

Revalidation of the Contractor Assurance Program for Achieving Zero Injury

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Introduction

Since the Safety Council Texas City (“SCTC”) organizational inception on June 25, 1987, SCTC has served as a model for innovative solutions for contractors working in the petrochemical industries in Texas City, Texas and throughout the country. Originally founded as a nonprofit corporation by six major industrial facilities and the contractors who provided services, SCTC, formally known as the Contractors Safety Council of Texas City, has enjoyed great success in creating solutions that enhanced safety, health, environmental and security services to the contractor community. Beginning as the first training center to create a common contractor orientation training program for area industry, the SCTC model has been adopted and replicated by numerous Safety Councils along the Gulf Coast. SCTC innovative solutions were first recognized as a model practice in the John Gray Report on Petrochemical Safety commissioned after two serious explosions that occurred in the Houston, Texas area in 1989 and 1990. The report recognized SCTC for creating a generic contractor safety orientation that raised the level of safety awareness for the entire contractor community and recognized the need to offer training services in English and Spanish when it published its findings in 1992. These successes lead other locations to form similar nonprofit Safety Councils that expanded its outreach across the United States. The expanding Safety Council network created a nonprofit parent organization entitled the Association of Reciprocal Safety Councils (“ARSC”) to facilitate and expand reciprocal services to the contractor and petrochemical community. The core training developed by ARSC members was taught to over 327,000 workers in 2012 and has grown to 23 Safety Council members.

SCTC services have changed and evolved with the times always geared to fulfill our mission “to advance the Safety, Health and Security of workers in the communities we serve.” In 2008, SCTC received the Annual Risk Innovator award from Risk & Insurance Magazine for the development of the Contractor Assurance Process (“CAP”) software which allowed our petrochemical owners to prequalify contractors using various matrices and allowed screening of contractor employees to ensure a drug-free, security background-checked, safety-trained and

skill-assessed workforce. SCTC became an accredited National Center for Construction Education and Research (“NCCER”) Assessment Center in October 2009 and continues to offer assessments and performance verifications for rigging and heavy equipment operators. SCTC plans to offer mobile crane certifications in May 2013.

SCTC headquarters are located in Texas City, Texas in a 24,500 square foot facility located on five acres of land less than one mile from our largest client. The state-of-the-art facility features a main computer based training (“CBT”) lab with 132 units along with a second CBT lab of 36 units for conducting assessments for NCCER. The facility has five large training classrooms, as well as tenant services that allow for drug testing, fit testing, issuance of the Transportation Worker Identification Credential (“TWIC”) for Galveston County and a wellness, non-urgent medical services center was introduced in January 2013. The integrated service center approach is another innovative solution to optimize return on investment for our contractor members. SCTC also offers the NCCER sponsored Construction Site Safety Technician (“CSST”) course on a quarterly basis to meet the needs of the contractor community.

The future of SCTC continues to be built on innovation. SCTC is working with our area contractors, community leaders, industrial partners and the local school district to create a career tech high school that would teach the NCCER curriculum to those students seeking a career in our area industry. SCTC’s logo and tag line “Serving Local, Reaching Outward” reflects the execution of our strategic plan, which is based on innovation from the past, present and future.

Development of the CAP Software Solution

Safety professionals have long utilized the strategy of lessons learned to create safety and health solutions to tackle today’s challenges and better equip us for future opportunities to minimize risk associated with our work environment. One of the most challenging work places to minimize the risk of personal injury is the petrochemical industry. These facilities are required to operate 24 per day, 365 days per year under conditions of high temperatures and pressures while utilizing highly hazardous chemicals as feed stock to produce chemicals and refinery products so essential for American life. As a nation, we expect these facilities to operate unabated and without incident day after day, year after year. In order to achieve these operating parameters and expectations, large maintenance activities, called turnarounds (“TARs”) are planned by the facility owner to repair, maintain and upgrade equipment for continual safe operations of these facilities. It has become commonplace since the early 1980’s to utilize general and specialty contractors to perform many of these repair activities. The contractor workforce at an owner facility can easily increase by a factor of five-ten times the normal contractor population during TAR outages. The startup of these units can be especially dangerous as highly hazardous chemicals are reintroduced into the process and increased temperatures/pressures can form a potentially catastrophic event without proper safeguards in place.

Such an event occurred on March 23, 2005 at the BP Texas City Refinery, Texas City, Texas. The explosion occurred during the startup of the isomer unit resulting in 15 deaths and over 170 people injured. OSHA levied an initial fine of \$21 million against BP for numerous violations of the Process Safety Management (“PSM”) standard (29CFR 1910.119). A subsequent fine of \$87 million was levied on October 30, 2009 for failure to abide by the terms and conditions of the initial settlement agreement. On August 12, 2010 BP settled the case with

OSHA by agreeing to pay \$50.6 million. It is estimated that the total cost of compensation paid by BP to deceased or injured plaintiff's exceeded \$1.6 billion. This event generated a study into the practices of BP management entitled the Baker Report, which was submitted to governmental officials in January 2007. A large portion of the study focused on the safety culture at the site and within the BP organization. It is at this very site that this case study in creating a zero injury culture was implemented. This site was sold to Marathon Petroleum on February 1, 2013 and now operates under the name of Marathon Galveston Bay Refinery (GBR).

