visit each site to check safety.
- Lead a company management safety meeting.

Foreman

Pre-job:

- Perform a hazard assessment.
- Plan-in writing- how to control all identified hazards.
- Plan for the right equipment for the job.
- Plan for housekeeping and waste disposal.
- Prepare a chemical inventory. Obtain MSDSs for all chemicals that you'll use.
- Read the MSDSs and inform your crew of all hazards and proper control methods.
- Set up an MSDS file and keep in a worker accessible location at the job site.
- Train all workers on the safety plan..
- Be first aid/CPR qualified.
- Ensure that competent persons will be present when required.

Weekly:

- Hold a crew safety meeting.
- Inspect all safety related equipment.

Daily:

- Ensure that the worksite is well lighted.
- Brief your crew in the morning – point out any special safety hazards.
- Have materials delivered as close as possible to where they will be used.
- Check for safety hazards produced by other trades on site. Have hazards fixed or controlled.
- If other trades use chemicals, ensure they have MSDSs. Brief your crew on the hazards.
- Spot check equipment and site for safety hazards.
- Have all safety hazards that you find, or that are reported to you, fixed immediately.

Trades Workers

Pre-job:

- Understand the company's safety program and site-specific safety plan.

Daily:

- Report to work physically and mentally ready to work safely.
- Follow all safety rules.
- Wear all required safety equipment.
- Do not wear loose or dangling clothing or jewelry.

Before each task

- Know how to do the job safely. If you don't know – ask!
- If you need help—get it!
- Check that you have the right tools for the job and that they are in good repair – no loose or cracked handles, no mushroomed heads on impact tools, no dull blades or bits, no damaged cords or ladders.
- Use grounded, double-insulated power tools.
- Make sure that you have the PPE that you need. Always wear a hard hat and eye protection, hearing protectors when it's loud.
- Check your work area for secure support and footing.
- Make sure that other workers' tools or materials can't fall or fly at you.
- Correct any hazard you find before beginning work. Report any hazards you can't correct to the foreman.
- Know the hazards of any chemicals you use or that are used near you. Use the right protection..

As you work

- Look out for your self, your fellow workers and the public.
- Keep your area clear of waste and trash accumulation.

SAFETY FIRST with…
LADDERS

Contractor

- Provide ladders of the right type, strength, and length
- Ensure that ladders are properly stored and maintained.
- Require ladder safety training
- Audit ladder safety

Foreman

On each job:

- Secure the right number, type, length, and strength ladders for the planned work
- Use ladders with non-slip footing
- Inspect all ladders for structural wear
- Brief all trades people on safe ladder use

Weekly:

- Inspect all ladders for wear; destroy broken ladders.

Daily:

- Spot check ladder set up and use.

Trades Workers

Daily:

Pick the right ladder

- No metal ladders near electrical hazards
- Pick the right length ladder for the job (see label)
- Pick the right strength for the load (see label)

Inspect the ladder

- No cracks in side rail
- No broken/bent/missing rungs
- No grease, oil, mud, ice etc
- Spreader in place and locks (stepladders)

Set it up right

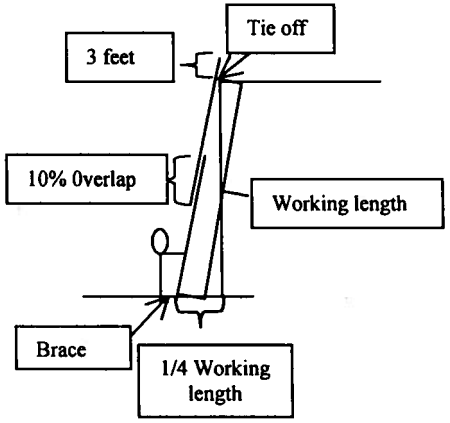
- Avoid overhead wires
- Set up on a firm, level base
- Don't set up near exposed rebar
- Avoid traffic areas or guard the base
- Don't put the ladder on top of anything
- Set up 1 foot away from the wall for every 4 feet of working height. Your palms should reach the rungs at shoulder height when your toes are on the side rails.
- Keep at least a 10% overlap on extension ladders
- Tie off the top, brace the bottom
- Keep the top and bottom access area clear

Climb smart

- Always face the ladder when going up or down
- Check for stability before you climb
- Always keep 3 points of contact with the ladder (hands free!). Keep tools in a tool belt. Use a rope to hoist supplies.
- Stay centered. Keep your belt buckle inside the rail.
- Don't stand on top three rungs of a single or extension ladder
- Do not stand on the step below the top cap of an extension ladder
- Get off the ladder to move it

Move it right

- Get off the ladder to move it
- Lower extension ladders before moving
- Use two people to carry long ladders



SAFETY FIRST with…
Fall Protection

Contractor

- Know when fall protection is required
- Have a qualified person develop a fall protection plan if standard fall protection equipment can not be used
- Provide and maintain personal fall protection equipment
- Audit the fall protection program monthly during site visit

Foreman/ Competent Person

Pre-job:

- Determine fall protection needs
- Prepare site-specific fall protection plan
- Plan for anchorage points
- Train trades workers on fall protection plan
- Train trades workers on use of fall protection equipment

Weekly:

- Inspect all fall protection equipment
- Update fall protection plan with qualified person
- Identify controlled access zones (CAZ) and persons permitted to enter

Daily:

- Ensure the immediate guarding or covering of:
  - Wall openings less than 39" above working surface
  - Floor opening and holes
  - Stairs (hand rail and stair rail)
- Spot check use of PFP equipment. Discard any that is damaged, worn, or that has arrested a fall.

Trades Workers

Pre-job:

- Know how to use personal fall protection
- Learn about the site-specific fall protection program

Daily:

- Be sure that your working surfaces are clean and secure
- Wear personal fall protection and tie off when above 6' (unless FPP in place)
- Inspect:
  - Body harness (no belts!)
  - Lanyard
  - Life line
  - Attachment point
- Wear harness properly, with D-ring to the back.
- Use an attachment point at least as high as the connection point on the harness.
- Don't use knots to tie off
- Don't run lanyard or lifeline around an I-beam or other sharp edge.
- Only one attachment to a vertical lifeline
- Store fall protection equipment properly
- Cover and mark holes in the work surface immediately.

SAFETY FIRST with…
Electrical Hazards

Contractor

- Ensure that qualified electricians are hired to perform any electrical work.
- Require GFCI on all outlets.

Superintendent

Pre-job:

- Determine the location and voltage of all power lines on the site.
- Train all trades workers on electrical safety.
- Ensure that qualified electricians are available for any electrical work.
- If 10' distance can not be maintained from all power lines (35' if over 5,000 V) at all times, have the power company shut off or insulate the line.
- Contact the power company before digging.

Foreman

Daily:

- Spot-check equipment, tools and cord sets for insulation and grounding.
- Ensure that skirted plugs are used on equipment operated above 300V.
- Have any digging within 4' of power lines done by hand.
- Guard any temporary lights within 7' of the work surface.

Trades Workers

Pre-job:

- Learn about electrical safety.

Daily:

- Do not work on electrical equipment unless you are qualified.
- Use only grounded or double insulated tools.
- Use only GFCI protected outlets.
- Cords: do not staple, hang on nails, immerse in water or expose to vehicle traffic.
- Inspect tools and electrical cords for insulation and grounding. Remove from service if damaged.
- Never remove round plug from power cords.
- Never attach 2-prong adapters to 3-prong plugs.

On each task

- Check for power lines (overhead, underground, within walls) before beginning work.
- Lockout electrical before working on energized systems.
- Keep 3' of free space around live parts of electrical equipment.
- Never use metal ladders near power lines.
- Never use metal tapes, ropes, or long tool handles near electrical equipment.

Equipment operators

- Always check for power lines (above and below ground if digging!)
- Maintain safe distance at all times.
- If your view of a power line is obscured, use a dedicated observer.

Appendix II

Site Safety Observation Protocol

1.Site Visit Coordination and Entry

1.1 Observers .

Site observations will be made only by trained observers using the Site Observation Form and this protocol.

1.2 Frequency of Visits.

Observations will be attempted at least six times per year per participating contractor. Site visits will be targeted for every other month, but the rate of visitation may vary depending upon the amount or seasonality of each contractor's work. Additional site visits may be conducted.

1.3 Coordination

Site visits will be coordinated with the participating contractor. The observer and contractor should agree on a one-week window for the visit. The contractor will provided a list of all his/her jobs active during that time period and to inform site managers of a possible visit. The observer will then independently select the site(s) to be visited and the visit date. The observer will not specify the exact time of the visit, nor which site will be visited unless advance clearance is required by the site owner or a higher level contractor. If advanced notice is provided, a note to that effect will be made in the site safety observation forms note section.

1.4 Site Entry

Upon reaching the observation site, the observer will immediately notify the site superintendent or his/her representative. The observer will explain the purpose of the visit, that the site observations are made for research purposes only, that the site identity will not be uniquely associated with the data collected, and that the data sheet will be held confidential by the research team. The observe will also explain that the visit does not constitute a safety audit and that not all safe or unsafe conditions will be targeted for observation.

