CREATING AN EXTRAORDINARY SAFETY CULTURE

People, Commitment, Values, Best Practices

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Saudi Chevron Petrochemical (a 50/50 joint venture of Chevron Chemical Co., a wholly owned subsidiary of Chevron Corp., and Saudi Industrial Venture Capital Group) recently completed a $650 million grass-roots Aromax Benzene and Cyclohexane project in Jubail, Saudi Arabia.

The facility was mechanically complete in May 1999, and is now operational. Via breakthrough project management and a "step change" in safety behavior—achieved by emphasizing subjective elements of incident- and injury-free techniques—this international project was executed with superior results.

For example, it was completed on time—in 28.5 months (design and construction)—below budget and with an exemplary safety record. At peak construction, some 3,500 workers were in the field. In more than 13 million construction hours worked, one lost-time injury was recorded, which led to an OSHA lost-time incident rate of 0.02, and two recordable injuries, which produced an OSHA total recordable incident rate (TRIR) of 0.05.

TABLE 1 OSHA 200 Results - Design & Construction Phase

	1997	1998	1999	TOTAL PROJECT
Lost-Workday Incidents	0	1	0	1
OSHA Lost-Workday Incident Rate	0.00	0.02	0.00	0.02
Total Recordable Injury Incidents	1	2	0	3
OSHA Total Recordable Incidents Rate	0.15	0.04	0.00	0.05
Motor Vehicle Accidents	1	2	0	3
Total Field Workhours (millions)	1.295	8.935	3.017	13.247

TABLE 2 Injury & Incident Comparison

INJURY & INCIDENT COMPARISON	BLS	*TYPICAL PROJECT	SCP PROJECT
TRIR	9.9	2.0	0.05
Lost-Time Injuries	300	13	1
Total Recordable Incidents	650	132	3
First-Aid Incidents	-	1,325	141
Near Misses	-	13,250	87

*Typical project data was compiled using information from the Construction Industry Institute and Houston-based Business Roundtable member companies.

The SCP project experienced about 10 percent of the "typical" number of lost-time, recordable and first-aid injuries. This difference is even more dramatic when compared to "typical" international projects.

Compared to similar projects in the U.S., the Saudi Chevron Petrochemical (SCP) project experienced only about 10 percent of the "typical" number of lost-time, recordable and first-aid injuries (Tables 1 and 2). This difference is even more dramatic when compared to "typical" international projects.

Achieving these results required a program with focus and commitment. Its key elements:

- A visible, proactive and extraordinary vision and commitment to safety at all levels.
- World-class safety processes and best practices.
- A culture that valued workers and focused on protecting people.

By changing the focus of safety from "requirement to comply" to an attitude of "I want to work safely," most workers returned home each night injury-free. As a result, SCP enjoyed enhanced productivity and superior morale, while avoiding downtime and the monetary and human costs associated with incidents and injuries.

STARTING CONDITIONS

Project leadership recognized that international projects often have a mindset in which safety is emphasized only after an incident occurs. As a result, some injuries are seen as unavoidable. Workers who speak out about safety oppose cultural norms—which could lead to the loss of their jobs. In some Middle East settings, safe work practices are not effectively implemented and basic safety requirements (protective eyewear and footwear, fall protection) are often not enforced.

These obstacles were magnified by the circumstances of project execution. The SCP project employed contractors and workers from 15 different nations; members of this workgroup spoke at least six distinct languages and represented most of the world's major religions. Consequently, the project encountered significant cultural differences and varying perceptions of how to approach safety, work relationships and project work processes.

Clearly, however, the existing mindset was unacceptable and in conflict with the "Chevron Way"—the mission and vision of Chevron Corp. This mission and vision advocates committed team values, total quality management (TQM), and protecting people and the environment. With enthusiastic support from the highest corporate level of both parent partners, SCP project leadership set out to accomplish a breakthrough in safety and project execution. The statement of this commitment was summarized in the project's pacesetter goals, which set aggressive cost, schedule and operational targets, and established the goal of an incident- and injury-free project.

Throughout the project, Chevron's project development and execution process was implemented. This process is designed to produce superior results in the business and performance aspects of a project, with incident-free construction as a cornerstone.