Since SCTC was responsible for providing baseline contractor safety training for all contractors entering the Marathon GBR site, Marathon Health, Safety, Security and Environmental ("HSSE") staff continues to work with SCTC to create a state-of-the-art safety process for their contractors. To fully understand the complexity of this task, it is important to grasp the size of the site and number of personnel working there on a daily basis. The Marathon GBR site is the fourth largest refinery in the United States with a refining capacity of 475,000 barrels per day. The refinery and contractor workforce works between 15-17 million work hours per year depending on major capital project or TAR activities. In addition to the Marathon GBR site, SCTC provides baseline contractor safety training for eight additional petrochemical owners. These owners are Ashland Inc., Ascend, Inc., DOW Chemical, Eastman Chemical, INEOS Chocolate Bayou, Marathon Petroleum, Styrolution America LLC and Valero Refining. In creating a solution for Marathon GBR Texas City, SCTC also gathered input from these other owners to create a solution that was workable at other owner facilities and leverage the concept of reciprocity to ensure cost saving and consistency of performance. SCTC routinely trains over 17,000 contractor workers per year working at the Texas City Industrial complexes. When developing the solution for the owners, SCTC chose to utilize a "cafeteria" approach as opposed to a "standardized" solution with limited flexibility. There are standardized components in the CAP, but owners are free to choose what components they will implement and how they will implement them. Before entering into the discovery process, SCTC began to examine how HSSE expectations were defined by our owners and the contractors they employ. For petrochemical owners compliance with the OSHA PSM standard (29CFR 1910.119) is paramount and section (h) of the standard addresses the owner's responsibility as it relates to contractors. In this section, owners are required to evaluate contractor safety performance and programs, inform contractors of known, potential fire and explosion hazards, explain provisions of the Emergency Action Plan, develop safe work practices, periodically evaluate performance of contractors and maintain injury/illness logs. Further contractor HSSE expectations can come from corporate mandates, regional or plant specific policies or additional compliance activities like the OSHA National Emphasis Program for refiners and chemical plants. These expectations can be communicated in a variety of ways, such as governmental regulations, consensus standards, contractual language, corporate policies, plant site policies/procedures, pre-bid/award meeting and job-specific task instructions, i.e., work permits and JSA's. After gaining an understanding relating to the HSSE expectations of the owner for their contractors, SCTC determined that five distinct cornerstones where necessary to drive to a zero injury performance. These cornerstones were Contractor Prequalification, Fitness for Duty, Security Screening, Safety Training, and Craft Skill Assessment. Once these cornerstones were established, SCTC operated as the Subject Matter Experts for the development of each cornerstone and utilized a strategy to set realistic expectations, plan for the learning curve, utilize success stories and build flexibility into the process. In addition, an evaluation component was developed to monitor performance and methodology, determine criteria for performance evaluation, establish short- and long-term goals, report to stakeholders and provide a system for feedback and process improvement.

Contractor Prequalification Cornerstone

The implementation of the five cornerstones in the CAP is designed to build upon each other in a systematic order to achieve a zero injury culture. The first cornerstone is centered on the use of qualified contractors. This cornerstone was developed to assure the owner that each contractor's safety performance and safety programs are evaluated and the contractor has the ability to perform the work activities required. To begin the process, the contractor is required to submit a standardized Prequalification Form ("PQF") to SCTC for review. The PQF tool utilized by SCTC was an electronic PQF tool designed and developed by the Safety Council of Southwest Louisiana ("SCSWLA"). This system was chosen on the criteria of flexibility, cost, and owner usage across the Gulf Coast region. Six associated Safety Council's utilize this PQF representing over 75 owner facilities and over 2,000 contractor companies. This solution allows for specific owner addenda to be added to the PQF and the owner can review the contractor PQF at no additional charge. The contractor fee is \$100/year to complete the PQF and safety statistics, i.e., EMR, OSHA recordable rates, etc., are submitted annually. There are many other providers of a standard PQF solution, e.g., IS Net World, PEC Premier, PICS, etc., but they are costlier and have limited flexibility. Fees for both owners and contractors in these other systems vary and increase when more owners view the PQF or are based on a sliding scale determined by the number of contractor employees.

In order to provide a quality, economic solution for Contractor Prequalification and review of contractor safety programs, SCTC formed a joint venture partnership with SCSWLA and Industrial Safety Training Council in the creation of Safety Council Solutions ("SCS"). SCS employs retired petrochemical HSSE professionals to perform the safety program audits. The contractor can log onto the SCS database to view the specific safety program requirements for each applicable standard. Each written safety program is scored against the required components with auditor's comments available to the contractor to assist them in achieving a score of 100% on each module. SCTC recognized that having a written safety program isn't sufficient in achieving a zero injury culture. SCTC conducts additional auditing by conducting a PSM audit of the contractor safety and health program. This audit is valid for a three-year period and the auditor performs a site review audit verifying each "yes" response on the PQF document submitted by the contractor. The auditor verifies required training, and interviews contractor employees to assure the training was meaningful and understood. This audit also utilizes retired petrochemical HSSE professionals knowledgeable in contractor operations and work activities.

