

**Identifying and Assessing Safety
Alternatives to Improve Safety at Terracon:
A Recommendation Report**

Prepared for: Mr. Brett Pope, Project Manager
Terracon

Prepared by: Brittany Pope, Student
Texas Christian University

December 4, 2013

Abstract

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Prepared by: Brittany Pope, student
Texas Christian University

The purpose of this paper is to present Terracon with a safety alternative that will meet their goals regarding an improved safety culture and EMR rating. Terracon is a company that provides solutions to engineering challenges while working in the office, the lab, the field, and the construction site.

To generate alternatives, research was performed at the TCU library and on the Terracon website. In addition, a Terracon project engineer was interviewed. As a result, three viable safety alternatives were formulated:

1. Make requirements of subcontractors.
2. Foster a culture of safety through greater employee involvement.
3. Invite employees to answer a safety perception survey.

To measure and assess the value of each alternative, a list of criteria was developed:

- Flexibility
- Reach
- Long-lasting

The safety perception survey alternative did not meet all the criteria. It is difficult to ensure all employees receive and participate in the survey, and there is no guarantee that suggested changes will be enforced.

Both the subcontractor requirements and safety culture alternatives fulfill the criteria, and it is suggested that a combination be utilized at Terracon. This solution will involve:

- Forming a transparent and open safety culture between management and employees with shared safety goals, policies, procedures, and responsibilities
- Hiring only cooperative subcontractors and requiring them to follow Terracon's safety standards, attend safety meetings, and maintain a determined EMR rating
- Inviting cooperative subcontractors to participate in Terracon's safety culture and fostering trusting relationships with them

If enforced and updated, this strategy will achieve Terracon's goal of a lower EMR rating and will guarantee that "everyone goes home safely to his or her family each and every day" (Terracon, 2012).

Introduction

Terracon is a company of consulting engineers and scientists that provides solutions to geotechnical, environmental, and construction engineering challenges. They sample soil to determine how it will react to the weight of new buildings and structures, conduct site investigations and assessments to examine environmental issues, and observe construction materials to ensure that project standards are met.

Safety

In this field, safety is a key concern. There are four main areas of work involving safety hazards that require employees' complete attention and awareness.

1. *The office.* While project managers are not in immediate danger at the office, they must be cognizant of the job sites to which they send their technicians. Job sites can pose a number of safety hazards, from environmental threats to traffic concerns.
2. *The lab.* Fire hazards and moving parts on equipment are a daily threat to laboratory technicians. In addition, there is a chance incoming soil samples from job sites could be contaminated.
3. *The field.* Geotechnical field technicians and drillers frequently work in the field sampling soil and operating a drill rig. The rig is a cause for concern as well as traffic when the site is near roadways. In addition, the drillers could unknowingly drill close to underground gas lines.
4. *The construction site.* Construction Material Testing Technicians spend most of their time working around heavy machinery that pose multiple threats.

Safety goals

One mission of Terracon is to ensure the safety of every Terracon employee. Terracon has several reasons for achieving this goal, including,

- Preventing liability caused by employee and subcontractor accidents and injuries
- Presenting the best company image for potential clients, stakeholders, and future employees
- Achieving a lower worker compensation premium through a lowered Experience Modification Rate (EMR)
- Fostering a culture of mutual trust between management and employees

The EMR is a number used by insurance companies to determine a business's worker compensation insurance premium. It is calculated using a formula that accounts for inherent job risk, rate of injuries in the past, the severity of injuries, and the ratio between expected industries in the company's industry and the number of injuries the company actually incurred (Safety Management Group, 2008).

Although Terracon already has an Injury-Free (IIF) safety plan in place, Terracon is determined to commit unlimited resources until they can truthfully say "everyone goes home safely to his or her family each and every day" (Terracon, 2012).

To achieve this goal, Mr. Brett Pope, a project engineer at Terracon, was interviewed on the general company culture and existing safety plan. In addition, secondary research was conducted on general safety concerns and considerations within the broad field of engineering. Finally, possible safety alternatives were identified, and the most viable option chosen.

Materials and Methods

Materials

- Google search engine
- TCU Library Database
- E-mail survey

On September 21, Mr. Pope responded to an e-mail previously sent to him inquiring whether or not Terracon has a major decision they need help making. He stated that Terracon is still in the process of trying to lower its EMR as part of an overall plan to maximize employees' safety.

Background and Preliminary Research

Before solutions could be formulated, it was necessary to learn about Terracon's company as well as safety within the engineering field. This was fulfilled by conducting background research on,

- *Experience Modification Rates (EMR)*. A simple Google search was used to learn what an EMR is, why and how it is used, and who calculates it.
- *Terracon's company culture*. The Terracon website was observed to gain an understanding of the company's culture and existing safety plans. A brief mention of the IIF safety plan was found on the "Working and Living Safely" page.