Project leadership realized that to achieve its objective, especially on an international project, step change was needed in project execution and safety management. Such a change required the use of proven, objective safety techniques and best practices, as well as creation of a new safety mindset. "Business as usual" would not suffice.

During the contractor selection process, SCP considered each contractor's ability to become a "safety partner" and communicated the need for those selected to adopt the injury-free philosophy. A specific list of minimum safety requirements was stated in contracts, and was reviewed during the bidding stage and again prior to contract award.

Interviews were conducted to verify each contractor's reported safety performance records and to evaluate their proposed safety personnel and programs. If not demonstrably OSHA-based, contractor-reported "incident and injury" results were evaluated relative to comparable OSHA performance statistics.

Of the contractors under initial consideration, one was rejected based solely on safety performance, while three others

TABLE 3 Extended Training Program Highlights

TRAINING/WORKSHOP & OBJECTIVE	NO. OF PARTICIPANTS
OSHA 500 Outreach Program; Train-the-Trainer: Understanding, recognizing and communicating safe/unsafe conditions and potential hazards.	50
Follow-up contractor-led workshops to train-the-trainer course: How to assign work safely and transfer of safety recognition training.	250
Site-/job-specific training for field personnel: Specifics of JSAs, pre-task planning, compliance with safe work procedures.	600
Safe Driving Course: Safety awareness and enhanced driving skills.	300
Teambuilding, Expectation Workshops and Supervisory Skill training.	500

Ongoing training was essential to reinforce and direct the safety commitment. In addition to safety orientations and task-specific safety training, special-focus courses addressed safety, communications and leadership.

(Below): The site's Aromax unit.

were rejected due in part to safety considerations. Safety records of proposed subcontractors were also evaluated. Fluor Daniel; Chiyoda Corp.; Consolidated Construction Contractors; SA Kent; Al-Ysur, Townsend and Bottoms; and Saipem were among the contractors selected.

Other selection criteria included: safety leadership, environmental care performance and cultural alignment to accept a step change in behavior and mindset. To achieve the formidable task of shifting safety perceptions, project leadership hired an outside consultant, JMJ Associates, Austin, TX, to provide necessary expertise, training and coaching to support this change.

ELEMENTS OF THE PROGRAM

Working in partnership, SCP project management, its contractors and JMJ developed a three-tiered strategy.

TIER ONE: At the executive management level, initiate a visible, proactive vision and commitment to safety. Owner and contractors must partner in this process because their sponsorship and involvement are critical. Extend the vision and commitment to all levels of the project and ensure that all workers are treated with dignity and respect and are provided with a healthy, safe place to work and live.

TIER TWO: Implement world-class safety processes and proven safety programs. Evaluate all contractors on safety performance, and establish and enforce safety standards. Although not legally mandated, adhere to relevant OSHA requirements.

TIER THREE: Create a culture that values workers. Effectively integrate subjective (e.g., culture, commitment, attitude) and objective (e.g., processes, procedures) domains of safety. Translate the vision into actions, work processes and measurable results that make the vision a reality.

Elements of Tier One

Early on, SCP established an executive sponsor leadership team composed of senior managers (at the vice-president and project-director level) from both SCP and major contractors. This team's purpose was to create the vision, remove barriers, supply resources and sustain the commitment to safety. The team met monthly and maintained a visible presence from project start to mechanical completion. To achieve this, the group:

- publicly stated its commitment to the established safety vision;
- performed monthly site audits and staff presentations;
- conducted monthly executive sponsor meetings, with one half day devoted to safety issues;
- performed monthly construction site walks (as individual sponsors and in groups), to acknowledge safe behaviors;
- conducted unannounced contractor work camp visits and audits;
- formed a workable, results-focused owner/contractor safety partnership;
- embraced the principle that business objectives are enhanced by eliminating injuries and that providing a safe working and living environment is a key component of responsible project management.

Executive sponsors funded activities to support their commitment to health, safety

During the contractor selection process, SCP considered each contractor's ability to become a "safety partner" and communicated the need for those selected to adopt the injury-free philosophy.

TABLE 4 Pacesetter Goals

Pacesetter goals achieved confirm the principle that business objectives are enhanced by eliminating injuries and incidents.