Once the contractor has successfully completed both the written safety program audit and the PSM audit, they are listed as "authorized" in the Contractor Prequalification database built by SCTC. The authorization status is maintained by the owner procurement/HSSE staff. This database is linked to the owner site-specific safety training so a contractor who is not "authorized" by the owner is not eligible to register their employees for the owner site-specific safety training allowing them access into the petrochemical facility. This process has prevented access of second/third tiered subcontractors from being eligible to work on the owner site without having submitted all required documents and be properly vetted based upon owner HSSE requirements. If an "unauthorized" contractor attempts to register for the owner site-specific safety training, an information message will be displayed on the registration screen stating the contractor was "unauthorized" for work at the owner facility and a contact name/number is provided by the owner.

Fitness for Duty Cornerstone

The second and subsequent cornerstones in the CAP focus on the individual contractor employee. Once a contractor is “authorized” for work in an owner facility, entry requirements for each employee are determined. The fitness for duty cornerstone is essential in creating a zero injury culture. Workers must be drug and alcohol (“D&A”) free in order to perform their job tasks in a safe manner. D&A testing requirements can exist due to governmental mandates, e.g. DOT, owner mandates or contractor mandates. Most D&A testing programs involve pre-employment testing, random testing, post incident testing and for cause testing. Because of the sensitive nature of D&A testing, SCTC chose to provide a D&A collection center in our training headquarters and allowed the owner to determine the acceptable D&A testing program. SCTC involvement in the D&A program is to electronically link to the database of selected D&A testing labs to determine compliant status to the owner D&A testing program. Four of the eight owner facilities served by SCTC utilize hair testing as the means to determine if each contractor employee is fit for duty. Many of our owner’s participate in industry sponsored D&A consortium programs, e.g., VECTOR, NASAP, DISA, etc., to leverage reciprocity and ensure compliance with Fair Credit Reporting Act (“FCRA”) requirements. Actual data from the D&A labs showed a 5-10% increase in the positive rate of employees tested when utilizing hair testing over urine testing. The urine-testing component is still utilized for post incident and for cause testing. Current random testing policies for owners are 50% of the contractor workforce. Additional D&A testing is mandated for contractors performing Immediately Dangerous to Life and Health work. The use of the industry-sponsored programs has shown success for completion of rehabilitation and aftercare testing. By having SCTC electronically “ping” the industry-sponsored databases for compliant status of the contractor worker, drug testing results remain confidential between the contractor and his employee. SCTC does not see the drug test results or know who is noncompliant. When the contractor registers the employee for the owner site-specific safety training, the SCTC CAP software verifies if all owner business rules are met. If they are met, the registration process continues and the employee is scheduled for training. If the owner business rules are not met, the contractor is provided an information message to review all owners’ business rules. These business rules include D&A testing and security background checks.

Security Screening Cornerstone

Once a contractor employee has successfully completed the fitness for duty requirements, all of our owner companies require some sort of security vetting of each employee. The purpose of this cornerstone is to assure each contractor employee has presented valid picture identification and completed an initial security assessment. The program ensures each contractor employee provides a government-issued photo I.D. matching their name against their established Social Security Number (“SSN”). Starting in 2003, SCTC began a process to verify the identity of all contractor employees by conducting a Social Security Verification (“SSV”).

In order to safeguard against the acceptance of fraudulent identification cards, SCTC reads each badge using an electronic reader that verifies the authenticity of each state issued photo identification card. The contractor is required to order the SSV report through SCTC that provides information regarding the validity of the SSN and this is matched against the established

name. An auto grader system was developed for SCTC to grade the name/number match as approved or provisional. All provisional grades are matched against an established database. An example of a provisional grade would be a submittal of the SSV under the name, e.g., Bob Smith, but the SSN is issued to, e.g., Robert Smith. The provisional grades are reviewed and scored as approved or rejected in the SCTC database. SCTC further enhanced the SSV process by linking it to our local F.B.I. Joint Terrorism Task Force representative and local law enforcement to arrest and prosecute offenders. Each contractor employee signs an affidavit verifying their name and SSN and agrees in the affidavit to the prosecution allowable under Texas State law for submittal of false identification credentials. This language, crafted by the local District Attorney, resulted in successful prosecution of contractor employees who provided false identification credentials. Since SCTC began this process in 2003, over 78500 SSV's have been conducted with 282 rejections resulting in a .35% rejection rate. In the past two years, only one rejection occurred. The SSV is a one-time event and costs the contractor \$5/person. The designated SSV code is printed on the contractor employee badge and verified in the SCTC database. SCTC accepts SSV's from other Safety Councils participating in the program and honors reciprocity. In 2012, over 2,600 SSV's were honored by SCTC resulting in a cost savings exceeding \$13K for contractor companies. All nine of the petrochemical facilities served by SCTC require a SSV as a prerequisite for site-specific safety training.

Four of our eight facilities are under the security requirements established by the Maritime Transportation Security Act. These requirements are maintained and monitored by the U.S. Coast Guard and vetting is done according to the requirements established by TWIC. Since all of our petrochemical facilities are considered part of the critical infrastructure of the United States, many of our owners have adopted a more stringent security screening standard.