During the walk around the observer may be accompanied by a site representative or representatives. If so, the observer may briefly explain the data collection process.

1.5 Observer Safety

The observer will inquire about any site specific safety rules related to their presence on site. While on site visits, the observer will wear appropriate work attire, (work clothing, boots, hard hat, safety glasses, and ear plugs when required). General and site specific safety rules will be followed at all times.

2. Data Collection

2.1 Observational data

2.1.1 Extent of observation

The Site Safety Observation Sheet groups the indicators of safe work conditions and actions under headings (e.g. Fall hazards) and sub-headings (Protection, Ladders, etc).Work site observations will be restricted to those items contained on the site safety observation sheet. Criteria for evaluation are contained in Section II of this protocol. Only conditions and actions actually observed will be evaluated and recorded.

The observer will determine from the superintendent or his/her representative the physical extent of the participating contractor's work area, and the type and phase of the job. The observer will make every effort to observe the entire area of the contractors work and to observe and evaluate ten (10) instances of each safety indicator on the site safety observation sheet. If the job site is too large to cover completely, the observer will determine a start and finish point prior to beginning the walk through.

2.1.2 Recording Observations

For each instances evaluated to be "safe" a circle will be filled in the corresponding data row. An "X" will be marked through a circle for each instance judged to be unsafe. All instances observed must be evaluated and recorded. If more than ten instances are observed for any item, up to three additional circles may be hand drawn in a row or rows. Beyond three additional observations per row, an additional data sheet must be used to maintain form clarity.

At the entry meeting, the observer will ask to see the site safety program and will determine if there is an adequate site specific job safety analysis, hazcom plan, and fall protection plan. Each plan is rated adequate (filled circle) or inadequate (X).

Field items will be observed and evaluated as they appear on a walk-through inspection. Only conditions or actions actually witnessed by the observer will be evaluated. No worker will be asked to perform or repeat any task. The observer may spend as much time in each area as he/she deems necessary to observe work but may not return to a previously evaluated area. Conditions that are viewable from a distance, such as ladder climbing , may be evaluated in any area at any time.

Circles are pr-drawn on the observation form for recording zero to ten evaluations for each indicator. If more than ten instances of any item are observed, up to three additional circles may be hand drawn in a row or rows. Beyond three additional observations per row, an additional data sheet must be used to maintain form clarity.

A notes section is provided for recording clarifying, amplifying or limiting information regarding the observations. No names, (other than that of the contractor and the site identifier), personal

identifiers, or identifying personal characteristics may be used in this section or anywhere on the site observation form. Upon request, the observation data will be discussed with the contractor's site representative (superintendent or foreman) or worker representative at the time of the visit, but no observed individual will be identified by name or other personal identifier or unique characteristics.

2.1.3 Data Reduction

2.1.3.1 Calculation of Ratios and Averages

Ratios and averages will not be weighted for the number of items included in the calculations.

- For each indicator, the ratio of safe instances to total instances will be determined and expressed as a decimal equivalent to two significant figures. If no observations are made for an indicator, N/A will be entered for the rate and that indicator will not be factored into any average calculation.
- Ratios will be used to determine the average ratio for each sub-heading without regard to the number of instances upon which the ratio is based (i.e. a ratio base on a single observation is weighted equal to a ratio based upon ten or more instances).
- Heading averages will be calculated from sub-headings without regard to the number of sub-headings included or to the number of observations made.
- Total averages will be computed from heading averages and,
- Study averages will be calculated from the total averages for individual contractors.

2.2 Injury Data

2.2.1 Data Collection

Each participating contractor will be asked to provide a copy of their OSHA injury logs for the three year period prior to joining the study and for the period of the study. Contractors will also be asked to provide documentation of the hours worked by trades workers during these same periods. Injuries due to repetitive exposures (eg hearing loss, carpel tunnel, asbestosis) will be excluded from analysis because responsibility for those conditions can not be assigned with certainty to the participating contractor nor temporally to the period of the study.

2.2.1.2 Data Analysis

Each contractor's injury rate for up to three years prior to participation will be averaged to determine their baseline rate. Their averaged rate after program implementation will serve as their post intervention rate. Each contractor will serve as their own control.

4. Progress Reporting

4.1 A report summarizing individual contractor performance will be made to each contractor approximately every six months. A minimum of three site visits must be completed for each report to ensure a minimum level of confidentiality for site managers and workers. No names, other personal identifiers, or identifying

personal characteristics may be used in the report. Where comparison are made to the rest of the study population, no identifiers more specific than trade or region (but not both simultaneously) will be used.

4.2 An annual report will be prepared following the posting of OSHA injury logs in February. The annual report will be made available to all participating contractors.

5. Data Confidentiality

5.1 Use of Identifiers

Other than the identity of the contractor, no names, personal identifiers or unique personal characteristics will be recorded on the Site Safety Observation Form. The names and contact information of management or labor representatives on site or on call that may be needed for contact purposes may be recorded separately. Individual observation sheets will not be made available to anyone outside of CPWR without appropriate legal authorization.

Personal identifiers will not be used in any verbal or written report to any person of organization. A contractors name, however, may appear in its own progress report but not in any report available to other contractors, NIOSH, or the public. Furthermore, the identification of site managers or workers will not appear in any report provided to a contractor.

5.2 Security of Data

Completed Site Safety Observation Forms will be kept in a secure file.

Section II Criteria for Evaluation

1. Administrative

1.1 Job Safety Analysis must:

- Be specific to the current site and phase of work
- Identify specific hazards, and controls
- Routine hazards and controls (e.g. using safety glasses to protect from projectile nails) need not be addressed.

1.2 The Hazcom materials must:

- Be accessible to workers on all shifts
- Contain the company hazcom program
- Contain MSDSs for onsite chemicals or directions for same day access

1.3 The Fall Protection Program must:

- Be specific to the current site and phase of work
- Identify specific hazards, and controls

2. Housekeeping (evaluated for safety, not for appearance.)

2.1 Objects must be placed so that they do not cause a trip, slip or projectile hazards. Tools should not be on ladders or elevated surfaces where they are subject to falling. Small objects, such as fasteners must not be on working or walking surfaces beyond the immediate time and area where used.

2.2 The access points must not have accumulated materials that could interfere with free access.

2.3 Materials, whether structural, in use, stored, or waste must not extend into a walking area.

2.4 Rebar or other projecting sharp ends must be capped. Nails must be removed or bent over in scrap.

2.5 Lighting must be appropriate for the work activity, but not less than 5 foot-candles measured with a light meter.

3. PPE

3.1 All workers and supervisors must be wearing safety glasses unless other appropriate eye protection is worn (e.g full-face respirator).

3.2 All workers and supervisors must be wearing hard hats with proper suspension if any falling or flying hazards are present. Interior carpet installers, finish carpenters, roofers and similar trades may be excluded when they are in an area free from overhead exposures.

3.3 Hearing protectors must be available and worn if the noise level exceeds 90 dBA near the workers hearing zone. A 90dBA level will be estimated by the observer based on communication interference (the 3 foot rule).

3.4 Respirators and proper filters or canisters must be correctly worn if a known or suspected vapor, fume or dust exposures is likely to exceed a PEL. The likelihood of exceeding the PEL will be estimated by the observer based on the type and amount of material released and the ambient air movement. No air measurements will be taken in making this determination.

4. Electrical Hazards

4.1 Cords will be traced back to a protected and labeled outlet.

4.2 With the users permission, tools will be checked for double insulation marking or grounding plug.

4.3 Cords will be free from significant cuts, gouges and deterioration. Grounding plug will be in place.

4.4 Cords will be protected if crossing vehicular traffic route and will not be stapled in place or run across a sharp edge.

4.5 Sufficient free space will be provided around power sources. Power lines will be de-energized or more than 10 feet from any observable potential contact.

5. Fall Hazards

5.1 Fall Protection

5.1.1 Wall, roof and floor openings will be covered immediately after the completion of the task for which they are opened and remain covered or guarded at all times. Openings will be monitored at all times when open.

5.1.2 Harnesses will be used when workers are in an unguarded position 6 ft or more above the lower surface Unless alternative protection specified in an acceptable fall protection plan is in place. Harnesses will be attached from the rear to an anchor point set at shoulder height or higher.

5.2.Ladders

5.2.1 Ladder will be straight and free of cracked or broken rungs or side rails, without or ice or mud accumulation. Wooden ladders will be unpainted. Step ladders will have side locks.

5.2.2 Ladders will be set up on a level and solid base. No movable objects (including vehicles) will be used to increase height. Levelers may be used.

5.2.3 Ladders used to access a different level will be of sufficient length to be set at the correct angle with 3 feet of excess and sufficient overlap for extension ladders. Ladder set against a wall will be of sufficient length to preclude use of the top three rungs.

5.2.4 Straight or extension ladders will be set at a 4:1 ration which may be tested by the palms of the observer's fully extended arms reaching the side rails when his/her toes are against the base.

