

Breakthrough Environmental and Safety Performance In Your Organization Using Six Sigma Methodology

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This session will present real life examples of successful Six Sigma Environmental and Safety Projects. It will cover Pareto Charts, Failure Mode and Analysis, Process Flow Diagrams and show how to make dramatic, popular improvements to the organizations environmental and safety performance. Get ready for a Rollercoaster Ride!!!!

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Let's start at the beginning. What is Six Sigma? It's a culture change effort to position a company for greater customer satisfaction, profitability and competitiveness. It's also a statistically derived performance target of operating with only 3.4 defects for every million activities or "opportunities". It's also a comprehensive and flexible system for achieving, sustaining and maximizing business success.

Now what does all this mean? Let's look at a common environmental opportunity facing many corporations here today and how you can apply Six Sigma techniques to address the issue.

ENVIRONMENTAL CONSULTANTS COSTS. How can they be reduced without sacrificing quality and detail? The first step in understanding Six Sigma techniques is to dismiss, put out of your head, your answer or your bosses answer to the question.

We need a Project Objective, which can be measured. Not some pie-in-the-sky but an actual either percentage or dollar savings. Consider your "Top 4" outside environmental consultants who are providing consulting and remediation services to your company in 2003. Our project objective is to implement cost saving processes to achieve a savings of x% in 2003.

Hopefully, you require your consultants to provide you with their estimated minimum/maximum range of spending for all projects that they are handling for the current year and possibly for some established number of future years. With this data you can begin to develop a Pareto Chart. Which is a specialized bar chart to help you identify the common occurrences or causes of a problem.

Here are our 4 Top consultants:

| Consultant | Estimated Spending | | | |
|------------|--------------------|--|--|--|
| А | \$2,856,000 | | | |
| В | 675,000 | | | |
| С | 280,000 | | | |
| D | 185,000 | | | |
| | | | | |

Now the chart:



CY02 Remediation Estimates(Max)of Top 4 Consultants (000's)

Next we need a Cause and Effect diagram.

The Cause and Effect or Fishbone Diagram is a great tool for gathering ideas, brainstorming. Let's list some items that will effect consulting



Fishbone Diagram

The Fishbone will help us to see the items over which we have control and those that we can't control.

What do you do when you receive a letter from a regulator? Freak Out? Go to Lunch? Think a While?

| Process | Potential Failure | Failure Effect | S | Cause of Failure | 0 | Process Controls | D | RPN |
|------------------------------|-----------------------------------|---------------------------------|---|---|---|---------------------|---|-----|
| Letter | Not Valid | Resources | 2 | Human Error | 1 | Human Competence | 3 | 6 |
| ESH Dept. Gathers Info | Inadequate Info is gathered | Make Uninformed Decisions | 5 | In House Files not Researched | 1 | Human Competence | 1 | 5 |
| Evaluate Consultants | Inadequate Evaluation | Resources | 3 | Firm not Properly Evaluated | 2 | Human Competence | 3 | 18 |
| Complex Project | Best Contractor Not Hired | Resources | 4 | Failure to Characterize Project as Complex | 2 | Human Competence | 4 | 32 |
| | | | 4 | Failure to Deliver Gathered Info to Consultant | 1 | Human Competence | 1 | 4 |
| | | | 4 | Failure to Evaluate Cost Estimates | 3 | Human Competence | 3 | 36 |
| Work Proceeds | Work Deviates | Resources | 2 | Failure to Communicate And Obtain Reports | 1 | Human Competence | 2 | 4 |
| | | | 2 | Budget vs. Actual | 3 | Human Competence | 4 | 24 |
| | | | 2 | Periodic Reviews | 3 | Human Competence | 3 | 18 |
| | | | 2 | Failure to Approve Rate Changes | 2 | Human Competence | 2 | 8 |

FAILURE MODE AND ANALYSIS

S: Severity (5=High Uncontrolled Costs; 1= Controlled Costs)

O: Occurrence (5=Always; 1=Never)

D: Detection (5=Impossible to Detect; 1=Always Detected)

RPN: Risk Priority Number = S*O*D

Determine whether the letter is valid. Research in-house files Interview current and past employees who may have knowledge Request FOIA Do some internet research Contact Third Parties for additional information Satisfy good faith regulatory requirements.

Evaluate timing/materials required for job with internal resources available.

If you're going to use outside consultants utilize your prior experience with the firm and/or individuals with the firm.

Meet with at least two consultants and have them submit detailed cost estimates. If it's a complex project, have them prepare estimates in stages.

Evaluate the cost estimates – Are they comparing apples to apples?

How will the consultant report to you?

Ask the consultant what he can do to reduce his costs.

- a) Can you provide sampling personnel?
- b) If heavy equipment is needed do you have any on-site? And/or can you negotiate better terms with a local contractor?
- c) Can you provide drawings/photographs/aeriels of the area in question?
- d) Sample analysis by in-house laboratory, local approved laboratory, national contract laboratory
- e) All subcontracting costs to be billed directly to you.
- f) Require the consultant report dollars billed vs the approved budget. Keep him aware of where he stands on his budget estimate.
- g) Have periodic, on site, reviews, ask the consultant what he needs to be more efficient.
- h) If the next stage of the project requires varied experience or you have found another remediation technique that appears promising, locate an expert who can help you. Don't pay for your consultant's education. Get additional cost estimates and go back through the consulting process.
- i) Develop specific SOP's for each step in the consulting process. Decide which steps are Value Added and concentrate on those.
 i.e.: Receiving the letter from a regulator is not a Value Added step but determining whether the letter is valid is a Value Added step.
- j) Use Failure Mode and Analysis for each process step.
- k) Track your results and compare with your objective.
- 1) Report to management

This same process works for Safety Issues.

Let's say you've got a plant with lots of lost-time injuries. Gather all of the data. Develop a Pareto Chart. See what it tells you. I am sure you will be surprised.

The data may include:

Types of Accidents (i.e. cuts, falls, lifting) Shift/Time of Day When They Occur Supervisor Where They Occur In The Facility New Employees vs. Experienced Employees Formally Trained vs. On The Job Trained Time Pressure Knee Pads Heavy Awkward Parts or Material Twisting Units are Cramped Cleanliness Too Heavy, Too Large

Evaluate the data. Ask the injured employees why they're getting hurt. Voice of the Customer.

Develop a Plan

Some other Environmental Projects:

- 1) Improve your response time to get back to a manager/plant with a problem.
- 2) Evaluate wastewater treatment systems
- 3) Waste gernation hazardous and non-hazardous
- 4) Reduce paper generation
- 5) Energy usage

Remember, all of the projects include getting real identifiable <u>data</u>, not intuition - and then measuring that data to effect a change.