In 2003, SCTC joined with other Safety Councils to create a reciprocal background screening solution for petrochemical owners. A group entitled the Safety Council Security Consortium ("SCSC") was formed to develop a cost effective, reciprocal security solution for the petrochemical industry. Thirteen Safety Councils began to participate in the SCSC Security Background Screening program. The basic guidelines were developed from a report issued by the American Chemical Council Responsible Care, Security Code of Management Practices. As a result of the events of September 11, 2001, it became imperative that a vetting system based on security guidelines for contractors entering into petrochemical facilities was needed. The SCSC members agreed to a tiered grading system ranging from 00, i.e., clear to 07, i.e., Patriot Act watch list, to grade each contractor employee. Each owner facility utilizing the Background screening program would establish the acceptable threshold for entry into their facilities. The Background Check Graded ("BCG") designation and upgraded 2.0 BCG product is printed on the contractor employee badge to verify the background check was performed. The process to conduct the background begins by developing a residence history for the contractor employee. The SSN is used to develop this residence history and a seven-year county criminal search is made from this history. The BCG program can be adjusted for increased risks and allows for each owner to establish their exclusion score. During the program's initial stages, most owners chose a score of 05, i.e., violent felony conviction, as the exclusion level, but recently, most owners have reduced the exclusion score to 03, i.e., any felony conviction. Since the program began, over 587000 contractor workers have been screened by SCSC member Councils and the screen is valid for a two-year period. If a contractor employee changes employers and was screened by a previous employer, the hiring contractor can order a prior screen gaining a copy of the report for a fraction of the cost. The exclusion rate for participating SCTC owners at the 03 level is 4.7% and

SCTC has conducted over 142,000 BCG screens since the program began. SCTC estimates that the reciprocity component built into the process has saved contractors over \$3 million since the program began. The average time to receive the results averaged 1.23 days in 2012. SCTC has established a business rule linking the owner's acceptable BCG score to the contractor's ability to register the contractor employee for the owner's site-specific safety training. If the contractor employee doesn't have an acceptable score or the results aren't completed, the contractor will receive an information message from the SCTC registration system that "employee registration cannot continue, verify owner business rules." If the required score is achieved, the registration of the contractor employee is accepted by the system and the worker is registered for the owner site-specific safety training. Each owner may choose to establish a petition process for special circumstances. It should be noted that this program is fully compliant with all rules established by the FCRA and the reports are viewable by the contractor only. The participating SCSC members serve as a portal hub for ordering the BCG, but the results/scores are not known by the SCSC members. An electronic 'ping' verifies compliance with the owner's business rules for the BCG.

Safety Training Cornerstone

The next cornerstone in the CAP is the Safety Training component. As stated previously, contractor employees who haven't satisfied the fitness for duty and security screening business rules aren't eligible for completion of the safety training component until the previously mentioned business rules are satisfied. The purpose of this cornerstone is to assure that each contractor employee receives the required safety training needed to perform his/her work safely. SCTC participates in an industry-sponsored training program developed by ARSC program entitled Basic Orientation Plus ("BOP") and Basic Orientation Plus Refresher ("BOPR") for baseline safety training. ARSC was founded in 1997 and its members have conducted over 3 million training units since 1999. The curriculum of the BOP/BOPR covers nine OSHA-mandated training topics. The program outline is as follows:

- Introduction to Basic Orientation Plus
- Hazard Communication
- Personal Protective Equipment
- Respiratory Protection
- Hearing Conservation
- Electrical Safe-Work Practices
- Elevated Work
- Process Safety Management
- General Rules and Emergency Response
- Excavation, Trenching and Shoring
- Job Hazard Analysis/Job Safety Analysis
- Review and Testing/Question Answer Period

Each contractor employee must successfully complete a comprehensive 50-question written test with 70% passing score with test question review to 100%. The BOP/BOPR is taught in English only for reciprocal purposes. All first-time participants are required to take an instructor-led version and the training is valid for 12 months. ARSC has developed a list of "Common Guidelines" that must be adhered to by all ARSC members teaching the program.

ARSC membership is limited to 501 (c) nonprofit organizations. Each ARSC member is audited every two years by a third-party independent auditor to ensure the “Common Guidelines” are followed. There are currently 23 ARSC members performing training in over 40 locations throughout the United States teaching this standardized curriculum. Since the training at ARSC member’s locations is reciprocal, SCTC contractor employees saved approximately 22,000 man-hours in duplicate safety training in 2012. SCTC has been involved with the ARSC training since 1999 and over 407,000 man-hours of duplicate training have been eliminated resulting in cost saving to contractors and owners of over \$16 million using an average man-hour cost of \$40/hour.

In addition to the cost savings from the reciprocity established for the BOP/BOPR programs, the base level of safety training and knowledge from the program has driven the best safety performance for contractors in the world. A cornerstone of creating a zero injury culture is building upon the foundation of safety knowledge and best practices. Industry safety recognition programs greatly contribute to creating the zero injury culture. The Houston Business Roundtable (“HBR”) is celebrating their 26th year of honoring outstanding contractor safety performance. In 2012, Petrochemical Owners nominated 86 contractors for outstanding safety performance, which totaled over 254 million man-hours worked. These contractors achieved a total OSHA recordable injury rate of 0.43%. All these contractors utilize the BOP/BOPR as their baseline safety training process.