5.2.5 Ladders used to reach a different level will be tied to the main structure at the top.

5.2.6 Ladders will be braced or securely set at the bottom.

5.2.7 Workers will not hand carry tools up the ladder and will maintain three points of contact at all times.

5.2.8 The worker will keep his/her belt buckle within the side rails and will not rest a foot on an additional support. The worker will not be on the ladder when it is moved, either be him/herself or by others. The worker will not work from the top three rungs of a straight or extension ladder.

5.2.9 Step ladders will be fully extended and locked. Step ladders will not be used as a straight ladder. Workers will not stand on the top or the top step.

5.3 Scaffolds

5.3.1 The scaffold will appear plumb and square when viewed from the base.

5.3.2 The scaffold will be braced every Feet. Vertically and at every feet horizontally.

5.3.3 The height will not exceed 4 times the smaller base dimension.

5.3.4 Guard rails will be in place on all sides and ends.

5.3.5 Ladders, either integral or additional, will be provided for climbing the scaffold.

5.3.6 Planks will be marked for scaffold use and be free of gouges, kerfs, or visible chemical damage. Planks will leave no more than 1" of space and extend not less than 6 inches nor more than12 inches beyond the lateral edges

5.3.7 Scaffold will be tied into the main structure at 4 X the base height (if higher) and at 26' intervals thereafter (20" if 3' or less based dimension.)

6. Struck by Hazards

6.1 Nail guns must not be points at any part of any person's body. Bounce nailing is rated as unsafe.

6.2 Vehicular traffic is restricted in speed and follows indicated routes. Backup alarms are used and audible.

6.3 Tools, parts, waste, etc must be so placed and restrained that it can not fall to areas where there are, or may be, workers.

6.4 Toeboards or debris nets must be in place on scaffolds and other elevated work areas.

6.5 Materials will be stored and moved so that loads can not fall onto or strike workers.

6.6 Equipment spotters will be used when mechanized equipment is used under conditions of restricted visibility.

7. Caught in Hazards

7.1 Crush points of mechanized equipment will be marked and their swing area restricted.

7.2 Guards will be in place on all saws.

7.3 Trenches over 5' deep will be sloped or stepped or trench boxes wll be in place.

7.4 Means of trench egress will be provided every 25'.

Appendix III

CPWR Site Safety Observation Report Form

Contractor _____

Report period From _____ To _____

	Site Visit								
	1	2	3	4	5	6	7	8	Average
1. Administrative									
1.1 Job safety analysis	___	___	___	___	___	___	___	___	___
1.2 Hazcom materials	___	___	___	___	___	___	___	___	___
1.3 Fall protection plan	___	___	___	___	___	___	___	___	___
Administrative Average	___	___	___	___	___	___	___	___	___
2. Housekeeping									
2.1 Tools, scrap, etc secured	___	___	___	___	___	___	___	___	___
2.2 Material at ladder top/bottom	___	___	___	___	___	___	___	___	___
2.3 Tripping hazards	___	___	___	___	___	___	___	___	___
2.4 Sharp ends (nails, rebar)	___	___	___	___	___	___	___	___	___
2.5 Work site lighting	___	___	___	___	___	___	___	___	___
Housekeeping Average	___	___	___	___	___	___	___	___	___
3. PPE									
3.1 Glasses	___	___	___	___	___	___	___	___	___
3.2 Hard hats	___	___	___	___	___	___	___	___	___
3.3 Hearing protectors	___	___	___	___	___	___	___	___	___
3.4 Respiratory protection	___	___	___	___	___	___	___	___	___
PPE Average	___	___	___	___	___	___	___	___	___

	Site Visit								
	1	2	3	4	5	6	7	8	Average
4. Electrical									
4.1 GFCI (or assured grounding)	___	___	___	___	___	___	___	___	___
4.2 Grounded/double insulated tools	___	___	___	___	___	___	___	___	___
4.3 Cords/plugs condition	___	___	___	___	___	___	___	___	___
4.4 Cords protected from damage	___	___	___	___	___	___	___	___	___
4.5 Power source/ lines	___	___	___	___	___	___	___	___	___
Electrical Average	___	___	___	___	___	___	___	___	___
5. Falls									
5.1 Protection									
5.1.1 Opening guarded/covered	___	___	___	___	___	___	___	___	___
5.1.2 Harness used/ tie off	___	___	___	___	___	___	___	___	___
Protection Average	___	___	___	___	___	___	___	___	___
5.2 Ladders									
5.2.1 Condition	___	___	___	___	___	___	___	___	___
5.2.2 Footing	___	___	___	___	___	___	___	___	___
5.2.3 Length	___	___	___	___	___	___	___	___	___
5.2.4 Angle	___	___	___	___	___	___	___	___	___
5.2.5 Tied off	___	___	___	___	___	___	___	___	___
5.2.6 Braced/secure	___	___	___	___	___	___	___	___	___
5.2.7 Climbing	___	___	___	___	___	___	___	___	___
5.2.8 Working from	___	___	___	___	___	___	___	___	___
5.2.9 Step ladder use	___	___	___	___	___	___	___	___	___
Ladder Average	___	___	___	___	___	___	___	___	___

	Site Visit								
	1	2	3	4	5	6	7	8	Average
5.3 Scaffold									
5.3.1 Plumb and square	___	___	___	___	___	___	___	___	___
5.3.2 Braced	___	___	___	___	___	___	___	___	___
5.3.3 Relative height 4:1	___	___	___	___	___	___	___	___	___
5.3.4 Guarded	___	___	___	___	___	___	___	___	___
5.3.5 Ladders for climbing	___	___	___	___	___	___	___	___	___
5.2.6 Planking	___	___	___	___	___	___	___	___	___
5.2.7 Tied in	___	___	___	___	___	___	___	___	___
Scaffold Average	___	___	___	___	___	___	___	___	___
Falls Average	___	___	___	___	___	___	___	___	___
6. Struck by									
6.1 Nail gun use	___	___	___	___	___	___	___	___	___
6.2 Traffic control	___	___	___	___	___	___	___	___	___
6.3 Displacable tools, waste, etc	___	___	___	___	___	___	___	___	___
6.4 Toeboards	___	___	___	___	___	___	___	___	___
6.5 Material storage	___	___	___	___	___	___	___	___	___
6.6 Equipment spotter used	___	___	___	___	___	___	___	___	___
Struck by Average	___	___	___	___	___	___	___	___	___
7. **Caught in**									
7.1 Equipment crush points	___	___	___	___	___	___	___	___	___
7.2 Machine guarding	___	___	___	___	___	___	___	___	___
7.3 Trench shored, angled	___	___	___	___	___	___	___	___	
7.2 Trench access	___	___	___	___	___	___	___	___	
Caught in Average	___	___	___	___	___	___	___	___	___
Overall Average	___	___	___	___	___	___	___	___	___

Appendix IV

Evaluation of the Effectiveness of Construction Safety Programs

Interim Report

Contractor:

Date: March 10, 2004

Type of report: Baseline Inspection Report

This report is based upon direct observation of four ( ) work sites in the ..... area. Only workers and locations under your management or control were audited. Workplace environment, tools, equipment and practices were rated "safe" or "unsafe" based upon there adherence to a predetermined criteria that are consistent with a "zero accident" standard of construction safety: the highest level achievable. An "unsafe" rating does not imply that a regulatory requirement has not been met nor does it imply that an accident is imminent. It does mean that a condition or action was observed that, if repeated many times, is likely to eventually contribute to producing an injury.

Observations focused on:

- General site safety management; and
- Conditions and practices closely related to the four most prevalent types of construction injury:
    - Falls,
    - Electrocutions,
    - Injuries resulting from being struck by falling, projected, or propelled objects or equipment.
    - Injuries resulting from being caught in machinery, materials, terrain or structure; and

3. Overall rating of safe workplace conditions and work practices:

The averaging system is designed to highlight on-site safety management rather than individual cases of safe or unsafe conditions or practices. The ratio of safe to total observed conditions and practices in each category was determined and then averaged over all sites. Sites results were not weighted by the number of observations made.

rs rating	**0.68**
Average for all contractors observed	**0.78**

Your rating is lower than the average of all participating contractors but was significantly impacted by one instance of a worker failing to wear proper fall protection. If that instance were removed your rating would rise to 0.73, not significantly different from the other contractors. However, an unchecked fall from elevation would likely cause a very serious injury or fatality and very negatively impact orkers compensation insurance experience modifier.

1. General Site Safety Management

1.1. Administrative This category was not numerically rated due to lack of an auditable process

Variation from normal work conditions or methods is frequently a factor in accident causation. Weather, season, staffing, site configuration, and structural design are a few of the variables that can impact safety. Site management (foreman, superintendent) should analyze the construction situation on a job, phase, and daily basis to ensure that all potentially hazardous conditions are identified and that effective control methods are available and employed.

1.2. Housekeeping: **Rating 0.64**

Work site lighting was generally very good, although at one location lighting, while within legal limits, was less than optimal for the job conditions. Tools and scrap were generally well controlled but other tripping hazards such as cords were not. Sharp ends of scrap in one bin extended into a walking area. At one site rain water was entering the work area and puddling on concrete working/ walking areas.