After the background was understood, preliminary research through the TCU Library Database was conducted. The goal of this research was to learn about different ways of improving employee safety. Relevant sources found include:

- "Safety Perception Survey" (2009) by Dennis Ryan
- "Organizational Culture and Safety Performance" (1999) by Zack Mansdorf
- "Safety Risk Management of Subcontractors" (2008) by Vladimir Iensky

Interview

Next, specific details about Terracon's current safety plan were required in order to develop a set of criteria. A list of questions was designed concerning the IIF safety plan as well as management's safety motives and dedication. See Appendix A for a complete list of interview questions. The interview was conducted over e-mail due to geographic constraints.

Criteria Formulation and Alternative Selection

Once a more complete understanding of Terracon's current safety plan management's motives was obtained, a set of three criteria were determined. These criteria narrowed a wide range of safety options down to a few alternatives that best align with Terracon's company culture and fulfill their goals.

Finally, a list of three safety alternatives were analyzed against the criteria, and the best alternative was selected for recommendation.

Results

Background and Preliminary Research

Experience Modification Rating (EMR)

According to the Safety Management Group website (2008), the EMR is a number used by insurance companies to determine a business's worker compensation insurance premium. It is calculated using a formula that accounts for:

- Inherent job risk
- Rate of past injuries
- The severity of injuries
- The ratio between expected industries in the company's industry and the number of injuries the company actually incurred

Each industry has an average EMR rating of 1.0. A company achieves a rating higher than 1.0 when a worker compensation claim has been paid by the insurance provider. A higher EMR rating causes the company's insurance premium to increase. Furthermore, an EMR rating lasts for three years.

Terracon company culture

The Terracon website (2012) claims that safety was adopted as a core value of the company in 2006. Although they have business motives for improving their safety, the IIF culture at Terracon is about "doing things right" and making sure all employees go home safely every day.

Preliminary research

According to Dennis Ryan (2009) a safety perception survey administered to employees is an effective way to improve a company's safety plan. This is because employees are more aware of operational deficiencies that either cause or lead to accidents and injuries. Questions asked must be very clear and very thorough.

The survey process involves nine simple steps:

1. Develop the survey
2. Select a sample size
3. Test the survey
4. Communicate intentions
5. Administer the survey
6. Analyze
7. Validate
8. Feedback
9. Reevaluate

It is important to communicate the intentions of the survey to keep employees actively involved and to make them feel like their input is valuable. But when administered correctly, a survey can identify organizational and human factors that influence a safety

culture and safety behavior. It can also make employees feel a sense of ownership and responsibility for their actions and the actions of others.

In “Organizational Culture and Safety Performance” (1999), Zack Mansdorf stresses the importance of fostering a safety culture that features mutual agreement between management and employees on safety responsibilities. There are a few key factors required to develop and maintain a successful safety culture, such as:

- A safety vision that establishes safety goals and employee responsibilities
- Open, two-way communication between management and employees
- Safety policies and procedures created with employee participation
- Safety training for equipment and tools
- Rewards for positive, safety behaviors

According to Mansdorf, a safety culture is effective because it guides an employee’s perceptions of the “value of safety to himself and the importance of safety to the organization that governs safety performance” (109).

In “Safety Risk Management of Subcontractors” (2008), Vladimir Ivensky explains contractors are obligated to provide reasonable care in preventing occupational hazards for subcontractors. Despite this, subcontractors are still a business risk for several reasons, including:

- *Risk of injury.* Subcontractors could seek legal action against their contractor.
- *Risk of citations.* Contractors could receive a citation from the Occupational Safety and Health Administration (OSHA) for subcontractors’ safety violations.
- *Risk of negative publicity.* Because of subcontractors’ neglectful safety performance, contractors could lose clients.

Many of these issues originate from the fact that subcontractors maintain their own safety standards and policies separate from those of contractors’. To prevent these issues and to achieve and to improve safety overall, Ivensky suggests,

- *Implementing safety requirements for subcontractors.* These include required safety meetings, joint meetings with regular employees, and regular safety inspections.
- *Employing subcontractors with lower EMR ratings.* Subcontractors with lower EMR ratings have a good safety performance record.
- *Developing relationships with subcontractors.* This will establish a trust between contractor and subcontractor and each will more likely know and comply with the other’s expectations.

Interview

Mr. Pope was asked to provide details of their current IIF safety plan. In response, he stated all employees attend an annual four-hour safety seminar, and supervisors receive an additional four hours of safety training. They hired a safety coordinator who sends office-wide e-mails when an accident has occurred, explaining how the incident could have been prevented. The result of this plan is that employees are more conscious of safety and speak about it more often.

When asked about safety standards and managers' dedication to safety standards, Mr. Pope expanded and explained that one of the issues Terracon has is with its subcontractors. Because they are not Terracon employees and have different standards, it is difficult to convince them to follow the same safety standards expected of Terracon employees.