Once a fundamental level of safety knowledge is established, the SCTC process involves the development of owner site-specific safety training modules unique to each owner facility. The owner’s set the training frequency, passing score, course content and performance objectives.

SCTC developed a training registry to track training and match safety training requirements for each contractor craft group against owner specific requirements. This registry provides training verification if the contractor worker “meets requirements” or “doesn’t meet requirements” for the required training for each contractor craft, e.g., boilermaker, electrician, pipefitter, machinist, etc.

Additional specialized training is offered in the areas of competent person training, OSHA Education Center courses utilizing the University of Texas at Arlington as the sponsor, and medical surveillance, e.g., fit testing, audio-metric testing, etc. SCTC recently completed a new standardized training program entitled “Protect Watch” for contractor employees performing “watch duties” for confined space, fire watch, etc. This program covers six modules (confined space, fire watch, hands-on fire extinguisher, bottle watch, principles of atmospheric testing and gas detection equipment). The training is reciprocal from contractor to contractor and a separate badge and “Protect Watch” hardhat decal is issued along with a separate badge.

Craft Skill Assessment Cornerstone

The last component of the CAP is the Craft Skill Assessment cornerstone. The purpose of this cornerstone is to assure that each contractor employee has the necessary craft skills to safely complete the work assigned to them. There are various craft skill assessment programs utilized by contractors including organized labor apprenticeship programs, industry-sponsored programs, i.e., NCCER and contractor-sponsored programs for specialty contractors. All of these programs play

an important role in creating a zero injury culture.

SCTC is an accredited NCCER Assessment Center and will begin offering craft curriculum training in 2012. A Workforce Development Partnership with College of the Mainland (“COM”) allows SCTC contractor members to utilize state-of-the-art lab facilities at COM for hands-on training in the various construction craft curriculum. In addition to the construction craft curriculum, SCTC offers the 100-hour CSST curriculum through NCCER and each candidate also receives a 30-Hour OSHA Certification card in construction standards at the completion of the training.

All of the CAP cornerstones contribute to creating a zero injury culture. The real challenge is execution in the field. This is where the “rubber meets the road” and where the HSSE system either succeeds or fails.

The Contractor’s Perspective

With the Safety Council of Texas City Association of Reciprocal Safety Council’s Basic Orientation Plus Course and Refresher and as well as refinery site-specific orientation as foundational safety training, The Contractor, a mechanical turnaround specialty company, has progressed with its Texas City workforce to be defined as *“Leaders in TAR Safety”*. After winning the prestigious Houston Business Roundtable Safety Excellence Award for *“Best in Category”* AltairStrickland (AS) has grown in prestige as well as in corporate magnitude as project and maintenance work continues in petrochemical, refining and chemical industries.

From a historical perspective, AS started in 1976 with meager beginnings. AS began by performing revamp construction on a refinery FCC Unit in Texas City, Texas. As a union contractor in the 1970’s, AS adapted from a union contractor to a merit shop contractor when union work diminished in the Gulf Coast area. AS works across the North America providing engineering, planning and TAR services. The company workforce has exceeded 1000 craft employees in numerous years.

Safety excellence initially became a reality in 1998 when AS was nominated and won its first Houston Business Roundtable Safety Excellence Award. In 2009 AS was introduced to the Construction Industry Institute (“CII”) zero injury safety leadership concept from research team activity performed at 122 work-sites in North America.

CII chartered six research teams, the first of which was to determine the safety techniques for prevention of accidents on construction project sites. The research evaluated 122 work-sites where contractors’ safety results were studied, finding 53 of the contractors (10% of the group) were achieving zero lost-time injuries cases and ten contractors (representing 8% of the group) were achieving zero recordable injuries based on OSHA recordkeeping guidelines and incidence calculations.

The research revealed five major techniques for implementation on contractor work-sites for achievement of zero lost time injuries. Those five techniques were:

1. Safety planning

2. Safety training and education
3. Recognition and rewards
4. Accident/Incident reporting and investigations
5. Drug and alcohol testing

Additional CII Research

The CII chartered five research teams from 1989-2003 to determine the feasibility and reality of attaining zero injuries on construction projects. A sixth team was chartered in 2012 to research the use of leading indicators. Table 1 reveals the research details from the first five teams.

122 Projects
North America including Canada
53 contractors were at Zero LTI's = 10%
10 contractors were at Zero TRIR = 8%

Table 1. CII Research.

In 2001, the Zero Accident Task Force was commissioned by the CII with the idea of “Making Zero Accidents a Reality.” The research task was to determine if the original five techniques were still viable. The Zero Accident Task Force came up with four additional techniques to expand the critical elements to nine, from the original five (new items underscored).