1.3. Personal protective equipment (PPE) **Rating: 0.51**

Safety glasses were not regularly worn when the danger of projectiles existed.

One worker was observed without a hard hat when the danger of falling objects existed.

2. High hazard conditions and practice

2.1 Electrical Safety: **Rating: 0.69**

GFCI or assured grounding was not used at one job site where interior rehab was taking place. When permanent outlets are used to directly power tools and equipment, GFCI is not required (because a permanent electrical system is being used). However, when an extension cord is used with a permanent power sources that part of the system is considered temporary wiring and GFCI or assured grounding is required.

NOTE: The 2000 N.E.C. prohibits reliance on assured grounding. Some OSHA jurisdictions have adopted that prohibition. Best practice is to always use GFCI protection.

2.2 Fall Protection **Rating: 0.33 (0.68 if the harness incident is excluded)**

2.2.1 Personal protection and guarding: **Rating: 0**

This rating is based upon the observation of one worker who was working at heights without a harness or guardrail. Although this single instance may not reflect standard practice at O'Brien Constructors it does point out the need to strongly reenforce fall protection guidelines.

2.2.2 Ladder Safety: **Rating 0.74**

The physical condition of ladders was excellent. Straight ladders were, with one exception, of the correct length for the task and were erected with secure bases. One ladder used to access a higher level was not tied off at the top.

2.2.3 Scaffold Safety: **Rating 0.75**

Unsafe conditions observed included "riding" a rolling scaffold. Otherwise scaffolds were properly erected on solid footing, were plumb and square, and were worked from safely.

Unsafe conditions noted were missing toeboards and guard rails, defective planking (cracks) and lack of a ladder for climbing.

2.2.4 Struck by: **Rating 1.00**

Safe conditions observed included the placement of hand tools and materials in locations where they were not subject to falling onto workers. Spotters were used during vehicle movement.

2.2.5 Caught in **Rating 1.00**

This category of injuries includes those resulting from entrapment in trenches and moving equipment parts. No trenching requiring shoring was observed. Power tools were guarded

Recommendations

1. Foremen should conduct and document a job hazard analysis daily and discuss any anticipated problems and how to control them with their crew.

2. Safety glass and hard hats should be worn when danger from falling or projectile hazards exists.

3. Proper use of folding ladders should be emphasized. Use of lifts to replace ladders was observed and is an excellent choice.

4. Housekeeping was very good but should be reenforced.

5. Scaffolding should be inspected frequently.

CPWR Site Safety Observation Report Form

Contractor
Report period From 5/03 To 12/03

	Site Visit 1	2	3	4	5	6	7	8	Average	
1. Administrative										
1.1 Job safety analysis	___	___	___	___	___	___	___	___	___	
1.2 Hazcom materials	___	___	___	___	___	___	___	___	___	
1.3 Fall protection plan	___	___	___	___	___	___	___	___	___	
Administrative Average	___	___	___	___	___	___	___	___		___
2. Housekeeping										
2.1 Tools, scrap, etc secured	0.8	0.4	1.0	1.0	___	___	___	___	0.8	
2.2 Material at ladder top/bottom	___	___	___	___	___	___	___	___	___	
2.3 Tripping hazards	___	0.25	0.5	0.0	___	___	___	___	0.25	
2.4 Sharp ends (nails, rebar)	___	0.5	___	___	___	___	___	___	0.5	
2.5 Work site lighting	___	1.0	1.0	1.0	___	___	___	___	1.0	
Housekeeping Average	0.8	0.54	0.67	0.67	___	___	___	___		0.64
3. PPE										
3.1 Glasses	0.0	0.29	___	1.0	___	___	___	___	0.43	
3.2 Hard hats	___	0.67	___	___	___	___	___	___	0.67	
3.3 Hearing protectors	___	___	___	___	___	___	___	___	___	
3.4 Respiratory protection	___	___	___	___	___	___	___	___	___	
PPE Average	0.0	0.48	___	1.0	___	___	___	___		0.55
	Site Visit 1	2	3	4	5	6	7	8	Average	

4. Electrical										
4.1 GFCI (or assured grounding)	0.0	1.0	0.71	1.0	___	___	___	___	0.68	
4.2 Grounded/double insulated tools	1.0	0.67	___	1.0	___	___	___	___	0.89	
4.3 Cords/plugs condition	1.0	1.0	___	___	___	___	___	___	1.0	
4.4 Cords protected from damage	1.0	0.0	0.0	___	___	___	___	___	0.33	
4.5 Power source/ lines	___	1.0	___	___	___	___	___	___	1.0	
Electrical Average	0.75	0.73	0.36	1.0	___	___	___	___		0.78
5. Falls										
5.1 Protection										
5.1.1 Opening guarded/covered	___	___	___	___	___	___	___	___	___	
5.1.2 Harness used/ tie off	___	0.0	___	___	___	___	___	___	0.0	
Protection Average	___	0.0	___	___	___	___	___	___		0.0
5.2 Ladders										
5.2.1 Condition	1.0	1.0	1.0	1.0	___	___	___	___	1.0	
5.2.2 Footing	1.0	___	___	___	___	___	___	___	1.0	
5.2.3 Length	1.0	1.0	1.0	1.0	___	___	___	___	1.0	
5.2.4 Angle	___	___	___	___	___	___	___	___	___	
5.2.5 Tied off	___	0.0	___	___	___	___	___	___	0.0	
5.2.6 Braced/secure	___	1.0	___	0.5	___	___	___	___	0.75	
5.2.7 Climbing	___	___	___	0.5	___	___	___	___	0.5	
5.2.8 Working from	___	0.0	___	0.5	___	___	___	___	0.25	
5.2.9 Step ladder use	___	0.5	___	0.5	___	___	___	___	0.5	
Ladder Average	1.0	0.67	1.0	0.63	___	___	___	___		0.69

	Site Visit								
	1	2	3	4	5	6	7	8	Average
5.3 Scaffold									

5.3.1 Plumb and square										
5.3.2 Braced										
5.3.3 Relative height 4:1										
5.3.4 Guarded										
5.3.5 Ladders for climbing										
5.2.6 Planking										
5.2.7 Tied in										
Scaffold Average										N/O
Falls Average										
6. Struck by										
6.1 Nail gun use										
6.2 Traffic control										
6.3 Displacable tools, waste, etc										
6.4 Toeboards										
6.5 Material storage										
6.6 Equipment spotter used				1.0						
Struck by Average										1.0
7. **Caught in**										
7.1 Equipment crush points										
7.2 Machine guarding										
Caught in Average										N/O
Overall Average										0.73

CPWR Site Safety Observation Report Form

Contractor
Report period From June 2004 to August 2004

	Site Visit										
	1	2	3	4	5	6	7	8	9	10	Average
1. Administrative											
1.1 Job safety analysis											
1.2 Hazcom materials											
1.3 Fall protection plan											
Administrative Average											
2. Housekeeping											
2.1 Tools, scrap, etc secured	0.73	0.73	0.86	0.43	0.75	1.0	0.75	0.86	0.55	0.51	0.70
2.2 Material at ladder top/bottom									0.71		0.71
2.3 Tripping hazards						1.0				0.72	0.86
2.4 Sharp ends (nails, rebar)											
2.5 Work site lighting	1.0				1.0						1.0
Housekeeping Average											**0.82**
3. PPE											
3.1 Glasses		0.73	1.0	1.0		1.0		1.0	0.78	0.86	0.94
3.2 Hard hats		1.0	1.0			1.0			1.0	1.0	1.0
3.3 Hearing protectors											
3.4 Respiratory protection											
PPE Average											**0.97**

	Site Visit										
	1	2	3	4	5	6	7	8	9	10	Average
4. Electrical											
4.1 GFCI (or assured grounding)	1.0	1.0	___	1.0	1.0	1.0	___	1.0	1.0	1.0	1.0
4.2 Grounded/double insulated tools	___	___	___	___	___	1.0	___	1.0	1.0	1.0	1.0
4.3 Cords/plugs condition	1.0	1.0	___	___	1.0	1.0	___	1.0	1.0	0.86	0.98
4.4 Cords protected from damage	___	___	___	___	___	___	___	___	0.75	0.75	0.75
4.5 Power source/ lines	___	___	___	___	___	___	___	1.0	1.0	___	1.0
Electrical Average	___	___	___	___	___	___	___	___	___	___	**0.95**
5. Falls											
5.1 Protection											
5.1.1 Opening guarded/covered	___	___	___	___	___	___	___	___	0.83	___	0.83
5.1.2 Harness used/ tie off	___	___	___	___	___	___	___	___	___	1.0	1.0
Protection Average	___	___	___	___	___	___	___	___	___	___	**0.92**
5.2 Ladders											
5.2.1 Condition	1.0	1.0	___	1.0	1.0	1.0	___	1.0	1.0	1.0	1.0
5.2.2 Footing	___	___	___	1.0	___	___	___	___	1.0	___	1.0
5.2.3 Length	1.0	___	___	1.0	1.0	1.0	___	___	1.0	___	1.0
5.2.4 Angle	___	___	___	1.0	___	___	___	___	1.0	___	1.0
5.2.5 Tied off	___	___	___	1.0	___	___	___	___	1.0	___	1.0
5.2.6 Braced/secure	___	___	___	1.0	___	___	___	___	1.0	___	1.0
5.2.7 Climbing	___	___	___	___	___	___	___	___	1.0	___	1.0
5.2.8 Working from	___	___	___	___	___	___	___	0.60	0.67	___	0.64
5.2.9 Step ladder use	___	0.75	___	0.67	___	___	___	___	___	___	0.71
Ladder Average	___	___	___	___	___	___	___	___	___	___	**0.93**