SAFETY	COST	DESIGN & CONSTRUCTION SCHEDULE	ATTAINMENT/OPERABILITY
13 million construction hours; 1 lost-time and 2 recordable injuries.	$650 m ($20 m under budget).	28.5 months vs. 32 months per IPA.*	Operational.

*Independent project analysis schedule based on comparable projects, 1994 and 1996 reports.

and individual dignity. Collectively, contractors included nearly $1 million in their initial bids to cover SCP-required safety programs. SCP and contractors provided an additional $1 million to fund safety and leadership consultants. Some $600,000 was committed to fund behavior-based safety incentives, and $200,000 was used to hire additional construction safety experts.

Ongoing training was essential to reinforce and direct the safety commitment. In addition to safety orientations and task-specific safety training, special-focus courses addressed safety, communications and leadership. Table 3 provides highlights of the extended training program.

Project safety staff consisted of 15 full-time owner/contractor safety professionals. To ensure overall safety coordination, SCP established onplot and offplot safety steering committees (SSC). These groups, which included construction, project and safety managers, and field engineering and construction supervisors, met weekly. The SSCs provided a continuous focus and conveyed upper management's safety commitment. One of their major functions was to routinely examine the question, "Where is the next injury likely to occur?" then initiate measures to prevent it.

The project's full-time TQM coach provided safety awareness training; conducted defensive driver training; obtained feedback for sponsors; and promoted the overall safe worksite objective with posters, visuals and project newsletters. Newsletters emphasized people and highlighted safety awards, achievements and milestones, as well as lessons learned and corrective action implemented as the result of near-misses and incidents.

An SCP-funded safety incentive program was also created to reinforce desired safe behaviors. Incentives were not based on traditional "safe work-hours" criteria; rather, workers were recognized for reaching milestones safely and using appropriate safe behavior. Leading indicators that support prevention were emphasized as opposed to after-the-fact measures.

Site safety representatives used small incentives, such as raffle tickets for larger prizes and pre-paid phone cards, to immediately reward positive behaviors. Those holding "safety tickets" were entered into monthly drawings for small electronics and similar items. Each quarter, a grand prize—a trip home with one week's pay—was awarded via a random drawing that included all those holding a ticket.

Executive leadership sponsored and personally presented medallion awards. These awards were open to individuals at all levels who made significant contributions to creating a safe environment or providing safety leadership. The medallions reinforced the concept that it was "okay" to speak out and that worker suggestions were valued.

Elements of Tier Two

A step change in safety execution began by implementing world-class safety processes and best practices that could then be extended into the subjective areas of attitudes and behaviors. Fundamental to this approach was the decision to require all contractors to follow OSHA requirements (even though those rules do not apply in the Middle East). World-class safety practices applied included those advocated by Construction Industry Institute and Business Roundtable, Chevron Best Practices for safety performance improvement and the proven safety practices of various contractors. In addition, all contractors were required to adopt a safety program that included (at minimum) the following elements:

1) A full-time western safety manager, with safety staff onsite during all working hours.

2) Use of OSHA terms and definitions in collecting and reporting safety statistics and OSHA-mandated/approved personal protective equipment.

3) Daily use of pre-task safety planning sessions and use of job safety analysis at the crew and craft level.

4) Weekly safety meetings and weekly site safety walks by site contractor supervision and by SCP and site contractor management.

5) Near-miss/incident/accident investigations and reporting overseen by the project director. The contract included written requirements regarding the timing and format of investigations and reports.

6) Safety orientations (consisting of a two-hour course) delivered in workers' native languages (approximately 5,000 participants).

7) Full-time onsite medical staff with ambulances.

8) Contractor-sponsored safety recognition and award program.

9) Adherence to a prescribed system of permits and practices to mitigate potentially hazardous activities.

Within these elements, SCP required that a joint owner/contractor team investigate all incidents and provide a preliminary report to the project director within 24 hours; a full report was required within seven days. Implementation of recommendations and follow-up evaluations were the site manager's responsibility, with assistance from the SSCs.

Contractor safety assessments and significant incentive awards were based on compliance with these requirements. Project management emphasized line supervision's accountability for safety and provided the training and skills needed to enhance their effectiveness. Without exception, line supervision accepted accountability for the safety of their crews and work processes.