1. Demonstrated management commitment
2. Staffing for safety
3. Safety planning
4. Safety training and education
5. Worker participation and involvement
6. Recognition and rewards
7. Subcontractor management
8. Accident/Incident reporting and investigations
9. Drug and alcohol testing

After the initial evaluation, contractors and owners were challenged by CII researchers to verify if the nine principles would apply to all workplaces. CII researcher's data indicated annual collected safety tabulations. The research data, when implemented, became the cornerstone for achievement of zero injury. The listing of nine principles is a road map of what to do; however, successfully navigating the road map is the key to zero injury. According to zero injury consultant, Emmitt J. Nelson (“Nelson”) of Nelson Consulting, Inc., the return on investment, regardless of the amount invested, is 200-500%. A contractor, when compared to the OSHA BLS national averages for construction, may have a higher return on investment.

AS embarked on the journey to zero injury when they realized that zero injury was possible

for great lengths of time and work hours.

AS Journey to Zero Injury

Company safety leaders embarked on the zero injury journey with the help of project management leadership at BP Texas City. After the aftermath of the March 23, 2005 BP explosion, in-plant contractors were skeptical to think it couldn't happen again. Doing its part in injury prevention and safety training, AS site safety leaders invited Emmitt J. Nelson as guest speaker for a project safety committee meeting. The presentation was outstanding in bringing forth new ideas and it stimulated the team towards their commitment to attaining zero injury. Below are changes AS made to its safety program since implementation of the zero injury leadership concepts:

1. **Corporate Assessment**-AS brought Nelson to evaluate the safety culture of the project team in Texas City to assure the company had all required compliance documentation in place such as: Safety Manual, documented training, inspection/corrective action, safety meetings, reporting/investigations/tracking of incidents and others. In addition to having compliance requirements intact, AS leadership made the commitment to follow Nelson's recommendations to begin enhancement of the safety program. Additions to the program included:
 - a. CEO/President commitment letter
 - b. Zero injury project team assessment
 - c. Zero injury education certified through SCTC CBT data based training modules
 - d. Safety readiness index for upcoming project/maintenance/TAR
 - e. Enhanced commitment, communication and caring
2. **Project Safety Culture Assessment**-A project employee culture assessment process was used as an interview instrument whereby a cross-section of project team representatives were personally interviewed to determine a) quantitatively if the recommended CII best practices were implemented on the project; and b) a qualitative scoring to see how effective they were when used on the project. The employees interviewed were the project manager, lead safety specialist, four superintendents and staff, four foremen and eight craftsmen selected by the interviewers. When completed, Nelson compared the AS project team results with the CII national database of contractors that had been safety culture assessed. From comparisons with other companies, AS scored in the top three companies that had been assessed in the past 20 years.
3. **Safety Training Programs**-Additional and supplemental safety training was implemented in the AS Continuing Education ("ACE") Training Center to bring employees to a higher safety education level. The company installed 20 computer work stations in the ACE Training Center for employee training in culture safety studies as well as safety compliance topics such as scaffold use, fall protection, hazard identification and mitigation, lockout/tagout ("LOTO") and other safety training available at SCTC.
4. **Supervisor Leadership Training**-AS developed and implemented an ongoing training process for employees in the specifics of zero injury. This included leadership and

supervision of subcontractor employees, emphasizing responsibilities and accountability. The elements of communication, commitment and caring (the Big 3C's) were required training. Implementation and use of these programs helped the company reduce employee issues, enhanced employee participation in safety meetings, walkthrough audits and inspections, and behavioral safety observations.

5. **Site-Specific Safety Data**-AS maintained document history of job-site safety data and allowed all project participants' access. Upon NCI recommendation, safety statistics were communicated regularly and frequently to the project team. Keeping safety metrics up-to-date and on the minds of workers produced zero injury safety program commitment.
6. **Enhanced Orientation**-AS added new safety programs to the orientation for newly hired and returning employees. New program materials covering CII history of zero injury, zero injury logic, leading and lagging indicators, key performance indicators, leadership techniques, and comparative metrics show CII member companies versus national averages and other innovative materials were used. Project leaders were further trained in a tiered safety training approach based upon accountability and project safety responsibilities.
7. **Employee Craft Assessments**-AS employees are craft-assessed to assure knowledge of their trades. Certifications/training credentials with national registry such as Department of Labor apprentice programs and NCCER are used. AS discovered these programs did not always examine the skills applicable to the TAR industry, therefore, AS developed its own craft assessments to verify skills needed per customer requirements. Since AS work involves opening, inspecting, repairing/replacing petrochemical and chemical plant units, the AS-developed assessment instruments better suited the owner's skill needs.
8. **Incident Reporting/Investigation**-AS implemented a system for instantaneous reporting and trending of incidents to all corporate and project leaders. The new methodology is a system developed internally by corporate IT specialists using the latest software and web-based programs. New techniques assist with instant notification for improved case management and a resource for project leaders reaching offsite subject and project matter experts. The extra offsite project review was extremely useful for identifying problems and for initiating solutions and appropriate corrective actions. An identified, available preset team was trained and prepared for investigation and implementation of mitigating and corrective measures. From the CII research, AS learned the importance of treating near miss reporting as a leading indicator rather than a lagging indicator.
9. **Behavioral-Based Safety Program**-The AS behavioral-based safety system was modified after the zero injury process was implemented. It combined the humanities elements of observation, counseling, coaching and mentoring, and feedback to employees along with audit/inspection items. It is a process for joining people and things together into one audit/observation process. Observations are tabulated as "at-risk" or "safe" and the collection of items are cataloged, data based and communicated to all project participants. Scoring for the process is used as an opportunity to improve previous results.
10. **Safety Committees/Employee Recognition**-Implementation of a project employee safety committee program on every jobsite created commitment to the zero injury