	Site Visit										
	1	2	3	4	5	6	7	8		Average	
5.3 Scaffold											
5.3.1 Plumb and square											
5.3.2 Braced											
5.3.3 Relative height 4:1											
5.3.4 Guarded											
5.3.5 Ladders for climbing											
5.2.6 Planking											
5.2.7 Tied in											
Scaffold Average											
Falls Average											0.93
6. Struck by											
6.1 Nail gun use											
6.2 Traffic control											
6.3 Displacable tools, waste, etc								1.0	1.0		1.0
6.4 Toeboards											
6.5 Material storage											
6.6 Equipment spotter used								1.0	1.0		1.0
Struck by Average											**1.0**
7. **Caught in**											
7.1 Equipment crush points											
7.2 Machine guarding	1.0										1.0
7.3 Trench shored, angled											
7.4 Trench access											
Caught in Average											**1.0**
Overall Average											0.93

Appendix V

CPWR Site Safety Summary Sheet

A

	Baseline	Intervention Inspection Period				
		1	2	3	Post Ave	Change
2. Housekeeping						
2.1 Tools, scrap, etc secured	0.45	0.75	0.66	0.94	0.78	0.43
2.2 Material at ladder top or bottom	0.80	____	0.71	1.00	0.86	0.06
2.3 Tripping hazards	0.31	1.00	0.72	1.00	0.91	0.60
2.4 Sharp ends (nails, rebar, etc)	1.00	____	____	1.00	1.00	0.40
2.5 Work site lighting	1.00	1.00	1.00	1.00	1.00	0
Housekeeping Average	0.71	0.92	0.77	0.99	0.91	0.19
3. PPE						
3.1 Glasses	0.25	0.94	0.88	0.80	0.87	0.62
3.2 Hard hats	0.77	1.00	1.00	1.00	0.87	0.62
3.3 Hearing protectors	____	____	____	____	____	____
3.4 Respiratory protection	____	____	____	____	____	____
PPE Average	0.51	0.96	0.94	0.90	0.87	0.43
4. Electrical						
4.1 GFCI (or assured grounding)	0.50	1.00	1.00	1.00	1.00	0.50
4.2 Grounded/double insulated tools	1.00	1.00	1.00	1.00	1.00	0.00
4.3 Cords/plugs condition	0.96	1.00	0.95	1.00	0.98	0.02
4.4 Cords protected from damage	0.29	____	0.75	1.00	0.88	0.59
4.5 Power source/ lines	____	____	1.00	____	1.00	*
Electrical Average	0.69	1.00	0.94	1.00	0.97	0.28

	Baseline	Intervention Inspection Period				
		1	2	3	Post Ave	Change
5.1 Protection						
5.1.1 Opening guarded/covered	____	____	0.79	1.00	0.90	*
5.1.2 Harness used/ tie off	____	____	1.00	1.00	1.00	*
Protection Average	____	____	0.90	____	0.95	*
5.2 Ladders						
5.2.1 Condition	0.91	1.00	1.00	1.00	1.00	0.09
5.2.2 Footing	0.50	1.00	1.00	____	1.00	0.50
5.2.3 Length	0.93	1.00	1.00	1.00	1.00	0.07
5.2.4 Angle	1.00	1.00	1.00	____	1.00	0
5.2.5 Tied off	0.75	1.00	1.00	____	1.00	0.25
5.2.6 Braced/secure	1.00	____	1.00	1.00	1.00	0
5.2.7 Climbing	0.50	____	1.00	1.00	0.84	0.50
5.2.8 Working from	1.00	____	0.67	1.00	0.84	- 0.16
5.2.9 Step ladder use	0.50	0.71	____	1.00	0.86	0.36
Ladder Average	0.79	0.96	0.96	1.00	0.95	0.19
5.3 Scaffold						
5.3.1 Plumb and square	1.00	____	____	1.00	1.00	____
5.3.2 Braced	1.00	____	____	1.00	1.00	____
5.3.3 Relative height 4:1	1.00	____	____	1.00	1.00	____
5.3.4 Guarded	0.50	____	____	0	0.00	____
5.3.5 Ladders for climbing	0.50	____	____	0	0.00	____
5.2.6 Planking	0.50	____	____	____	____	____
5.2.7 Tied in	____	____	____	____	____	____
Scaffold Average	0.75	____	____	____	0.67	-.32
Falls Average	0.77	0.96	0.93	____	0.89	0.12

	Baseline	Post-intervention Inspection Period				
		1	2	3	Post Ave	Change
6. Struck by						
6.1 Nail gun use						
6.2 Traffic control						
6.3 Displacable tools, waste, etc	1.00		1.00		1.00	0
6.4 Toeboards						
6.5 Material storage	1.00				1.00	0
6.6 Equipment spotter used	1.00				1.00	0
Struck by Average	1.00		1.00		1.00	0
7. Caught in						
7.1 Equipment crush points						
7.2 Machine guarding	1.00		1.00		1.00	0
7.3 Trenches shored, angled						
7.4 Trench access	1.00		1.00		1.00	
Caught in Average	1.00		1.00		1.00	0
Overall Average	0.78	0.96	0.93	0.95	0.95	0.17

CPWR Site Safety Summary Sheet

B

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
2. Housekeeping						
2.1 Tools, scrap, etc secured	0.55	0.75	0.72	____	0.73	0.18
2.2 Material at ladder top or bottom	1.00	____	1.00	____	1.00	0
2.3 Tripping hazards	0.52	0.63	0.87	____	0.76	0.24
2.4 Sharp ends (nails, rebar, etc)	0.71	____	0.50	____	0.50	-0.21
2.5 Work site lighting	1.00	1.00	1.00	____	1.00	0
Housekeeping Average	0.76	0.79	0.77	____	0.80	0.04
3. PPE						
3.1 Glasses	0.67	1.00	0.75	____	0.83	0.16
3.2 Hard hats	1.00	1.00	1.00	____	1.00	0
3.3 Hearing protectors	1.00	____	____	____	____	*
3.4 Respiratory protection	____	____	____	____	____	____
PPE Average	0.72	1.00	0.88	____	0.91	0.19
4. Electrical						
4.1 GFCI (or assured grounding)	0.75	1.00	1.00	____	1.00	0.25
4.2 Grounded/double insulated tools	1.00	1.00	1.00	____	1.00	0
4.3 Cords/plugs condition	1.00	1.00	1.00	____	1.00	0
4.4 Cords protected from damage	0.25	1.00	1.00	____	1.00	0.75
4.5 Power source/ lines	1.00	____	1.00	____	1.00	0.00
Electrical Average	0.80	1.00	1.00	____	1.00	0.20

	Baseline	Post-intervention Inspection Period				
		1	2	3	Post Ave	Change
5.1 Protection						
5.1.1 Opening guarded/covered	1.00		1.00		1.00	0
5.1.2 Harness used/ tie off	1.00					*
Protection Average	1.00		1.00		1.00_	0
5.2 Ladders						
5.2.1 Condition	0.94					*
5.2.2 Footing	0.67		1.00			0.33
5.2.3 Length	1.00		1.00			0
5.2.4 Angle	0.67					*
5.2.5 Tied off	0.50					*
5.2.6 Braced/secure						
5.2.7 Climbing	0.00					
5.2.8 Working from	1.00		0.50		0.50	0.50
5.2.9 Step ladder use	0.00		1.00		1.00	1.00
Ladder Average	0.59		0.88		0.88	0.29
5.3 Scaffold						
5.3.1 Plumb and square	1.00					
5.3.2 Braced	1.00					
5.3.3 Relative height 4:1	1.00					
5.3.4 Guarded	1.00					
5.3.5 Ladders for climbing	0.50					
5.2.6 Planking	0.00					
5.2.7 Tied in						
Scaffold Average	0.78					
Falls Average	0.75		0.94		0.94	0.19

	Baseline	Post-intervention Inspection Period				
		1	2	3	Post Ave	Change
6. Struck by						
6.1 Nail gun use	____	____	1.00	____	1.00	*
6.2 Traffic control	0.50	____	1.00	____	1.00	0.50
6.3 Displacable tools, waste, etc	1.00	____	1.00	____	1.00	0
6.4 Toeboards	____	____	1.00	____	1.00	*
6.5 Material storage	1.00	____	____	____	____	*
6.6 Equipment spotter used	1.00	____	1.00	____	1.00	*
Struck by Average	0.88	____	1.00	____	1.00	0.12
7. Caught in						
7.1 Equipment crush points	____	____	____	____	____	____
7.2 Machine guarding	____	1.00	____	____	1.00	*
7.3 Trenches shored, angled	____	____	____	____	____	____
7.4 Trench access	____	____	____	____	____	____
Caught in Average	____	____	____	____	1.00	____
Overall Average	0.79	0.95	0.92	____	0.94	0.15