Mr. Pope responded to a question about Terracon's dedication to the safety plan, stating that they are already dedicating a lot of time to the plan and are willing to commit as much time as is necessary. Likewise, Terracon is prepared to commit a figure in the millions of dollars range to achieve their goals. Although their main focus is on the welfare of employees, they do have fiscal motives. The safety consultant informed them that between employee injuries and missed time, their high EMR has cost them between \$10-15 million.

Criteria Formulation and Alternative Selection

As a result of the background and preliminary research as well as the interview with Mr. Pope, a list of three possible safety alternatives were selected.

1. Make requirements of subcontractors.
2. Foster a culture of safety through greater employee involvement.
3. Invite employees to answer a safety perception survey.

In addition, three criterions were chosen to measure and assess the safety alternatives:

1. *Flexibility*. The alternative must be able to be modified as Terracon's needs change.
2. *Reach*. The alternative should improve the safety of the most number of employees.
3. *Long-lasting*. The alternative should create enduring change.

While weighing each safety alternative against the criteria, it was decided that safety alternative number 3 did not fully satisfy Terracon's needs. Instead, it is recommended that a combination of safety alternative numbers 1 and 2 be combined to achieve a lower EMR rating and safety for Terracon employees.

Discussion

Criteria Application

After measuring each safety alternative against the set of criteria, the following conclusions were drawn.

Safety Perception Survey

1. *Flexibility.* A survey is flexible because questions can be modified and adapted as Terracon's needs change and new safety issues arise. Questions about current safety measures and their effectiveness, management's commitment to safety, and suggestions for new safety efforts can be added, deleted, or altered. However, it would require a lot of energy to re-distribute the survey to every employee. Furthermore, employees may ignore a modified survey similar to one that have already completed.
2. *Reach.* In a large company with several departments such as Terracon, distributing a survey to each employee would be nearly impossible, especially if both hard copies and soft copies are distributed. Employees may ignore or forget about the survey, accidentally lose a paper copy or delete the e-mail, among other mishaps. Likewise, it could be challenging to collect completed surveys for similar reasons.
3. *Long-lasting.* The safety perception survey only assesses safety and gathers suggestions for solutions. There is no enforcing principle. Employees could contribute valuable suggestions, but management may not implement or enforce the suggestions, or they may only be enforced for a brief period.

Safety Culture

1. *Flexibility.* A safety culture would gradually change just as a company's organizational culture changes. With open communication and a common safety vision, policies and procedures can be modified and adapted to meet new safety challenges.
2. *Reach.* An organization's culture is made up of every employee in the company. Together, they influence safety goals and the creation, implementation, and maintenance of safety policies and procedures. Moreover, companies hire employees who fit in with the company culture, so new hires will adhere to the safety culture's safety norms.
3. *Long-lasting.* An organization's safety culture because it is embedded into the company. A safety culture is a culmination of employees' strong and enduring

values and beliefs. Policies and procedures will last because deviant employees will conform to the group's standards.

Subcontractor Requirements

1. *Flexibility.* Like a safety culture, subcontractor requirements are versatile. They be added, deleted, or modified on a trial-and-error basis. Likewise, requirements could be applied on a case-by-case basis as needed.
2. *Reach.* Subcontractors can affect the wellbeing of many employees, whether they put employees at risk of injury due to neglect or their own safety record causes Terracon's EMR rating – and therefore workers compensation insurance premium – to rise. Monitoring subcontractors' safety will benefit a maximum number of Terracon employees.
3. *Long-lasting.* Similar to the enforcing principle that guides safety cultures, subcontractors will adhere to safety requirements if consistently held accountable by employees. Likewise, management must take requirements seriously and apply an appropriate punishment when they are not followed.

Recommendation

Because both the safety culture and subcontractor requirement alternatives fulfill all criteria, it is suggested that Terracon implement a combined safety strategy.

Together, these alternatives will include:

- Forming a transparent and open safety culture between management and employees with shared safety goals, policies, procedures, and responsibilities
- Hiring only cooperative subcontractors and requiring them to follow Terracon's safety standards, attend safety meetings, and maintain a determined EMR rating
- Inviting cooperative subcontractors to participate in Terracon's safety culture and fostering trusting relationships with them

A safety culture that includes trusting and cooperative relationships with subcontractors is desirable because the behavior and actions of subcontractors can affect the wellbeing of many Terracon employees. If enforced and updated, this strategy will achieve Terracon's goal of a lower EMR rating and will guarantee that "everyone goes home safely to his or her family each and every day" (Terracon, 2012).

References

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Appendix A

1. What was Terracon's safety culture like before you hired a consultant?
2. What has the consultant done to improve safety?
3. You mentioned in your last e-mail that employees "at least think" about safety now. Could you explain this further?
 - a. Are the safety standards and regulations written down? Have they been updated recently?
 - b. Did managers and workers decide on safety standards and regulations together? Do they agree on them?
 - c. Do managers always set an example by following safety standards and regulations?
4. How dedicated is Terracon to improving their safety culture?
 - a. What is their main goal? To improve the EMR, to protect the welfare of employees overall, or both?
 - b. What resources is Terracon willing to dedicate to improving safety?