process. A teamwork approach utilizing committees are used regardless of job duration or number of employees on site. Modifications to program are made by Corporate Safety Committee approval. Committee members volunteer to serve on the committee providing input for solutions to safety issues and opportunities for improvement. An employee recognition program was created by participating employees. Employees make written suggestions that are evaluated and discussed at committee meetings and when appropriate, ideas are implemented. Entitlement/incentive plans were discontinued and replaced with employee-driven programs for recognizing the achievement of individuals and teams. Committee members representing crafts and staff participate in safety meetings, behavioral observations, audits and inspections.

11. Pre-Task Safety Planning/Risk Assessment-With the advent of the zero injury process, a new pre-task planning tool was implemented to acquaint crews with hazards of the task, scope of work to be done, and methods to mitigate hazards. AS developed and implemented a risk assessment component to the pre-task planning program whereby employees, prior to performing task work, have the opportunity to inform coworkers and supervisors of their risk level. This process allowed crafts to ask for additional resources and technical help as needed. If a craft team perceived that imminent danger/risk is inherent with the work, the ‘Stop Work Authority’ process was implemented. Where a perception of unacceptable risk is validated, work would not be allowed to continue until all issues are resolved.

12. Zero Injury Certified-The new zero injury process required employees to take the online CBT training at SCTC for craft, foreman, superintendent, project manager and safety specialist. A training matrix was available for owner review. Use of this instrument developed by AS safety leaders with help from NCI, provided AS consistency in achieving the same knowledge level regarding roles, responsibilities and accountability for achieving the daily result of zero injury. Employees received a frame-ready certificate from NCI/SCTC. Training modules for the five groups of project participants were available at SCTC. The craft course was one hour long. Foremen were required to take the foreman course plus the craft modules. Superintendents were required to take the superintendent modules plus the foreman and craft modules. A graduated training process allowed all project employees to have a consistent base of information necessary to achieve zero injury. Employees learned in the training modules the definition of zero injury: ***Zero injury does not mean that an injury will not happen, but that employees and leaders do not want another injury to occur and will do everything in their power to prevent the next at-risk behavior that leads to injury.*** Furthermore, employees learned the root cause of every injury is at-risk behavior and the remedy for injury prevention is the removal of at-risk behavior.

Key Performance Indicators (“KPI”)

In addition to the leadership concepts that AS implemented on the journey to zero injury, the following KPI’s were implemented in project safety execution:

- Leaders and employees were trained in the zero injury techniques
- Number of behavioral observations performed

- Number of hazards reported and corrective actions implemented
- Quality over quantity (audits, inspections, training)
- Achievement of OSHA competencies achieved by employees (mastery in training subject, completion of a training course)
- Number of field visits conducted by on-site supervisors
- Number of field visits by corporate representatives
- Leaders spent more time in the field with employees
- Quality safety observations/safety audits conducted identifying hazards, correcting hazards, and recognizing workers for safe work practices
- Number of employees participating in performing safety audits and task observations
- Implementation of action plans resulting from HSSE safety committee and safety audit findings
- Near misses being regularly identified, reported, and corrective actions developed and communicated
- Action items completed that were recommended in near miss investigations
- Repeat incidents being identified, reported, and acted on (action plan implementation)
- Percentage of Job Safety Analyses being completed properly for assigned activities and reviewed while task was being performed
- Percentage of incidents reviewed and closed out, and corrective actions communicated
- Housekeeping/hand tool /ladder safety /body positioning issues reported and corrected
- Permit/LOTO/PPE/cell phone/ fall protection compliance issues reported and corrected
- Re-work reported, investigated, and corrected
- Reported hazards were documented and corrected
- All workers receive documented orientation training prior to moving to the jobsite
- Percentage of safety audits indicated less at-risk behaviors
- Percentages of safety observations showed positive compliance with established safe work practices
- Number of workers involved in the safety process through safety committee participation, writing JSA's for each work assignment, participation in safety meetings, and participation in job-walks with supervisor
- Implementation of employee perception surveys and action plans to correct identified deficiencies and investigation of negative findings
- Determined adequacy of employee skill levels using pre and post employment craft assessment tools

The Results

The 2013 results in the quest for zero injury have been documented and are included in Table 2 below.

The 2012-2013 AS TAR began Texas City in December 2012 with pre-down activity and commenced in January 2013, ending in March 2013. Total work hours were 144,419.

Recordable injuries	0
Total Recordable IR	0.0
First Aid Cases	6
Near Misses	5
BBS Observations	824
JSA's completed	983
Safety Audits	523
Equip. Pre-use inspections	213
Safe Critical Lift Analysis	16

Table 2. Project Statistical Data

By comparing published data by the National Bureau of Labor Statistics/OSHA construction average in 2011 of 3.9 TRIR and 2.1 DART, once again the company safety performance is superior at a zero injury outcome. As shown in Table 3, AS prevented the following injuries by implementing a zero injury process.