CPWR Site Safety Summary Sheet

2

	Baseline	Post-intervention Inspection Period				
		1	2	3	Ave	Change
2. Housekeeping						
2.1 Tools, scrap, etc secured	0.56	0.69	0.92	____	0.81	0.25
2.2 Material at ladder top or bottom	1.00	0.00	0.50	____	0.25	-.075
2.3 Tripping hazards	0.81	____	0.80	____	0.80	0.01
2.4 Sharp ends (nails, rebar, etc)	0.32	0.80	0.77	____	0.79	0.47
2.5 Work site lighting	1.00		1.00	____	1.00	0
Housekeeping Average	0.74	0.50	0.80	____	0.73	-0.01
3. PPE						
3.1 Glasses	0.84	1.00	1.00	____	1.00	0.16
3.2 Hard hats	0.70	1.00	1.00	____	1.00	0.30
3.3 Hearing protectors	1.00	____	____	____	____	*
3.4 Respiratory protection	____	____	____	____	____	____
PPE Average	0.85	1.00	1.00	____	1.00	0.15
4. Electrical						
4.1 GFCI (or assured grounding)	0.79	1.00	1.00	____	1.00	0.21
4.2 Grounded/double insulated tools	1.00	1.00	1.00	____	1.00	0
4.3 Cords/plugs condition	0.83	____	1.00	____	1.00	0.17
4.4 Cords protected from damage	0.50	____	1.00	____	1.00	0.50
4.5 Power source/ lines	____	____	____	____	____	____
Electrical Average	0.78	1.00	1.00	____	1.00	0.22

	Baseline	Post-intervention Inspection Period				
		1	2	3	Ave	Change
5.1 Protection						
5.1.1 Opening guarded/covered	0.50		1.00		1.00	0.50
5.1.2 Harness used/ tie off		1.00			1.00	*
Protection Average	0.50	1.00	1.00		1.00	0.50
5.2 Ladders						
5.2.1 Condition	1.00	1.00	1.00		1.00	0
5.2.2 Footing	0.75		1.00		1.00	0.25
5.2.3 Length	0.83	0.00	1.00		0.50	-0.23
5.2.4 Angle		0.00	1.00		0.50	*
5.2.5 Tied off	0.00	1.00	1.00		1.00	1.00
5.2.6 Braced/secure			1.00		1.00	*
5.2.7 Climbing	1.00	0.00			0.00	-1.0
5.2.8 Working from	0.00		1.00		1.00	1.00
5.2.9 Step ladder use						
Ladder Average	0.59	0.40	1.00		0.75	0.16
5.3 Scaffold						
5.3.1 Plumb and square	1.00		1.00		1.00	0
5.3.2 Braced			1.00		1.00	0
5.3.3 Relative height 4:1	1.00					
5.3.4 Guarded	0.50		1.00		1.00	0.50
5.3.5 Ladders for climbing	0.50					
5.2.6 Planking	0.00					
5.2.7 Tied in						
Scaffold Average	0.60		1.00		1.00	0.44
Falls Average	0.56	0.70	1.00		0.92	0.36

	Baseline	Post-intervention Inspection Period				
		1	2	3	Ave	Change
6. Struck by						
6.1 Nail gun use						
6.2 Traffic control	0.50					*
6.3 Displacable tools, waste, etc						
6.4 Toeboards						
6.5 Material storage	1.00		1.00		1.00	0
6.6 Equipment spotter used						
Struck by Average	0.75		1.00		1.00	0.25
7. Caught in						
7.1 Equipment crush points						
7.2 Machine guarding			1.00		1.00	*
7.3 Trenches shored, angled						
7.4 Trench access						
Caught in Average			1.00		1.00	*
Overall Average	0.74	0.80	0.97		0.94	0.20

CPWR Site Safety Summary Sheet

D

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
2. Housekeeping						
2.1 Tools, scrap, etc secured	0.80	0.95	____	____		0.15
2.2 Material at ladder top or bottom	____	1.00	____	____	____	*
2.3 Tripping hazards	0.25	0.97	____	____	____	0.72
2.4 Sharp ends (nails, rebar, etc)	0.50	0.75	____	____	____	0.25
2.5 Work site lighting	1.00	____	____	____	____	*
Housekeeping Average	0.64	0.92	____	____	____	0.28
3. PPE						
3.1 Glasses	0.43	1.00	____	____	____	0.57
3.2 Hard hats	0.67	1.00	____	____	____	0.33
3.3 Hearing protectors	____	____	____	____	____	____
3.4 Respiratory protection	____	____	____	____	____	____
PPE Average	0.55	1.00	____	____	____	0.45
4. Electrical						
4.1 GFCI (or assured grounding)	0.68	0.94	____	____	____	0.26
4.2 Grounded/double insulated tools	0.89	1.00	____	____	____	0.11
4.3 Cords/plugs condition	1.00	1.00	____	____	____	0
4.4 Cords protected from damage	0.33	1.00	____	____	____	0.67
4.5 Power source/ lines	1.00	____	____	____	____	*
Electrical Average	0.78	0.99	____	____	____	0.21

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
5.1 Protection						
5.1.1 Opening guarded/covered	____	____	____	____	____	____
5.1.2 Harness used/ tie off	0.00	____	____	____	____	____
Protection Average	0.00	____	____	____	____	____
5.2 Ladders						
5.2.1 Condition	1.00	1.00	____	____	____	0
5.2.2 Footing	1.00	____	____	____	____	*
5.2.3 Length	1.00	1.00	____	____	____	0
5.2.4 Angle	____	____	____	____	____	____
5.2.5 Tied off	0.00	____	____	____	____	*
5.2.6 Braced/secure	0.75	____	____	____	____	*
5.2.7 Climbing	0.50	____	____	____	____	*
5.2.8 Working from	0.25	1.00	____	____	____	0.75
5.2.9 Step ladder use	0.50	1.00	____	____	____	0.50
Ladder Average	0.69	1.00	____	____	____	0.31
5.3 Scaffold						
5.3.1 Plumb and square	____	1.00	____	____	____	____
5.3.2 Braced	____	1.00	____	____	____	____
5.3.3 Relative height 4:1	____	1.00	____	____	____	____
5.3.4 Guarded	____	____	____	____	____	____
5.3.5 Ladders for climbing	____	____	____	____	____	____
5.2.6 Planking	____	____	____	____	____	____
5.2.7 Tied in	____	____	____	____	____	____
Scaffold Average	____	1.00	____	____	____	____
Falls Average	0.35	1.00	____	____	____	0.65

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
6. Struck by						
6.1 Nail gun use						
6.2 Traffic control						
6.3 Displacable tools, waste, etc						
6.4 Toeboards						
6.5 Material storage						
6.6 Equipment spotter used	1.00	1.00				0
Struck by Average	1.00	1.00				0
7. Caught in						
7.1 Equipment crush points						
7.2 Machine guarding		1.00				*
7.3 Trenches shored, angled		1.00				*
7.4 Trench access						*
Caught in Average		1.00				
Overall Average	0.66	0.99				0.33

CPWR Site Safety Summary Sheet

E

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
2. Housekeeping						
2.1 Tools, scrap, etc secured	0.83	0.83	1.00	1.00	0.94	0.11
2.2 Material at ladder top or bottom	1.00	____	1.00	1.00	1.00	0
2.3 Tripping hazards	0.84	0.50	1.00	1.00	0.88	0.04
2.4 Sharp ends (nails, rebar, etc)	____	____	____	____	____	____
2.5 Work site lighting	____	____	1.00	1.00	1.00	*
Housekeeping Average	0.89	0.75	1.00	1.00	0.96	.07
3. PPE						
3.1 Glasses	0.83	1.00	1.00	1.00	1.00	0.17
3.2 Hard hats	1.00	1.00	____	1.00	1.00	0
3.3 Hearing protectors	1.00	____	____	____	____	____
3.4 Respiratory protection	____	____	____	____	____	____
PPE Average	0.94	1.00	1.00	1.00	1.00	0.06
4. Electrical						
4.1 GFCI (or assured grounding)	____	____	0.67	____	0.67	*
4.2 Grounded/double insulated tools	____	____	1.00	____	1.00	*
4.3 Cords/plugs condition	____	____	1.00	____	1.00	*
4.4 Cords protected from damage	____	____	1.00	____	1.00	*
4.5 Power source/ lines	____	____	____	____	____	____
Electrical Average	____	____	0.92	____	0.92	*