SCP also supported the safety program through implementation of proven management practices and industry guidelines. This included incorporating construction safety concepts and practices into the project's front-end and detail design phases and conducting periodic reviews (plan-do-check-act) during each project phase to identify barriers and improve opportunities for the next phase.

Elements of Tier Three

To achieve a breakthrough in safety, the project team recognized the need to build on the solid base established by world-class safety practices. It was necessary to create a culture that valued workers and effectively integrated both subjective and objective domains of safety. This culture was based on care and concern; it required a commitment to treat all employees with dignity and respect, and to provide a healthy, safe place to work and live.

An ongoing effort was initiated to create positive attitudes and improve employee awareness and ownership of the safety initiative. Safety professionals and supervisors were coached to identify people "doing the right things" and to recognize their efforts to work safely. The goal was to create an environment in which employees were comfortable reporting an incident/near-miss; stopping work they felt was unsafe; and taking responsibility for their safety and that of others. In this culture, safety would be perceived not just as a priority, but as a basic individual and organizational value.

JMJ facilitated this breakthrough by engaging contractor management in these new concepts. To achieve this, the firm

Project construction manager Harry Melton of Fluor Daniel presents safety recognition awards to contractors and project team members.

conducted an ongoing series of interviews with a cross-section of the workforce in order to identify issues, perceptions and barriers; the goal of this exercise was to assess progress in changing the safety mindset. Issues related to safety were addressed through training and workshops attended by both SCP and contractor managers and supervisors.

Although the project achieved superior safety statistics, subjective feedback was routinely obtained to assess worker perceptions about the program. Worker comments included:

- "On other projects, you see people pushing safety, but here it seems to be occurring naturally, people are doing it on their own."
- "SCP is the kind of project I would want my son to work on someday."
- "Workers are treated with respect on the SCP project."
- "I have been astonished by the way this project deals with people [with respect to] safety."

Notable examples of health and safety successes were the heat stress prevention program, pipe spool construction work process improvement and contractor work camp focus program.

With summer temperatures routinely exceeding 115ºF, heat stress prevention was key. Frequent breaks were required and workers were reminded to drink sufficient amounts of cool water. As a result, no heat-related incidents were experienced for the entire project duration—even though peak construction occurred during one full summer. One contractor noted that its crews had experienced several heat-related hospital trips per day on recent projects in the same area.

Pipe spool installation on the main pipe rack was also identified as a concern. Many employees were working within a relatively small area, at heights and moving up, down and across the structure; in addition, progress was behind schedule. Based on these factors, this area was identified as a place where "the next incident could occur." A team was formed to focus on improving the safety and work process of pipe spool installation. Their efforts led to a change in the overall process of obtaining spools, lifting them into the rack and positioning them for installation. Subsequently, spool installation proceeded with no incidents and productivity doubled.

Contractor camps were another area of focus. Project managers made periodic unannounced visits to these camps to examine living conditions, eat lunch with workers and discuss the camp environment. As a result, action was taken to maintain a healthy, sanitary environment. In addition, buses transporting workers were inspected regularly and all drivers completed defensive-driving training. This program emphasized the importance of health and safety "outside the fence."

RESULTS

SCP, its contractors and consultants were proud to take a lead role in making rapid changes in safety on this project. Although not emphasized by the project team, statistics were collected and monitored to assess the step-change process. At one point, more than seven million workhours were completed over a nine-month period with no recordable injuries. Tables 1 and 2 provide key site statistics. Using typical U.S. cost data, the cited results translate to nearly $3 million in avoided cost on the SCP project when compared to the "typical project"—and significantly more avoided cost when compared to the BLS statistics. The pacesetter goals achieved (Table 4) confirm the principle that business objectives are enhanced by eliminating injuries and incidents.

CONCLUSION

Although the incident-and-injury-free mindset was not present at the start (feasibility phase) of the SCP project, through management diligence and a commitment to adopt safety as a value, a significant cultural change occurred. The project is being recognized as a model for future projects in the Middle East and throughout the world, as evidenced by requests for interviews and site visits from other companies, safety societies and contractors. As a result of the project's commitment to safety, not only were business objectives enhanced, most workers returned home uninjured each day. ■

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