3 recordable injuries
1.5 DART cases and
Unknown pain, suffering and loss

Table 3. Project Injuries Prevented

Extrapolation of BLS Injury Statistics

As shown in Table 4 below, the company illustrated that zero injury performance can achieve superior results.

In 2011 US constructors had 3.9 recordables in 250 work days
$250 \text{ days} / 3.9 = 64 \text{ days between recordable injuries for 100 workers}$
If 100 constructors could work injury free for 64 days why could they not work 65?

After all in 1989 (20 years prior) it was 250 / 14.3 = 17.5 days between injuries
That is 46 additional days at ZERO injury improved over the year 1998. That is equal to 500,000 fewer injuries/yr.

Table 4. Extrapolation of Injury Results

How the Company Did It

The CII research revealed three components to achieving zero injury, which are management and leadership principles. The three components are Communication, Caring and Commitment, as stated by Nelson. These cannot begin at the craft level and work upward. Management must demonstrate their commitment with “Boots on the ground.” All members of management must ensure consistency with project teams.

Communications

AS discovered that project teams must receive the details and the logic for reaching zero injury. It is truly for the worker who may be in harm’s way and face hazards on the job in refineries and manufacturing plants that white collar groups do not face. Management must inform workers that safety excellence is good business and zero injury with zero claims gives the employer a greater return on investment. Employees must be told that preventing injury and removing the direct and indirect costs and burdens to the company provides a more competitive organization. This results in more job opportunities, better working conditions, improved bidding opportunities and an overall better company. Employee perception surveys determined that no employee, leader, facility owner or family wants workers injured.

Caring

Nelson stated in his inaugural address to the AS employee safety committee, **“Until employees know how much the company cares for workers, the workers won’t care for the company.”** Nelson informed the AS safety committee that companies must treat employees with dignity and respect. He said that a company cannot punish its way to zero injury, therefore punishment; especially regarding safety infractions is a tedious affair. Workers that understand their roles and responsibilities to co-workers and to the project team will eliminate themselves from the project by self-termination. With continued commission of safety infractions, they will not fit into a zero injury culture and will have to leave the project. Nelson said that employers must listen to workers and ask them for input. Praise and recognition must come from the company first and progress to all workers. The company and project will get commitment from workers, making safety a core value, not a priority.

Nelson said that employees must adopt a ‘Safety Code of Honor,’ a value to be honored by safe work behavior. This involves an honor to live a zero injury-centered life at work and at home. This becomes a covenant promise made to self and to coworkers. Caring is most important to individual workers resulting in a worker concern for safety that yields outstanding

productivity for the project, profit for the company and pride for the employee. When these elements come together, it is a place where zero injury resides.

Commitment

Nelson personally asked members of the safety committee to define their personal safety commitment. It should be a brief written statement that eliminates soft poor wording that does not elicit true commitment. Words such as “really, totally, completely, deeply and strongly” are superficial words that have no foundational basis for commitment. Such words must be eliminated from corporate as well as individual commitment statements. Nelson stated, “*No person under the sun can commit anyone other than self to any endeavor, vision or dream.*”

Nelson informed project leaders that the top managers, line leaders and employees must embrace the idea that zero injury is not only possible, it is the only commitment a company should make if it cares for its workers and its future. Leaders are required to embrace this commitment toward zero injury. This will empower the organization resulting in a commitment to zero injury through established core values based on the zero injury concept.

Zero Injury Pledge of Commitment

Nelson led the project team in a pledge of commitment to zero injury, stating:

On my honor I:

Pledge to avoid personal unsafe behavior;
Am “always” taking the safe course of action;
Am “always” intervening when I see my co-employee in harm’s way;
Am swearing this “safety code of honor” in support of my “safety commitment;”
Am doing whatever it takes to “STOP” at-risk behavior;
Pledge my participation to corporate planning, strategic and operational excellence, to quality in my field work and in project safety implementation; and
Pledge to take my safety commitment home sharing it with my loved ones.

When employees make such a commitment, they have decided to go for zero injury. It is a measure of their success. Employees have chosen to be part of the new generation of workers who do their craft specialty work without at-risk behavior, choosing to be a zero injury zealot. To be such, change is required and it happens through leadership communication, caring and commitment.

Bibliography

American Chemical Council. *Responsible Care, Security Code of Management Practices Report*. 2003. (<http://www.americanchemistry.com>).

Association of Reciprocal Safety Councils. <<http://www.arsc.net>>.

Baker, James. *Report of the BP U.S. Refineries Independent Safety Review Panel*. January 2007.

Morris, Greg DL. *Pushing for Reciprocal Standards*. Risk and Insurance Magazine. 2008.

Nelson, Emmitt J. *The Employer Safety Guidebook to Zero Employee Injury*. Third Edition. 2011.

Nelson, Emmitt J. *The Pathway to a Zero Injury Safety Culture*. 2005.

OSHA 29.CFR.1910 General Industry Regulations. *Recording and Reporting Occupational Injuries and Illnesses*, Part 1904.0. 2003.

Texas City Disaster. *Texas City Refinery Explosion*. March 23, 2005
<<http://www.en.wikipedia.org>>.