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
5.1 Protection						
5.1.1 Opening guarded/covered						
5.1.2 Harness used/ tie off						
Protection Average						
5.2 Ladders						
5.2.1 Condition	1.00	1.00	1.00	1.00	1.00	0
5.2.2 Footing				1.00	1.00	*
5.2.3 Length	1.00	0.50	1.00	1.00	0.83	-0.17
5.2.4 Angle						
5.2.5 Tied off						
5.2.6 Braced/secure						
5.2.7 Climbing	1.00					*
5.2.8 Working from	0.67	0.50		1.00	0.75	0.08
5.2.9 Step ladder use	0.67			1.00	1.00	0.33
Ladder Average	0.86	0.75	1.00	1.00	0.91	0.05
5.3 Scaffold						
5.3.1 Plumb and square	1.00					
5.3.2 Braced						
5.3.3 Relative height 4:1	1.00					
5.3.4 Guarded	1.00					
5.3.5 Ladders for climbing						
5.2.6 Planking						
5.2.7 Tied in						
Scaffold Average	1.00					
Falls Average	0.93	0.75	1.00	1.00	0.92	-0.01

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
6. Struck by						
6.1 Nail gun use						
6.2 Traffic control						
6.3 Displacable tools, waste, etc	1.00		1.00		1.00	0
6.4 Toeboards						
6.5 Material storage	1.00		1.00		1.00	0
6.6 Equipment spotter used						
Struck by Average	1.00		1.00		1.00	0
7. Caught in						
7.1 Equipment crush points						
7.2 Machine guarding						
7.3 Trenches shored, angled						
7.4 Trench access						
Caught in Average						
Overall Average	0.87	0.83	0.98	1.00	0.96	0.07

* = undefined

CPWR Site Safety Summary Sheet

F

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
2. Housekeeping						
2.1 Tools, scrap, etc secured	0.39	0.74	1.00		0.84	0.45
2.2 Material at ladder top or bottom						
2.3 Tripping hazards	0.33	0.44	0.75		0.60	0.27
2.4 Sharp ends (nails, rebar, etc)	0.00					*
2.5 Work site lighting	1.00	1.00	1.00		1.00	
Housekeeping Average	0.43	0.73	0.92		0.81	0.38
3. PPE						
3.1 Glasses	1.00	1.00	1.00		1.00	0
3.2 Hard hats	1.00	1.00	1.00		1.00	0
3.3 Hearing protectors						
3.4 Respiratory protection						
PPE Average	1.00	1.00	1.00		1.00	0
4. Electrical						
4.1 GFCI (or assured grounding)	0.33	0.84	1.00		0.92	0.59
4.2 Grounded/double insulated tools	1.00	1.00	1.00		1.00	0
4.3 Cords/plugs condition	1.00	1.00	1.00		1.00	0
4.4 Cords protected from damage	0.75	1.00	1.00		1.00	0.25
4.5 Power source/ lines						
Electrical Average	0.77	0.96	1.00		0.98	0.21

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
5.1 Protection						
5.1.1 Opening guarded/covered	1.00	0.25	____	____	0.25	0.25
5.1.2 Harness used/ tie off	____	0.00	____	____	0.00	0
Protection Average	1.00	0.13	____	____	0.13	0.87
5.2 Ladders						
5.2.1 Condition	1.00	1.00	____	____	1.00	0
5.2.2 Footing	1.00	1.00	____	____	1.00	0
5.2.3 Length	1.00	1.00	____	____	1.00	0
5.2.4 Angle	1.00	1.00	____	____	1.00	0
5.2.5 Tied off	____	____	____	____	____	____
5.2.6 Braced/secure	____	____	____	____	____	____
5.2.7 Climbing	1.00	____	____	____	____	*
5.2.8 Working from	____	0.75	1.00	____	0.88	*
5.2.9 Step ladder use	1.00	1.00	1.00	____	1.00	0
Ladder Average	1.00	0.96	1.00	____	0.98	-.02
5.3 Scaffold						
5.3.1 Plumb and square	1.00	1.00	1.00	____	1.00	0
5.3.2 Braced	1.00	1.00	1.00	____	1.00	0
5.3.3 Relative height 4:1	1.00	____	1.00	____	1.00	0
5.3.4 Guarded	1.00	____	1.00	____	1.00	0
5.3.5 Ladders for climbing	____	____	1.00	____	____	*
5.2.6 Planking	1.00	____	1.00	____	____	0
5.2.7 Tied in	1.00	____	1.00	____	1.00	0
Scaffold Average	1.00_	1.00	1.00	____	1.00	
Falls Average	1.00	0.70	1.00	____	0.70	0

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
6. Struck by						
6.1 Nail gun use	____	____	____	____	____	____
6.2 Traffic control	1.00	____	____	____	____	*
6.3 Displacable tools, waste, etc	1.00	1.00	____	____	1.00	0
6.4 Toeboards	____	____	1.00	____	1.00	____
6.5 Material storage	____	1.00	1.00	____	1.00	____
6.6 Equipment spotter used	____	1.00	____	____	1.00	____
Struck by Average	1.00	1.00	1.00	____	1.00	0
7. Caught in						
7.1 Equipment crush points	____	____	____	____	____	____
7.2 Machine guarding	____	____	____	____	____	____
7.3 Trenches shored, angled	____	____	____	____	____	____
7.4 Trench access	____	____	____	____	____	____
Caught in Average	____	____	____	____	____	____
Overall Average	0.84	0.88	0.98	____	0.90	0.12

CPWR Site Safety Summary Sheet

G

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
2. Housekeeping						
2.1 Tools, scrap, etc secured	0.72	1.00	____	____	____	0.28
2.2 Material at ladder top or bottom	0.00	____	____	____	____	*
2.3 Tripping hazards	0.75	1.00	____	____	____	0.25
2.4 Sharp ends (nails, rebar, etc)	____	____	____	____	____	____
2.5 Work site lighting	1.00	1.00	____	____	____	0
Housekeeping Average	0.64	1.00	____	____	____	0.36
3. PPE						
3.1 Glasses	____	____	____	____	____	____
3.2 Hard hats	____	____	____	____	____	____
3.3 Hearing protectors	____	____	____	____	____	____
3.4 Respiratory protection	____	____	____	____	____	____
PPE Average	____	____	____	____	____	____
4. Electrical						
4.1 GFCI (or assured grounding)	1.00	____	____	____	____	____
4.2 Grounded/double insulated tools	1.00	____	____	____	____	____
4.3 Cords/plugs condition	1.00	____	____	____	____	____
4.4 Cords protected from damage	____	____	____	____	____	____
4.5 Power source/ lines	____	____	____	____	____	____
Electrical Average	1.00	____	____	____	____	____

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
5.1 Protection						
5.1.1 Opening guarded/covered	____	____	____	____	____	____
5.1.2 Harness used/ tie off	____	____	____	____	____	____
Protection Average	____	____	____	____	____	____
5.2 Ladders						
5.2.1 Condition	1.00	1.00	____	____	____	0
5.2.2 Footing	1.00	1.00	____	____	____	0
5.2.3 Length	1.00	0.50	____	____	____	-0.50
5.2.4 Angle	____	1.00	____	____	____	*
5.2.5 Tied off	____	1.00	____	____	____	*
5.2.6 Braced/secure	____	____	____	____	____	____
5.2.7 Climbing	____	____	____	____	____	____
5.2.8 Working from	0.84	____	____	____	____	*
5.2.9 Step ladder use	0.50	____	____	____	____	*
Ladder Average	0.88	0.90	____	____	____	0.02
5.3 Scaffold						
5.3.1 Plumb and square	____	____	____	____	____	____
5.3.2 Braced	____	____	____	____	____	____
5.3.3 Relative height 4:1	____	____	____	____	____	____
5.3.4 Guarded	____	0.50	____	____	____	*
5.3.5 Ladders for climbing	____	____	____	____	____	____
5.2.6 Planking	____	____	____	____	____	____
5.2.7 Tied in	____	____	____	____	____	____
Scaffold Average	____	0.50	____	____	____	
Falls Average	0.88	0.73	____	____	____	-0.15

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
6. Struck by						
6.1 Nail gun use						
6.2 Traffic control		1.00				*
6.3 Displacable tools, waste, etc	1.00	1.00				0
6.4 Toeboards		1.00				*
6.5 Material storage	1.00	1.00				0
6.6 Equipment spotter used						
Struck by Average	1.00	1.00				0
7. Caught in						
7.1 Equipment crush points						
7.2 Machine guarding						
7.3 Trenches shored, angled						
7.4 Trench access						
Caught in Average						
Overall Average	0.88	0.91				0.03

CPWR Site Safety Summary Sheet

H

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
2. Housekeeping						
2.1 Tools, scrap, etc secured	0.83	1.00				0.17
2.2 Material at ladder top or bottom	1.00					*
2.3 Tripping hazards	1.00	0.50				-0.50
2.4 Sharp ends (nails, rebar, etc)						
2.5 Work site lighting	1.00					0
Housekeeping Average	0.96	0.75				0.21
3. PPE						
3.1 Glasses						
3.2 Hard hats						
3.3 Hearing protectors						
3.4 Respiratory protection						
PPE Average						
4. Electrical						
4.1 GFCI (or assured grounding)	1.00	0.66				-.34
4.2 Grounded/double insulated tools	1.00					*
4.3 Cords/plugs condition	1.00	1.00				0
4.4 Cords protected from damage		1.00				*
4.5 Power source/ lines						
Electrical Average	1.00	0.78				-0.22

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
5.1 Protection						
5.1.1 Opening guarded/covered						
5.1.2 Harness used/ tie off						
Protection Average						
5.2 Ladders						
5.2.1 Condition						
5.2.2 Footing						
5.2.3 Length						
5.2.4 Angle						
5.2.5 Tied off						
5.2.6 Braced/secure						
5.2.7 Climbing						
5.2.8 Working from						
5.2.9 Step ladder use						
Ladder Average						
5.3 Scaffold						
5.3.1 Plumb and square						
5.3.2 Braced						
5.3.3 Relative height 4:1						
5.3.4 Guarded						
5.3.5 Ladders for climbing						
5.2.6 Planking						
5.2.7 Tied in						
Scaffold Average						
Falls Average					0.15	

	Baseline	Intervention Inspection Period				
		1	2	3	Ave	Change
6. Struck by						
6.1 Nail gun use						
6.2 Traffic control						
6.3 Displacable tools, waste, etc						
6.4 Toeboards						
6.5 Material storage						
6.6 Equipment spotter used						
Struck by Average						
7. Caught in						
7.1 Equipment crush points						
7.2 Machine guarding						
7.3 Trenches shored, angled						
7.4 Trench access						
Caught in Average						
Overall Average	0.98	0.77				0.21

Appendix VI

Paired Student's *t*-Test: Results

The results of a paired t-test performed at 19:02 on 23-DEC-2004

t= -3.13
degrees of freedom = 6

The probability of this result, assuming the null hypothesis, is 0.020

Group A: Number of items= 7
0.430 0.640 0.640 0.710 0.720 0.760 0.890

Mean = 0.684
95% confidence interval for Mean: 0.5543 thru 0.8143
Standard Deviation = 0.141
Hi = 0.890 Low = 0.430
Median = 0.710
Average Absolute Deviation from Median = 9.429E-02

Group B: Number of items= 7
0.730 0.800 0.910 0.920 0.920 0.980 1.00

Mean = 0.894
95% confidence interval for Mean: 0.8050 thru 0.9836
Standard Deviation = 9.658E-02
Hi = 1.00 Low = 0.730
Median = 0.920
Average Absolute Deviation from Median = 6.571E-02

Group A-B: Number of items= 7
-0.490 -0.360 -0.280 -0.200 -9.000E-02 -4.000E-02 -1.000E-02

Mean = -0.210
95% confidence interval for Mean: -0.3742 thru -4.5756E-02
Standard Deviation = 0.178
Hi = -1.000E-02 Low = -0.490
Median = -0.200
Average Absolute Deviation from Median = 0.141

Paired Student's *t*-Test: Results

The results of a paired t-test performed at 19:04 on 23-DEC-2004

t= -2.81
degrees of freedom = 5

The probability of this result, assuming the null hypothesis, is 0.038

Group A: Number of items= 6
0.510 0.550 0.720 0.850 0.940 1.00

Mean = 0.762
95% confidence interval for Mean: 0.5485 thru 0.9749
Standard Deviation = 0.203
Hi = 1.00 Low = 0.510
Median = 0.785
Average Absolute Deviation from Median = 0.168

Group B: Number of items= 6
0.920 0.940 1.00 1.00 1.00 1.00

Mean = 0.977
95% confidence interval for Mean: 0.9381 thru 1.015
Standard Deviation = 3.670E-02
Hi = 1.00 Low = 0.920
Median = 1.00
Average Absolute Deviation from Median = 2.333E-02

Group A-B: Number of items= 6
-0.450 -0.430 -0.200 -0.150 -6.000E-02 0.000E+00

Mean = -0.215
95% confidence interval for Mean: -0.4120 thru -1.7992E-02
Standard Deviation = 0.188
Hi = 0.000E+00 Low = -0.450
Median = -0.175
Average Absolute Deviation from Median = 0.145

Paired Student's *t*-Test: Results

The results of a paired t-test performed at 19:05 on 23-DEC-2004

t= -13.9
degrees of freedom = 4

The probability of this result, assuming the null hypothesis, is 0.000

Group A: Number of items= 5
0.690 0.770 0.780 0.780 0.800

Mean = 0.764
95% confidence interval for Mean: 0.7109 thru 0.8171
Standard Deviation = 4.278E-02
Hi = 0.800 Low = 0.690
Median = 0.780
Average Absolute Deviation from Median = 2.400E-02

Group B: Number of items= 5
0.980 0.980 0.990 1.00 1.00

Mean = 0.990
95% confidence interval for Mean: 0.9776 thru 1.002
Standard Deviation = 1.000E-02
Hi = 1.00 Low = 0.980
Median = 0.990
Average Absolute Deviation from Median = 8.000E-03

Group A-B: Number of items= 5
-0.290 -0.220 -0.210 -0.210 -0.200

Mean = -0.226
95% confidence interval for Mean: -0.2713 thru -0.1807
Standard Deviation = 3.647E-02
Hi = -0.200 Low = -0.290
Median = -0.210
Average Absolute Deviation from Median = 2.000E-02

Paired Student's *t*-Test: Results

The results of a paired t-test performed at 19:01 on 23-DEC-2004

t= -3.18
degrees of freedom = 6

The probability of this result, assuming the null hypothesis, is 0.019

Group A: Number of items= 7
0.560 0.590 0.690 0.790 0.880 0.890 1.00

Mean = 0.771
95% confidence interval for Mean: 0.6191 thru 0.9237
Standard Deviation = 0.165
Hi = 1.00 Low = 0.560
Median = 0.790
Average Absolute Deviation from Median = 0.133

Group B: Number of items= 7
0.880 0.880 0.900 0.980 0.980 0.980 1.00

Mean = 0.943
95% confidence interval for Mean: 0.8934 thru 0.9923
Standard Deviation = 5.345E-02
Hi = 1.00 Low = 0.880
Median = 0.980
Average Absolute Deviation from Median = 4.286E-02

Group A-B: Number of items= 7
-0.320 -0.310 -0.290 -0.190 -9.000E-02 -2.000E-02 2.000E-02

Mean = -0.171
95% confidence interval for Mean: -0.3033 thru -3.9601E-02
Standard Deviation = 0.143
Hi = 2.000E-02 Low = -0.320
Median = -0.190
Average Absolute Deviation from Median = 0.119

Paired Student's *t*-Test: Results

The results of a paired t-test performed at 18:59 on 23-DEC-2004

t= -2.84
degrees of freedom = 6

The probability of this result, assuming the null hypothesis, is 0.030

Group A: Number of items= 7
0.510 0.560 0.690 0.790 0.880 0.900 1.00

Mean = 0.761
95% confidence interval for Mean: 0.5926 thru 0.9302
Standard Deviation = 0.183
Hi = 1.00 Low = 0.510
Median = 0.790
Average Absolute Deviation from Median = 0.146

Group B: Number of items= 7
0.900 0.940 0.940 0.970 0.980 0.990 1.00

Mean = 0.960
95% confidence interval for Mean: 0.9275 thru 0.9925
Standard Deviation = 3.512E-02
Hi = 1.00 Low = 0.900
Median = 0.970
Average Absolute Deviation from Median = 2.714E-02

Group A-B: Number of items= 7
-0.460 -0.380 -0.310 -0.150 -8.000E-02 -2.000E-02 1.000E-02

Mean = -0.199
95% confidence interval for Mean: -0.3697 thru -2.7404E-02
Standard Deviation = 0.185
Hi = 1.000E-02 Low = -0.460
Median = -0.150
Average Absolute Deviation from Median = 0.151

Paired Student's *t*-Test: Results

The results of a paired t-test performed at 18:57 on 23-DEC-2004

t= -6.00
degrees of freedom = 6

The probability of this result, assuming the null hypothesis, is 0.001

Group A: Number of items= 7
0.720 0.740 0.790 0.790 0.840 0.880 0.920

Mean = 0.811
95% confidence interval for Mean: 0.7442 thru 0.8786
Standard Deviation = 7.267E-02
Hi = 0.920 Low = 0.720
Median = 0.790
Average Absolute Deviation from Median = 5.571E-02

Group B: Number of items= 7
0.940 0.950 0.960 0.970 0.980 0.980 0.980

Mean = 0.966
95% confidence interval for Mean: 0.9507 thru 0.9807
Standard Deviation = 1.618E-02
Hi = 0.980 Low = 0.940
Median = 0.970
Average Absolute Deviation from Median = 1.286E-02

Group A-B: Number of items= 7
-0.260 -0.210 -0.170 -0.150 -0.140 -9.000E-02 -6.000E-02

Mean = -0.154
95% confidence interval for Mean: -0.2172 thru -9.1360E-02
Standard Deviation = 6.803E-02
Hi = -6.000E-02 Low = -0.260
Median = -0.150
Average Absolute Deviation from Median = 5.000E-02