

# **Metrics That Matter: How Flowserve Became One of America's Safest Companies**

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## **Introduction**

Flowserve Corporation is the world's largest integrated manufacturer of pumps, valves, and mechanical seals. We operate in over forty (40) countries, with manufacturing and/or service/repair in over 200 locations. Our annual sales exceed \$4.5 billion, and global headcount is approximately 15,000 persons (plus temporary headcount).

Our safety programs dates back to 1926, when a predecessor of Flowserve, the Duriron Company, joined the National Safety Council (NSC).

I would like to share with you how Flowserve, through the aggressive use of SH&E metrics (we call it Safety, Health & Environmental Affairs or SHEA) drove our accident/injury statistics from a lost-time accident rate (LTR) of 5.3 and total recordable accident rate (TRR) of ~16 to 0.21 and 0.64, respectively.

The above numbers are global, utilizing OSHA's criteria for accident recordability, unless local criteria are more stringent.

## **The Beginning**

In the late 1980s, having grown significantly through acquisitions and organic growth, the Duriron Company operated in over 30 locations and in approximately 20 countries. Our safety and environmental performance was average at best. We tracked LTR and TRR at all locations, and an audit of facilities essentially was a shop tour, highlighting three to five issues and reviewing hazardous waste disposal documentation. No written reports were generated, and there was no accountability for corrective action.

Our results, in terms of regulatory compliance, could be described as average for that period in history, and our overall SH&E results were, perhaps, a little better than average.

Our industrial hygiene (IH) program was significantly better, in my opinion, than most capital goods manufacturers, having used the services of a certified industrial hygienist (CIH) on a regular basis since the mid-70s. (This foundation of IH excellence would later prove quite valuable in benchmarking the rest of our SHEA program with peer companies and in setting continuous improvement goals.)

## **What's an EMAS?**

In 1991, the Duriron Company implemented a detailed safety/environmental management program. Flowserve's program began before the creation of ISO 14000 environmental certification and the OHSAS 18000 health and safety certification. Since there was no standard SH&E program structure to emulate, we found ourselves building the structure as went so to speak, keeping elements that produced positive results and discarding those that did not. The goal I personally set was to create and sustain a world-class SH&E performance culture. Our initial approach was defined in a few core values, described in the following list:

- We will comply with both the intent and letter of applicable regulations.
- Corrective actions after a SHEA audit are mandatory.
- All injuries and environmental compliance issues are preventable.
- Management is responsible and accountable for prevention.
- We have one safety/environmental management standard, and it applies everywhere.
- Chemical use reduction/elimination is superior to the world's best compliance program.

## **SH&E/SHEA Auditing**

We also began conducting wall-to-wall SHEA audits of all locations, with the goal of visiting each facility at least annually. The audit scope included both regulatory compliance and conformance to our newly published *SHEA Policy and Procedures Manual*. A written corrective action plan (CAP) was required by each facility within thirty (30) days of audit report publication. The CAP became the foundation for the next audit (typically within 6-12 months). These initial audit reports contained four (4) sections, described below.

### Significant Accomplishments

These are initiatives that represent a level of achievement that exceeds most other company locations. They are important because they often lead to a reduction in accidents and injuries, workers' compensation costs, and environmental liabilities.

### Repeat Serious Observations

These are items identified in previous inspection reports as significant issues requiring corrective action. Their continued existence has the potential to cause serious problems with safety, health and environmental compliance, and they should be given top priority for immediate corrective action.

## Serious Observations

Serious observations are those items that are considered serious in nature due to their potential impact on safety, health and environmental compliance. These issues have not been identified during previous inspections, but they should be given a top priority for corrective action.

## Other Observations

These are items that require corrective action, but are considered less significant in impact than the serious observations.

## **Audit Reports**

The audit reports were distributed to management, all the way up to Division Presidents who, in turn, drove corrective actions at their assigned facilities. This level of participation in the process by the highest levels of management was invaluable in obtaining support for safety/environmental capital improvement requirements. In fact, in my 24 years with Flowserve and its predecessors, I can honestly say that I have never been turned down on a safety or environmentally related capital improvement request. The request may have withstood a bit of scrutiny and questions may have been asked about possible alternatives or an interim solution might have been implemented that quarter with a “hard-wired” solution the following quarter, but the support has always been there, every time.

## **Safety Training**

Safety training, in these initial years, was what was typically considered training by many in that era; heavy on video and handouts in English-speaking locations and much the same elsewhere, with very limited selection of non-English videos.

We realized very quickly that, if we were going to be true to our first core value as it related to safety training, we could not count on a traditional classroom, “feed ‘em with a fire hose” approach. Shutting down entire manufacturing departments over and over again to meet OSHA training mandates, and providing meaningful training that had a positive impact on accident/injury rates was extremely difficult, and produced conflict with manufacturing operations, the very people we were seeking to partner with in accident prevention and SH&E continuous improvement.

Working with a small vendor, we eventually implemented the Rogers Learning System (RLS), a PC-based, employee-paced safety instruction program covering 15-18 topics in both English and Spanish. While not a perfect solution for a multilingual company, we documented an average accident/injury reduction of thirty percent (30%) at locations using RLS.

## **Metrics**

If you can't measure it, you can't improve it, according to Deming. We very quickly realized that some locations were champions at meeting regulatory compliance requirements while, at other locations, it was an afterthought at best. Needing a way to measure compliance, we created what eventually became three separate checklists:

- 474 line-item Safety Checklist (OSHA 1910)

- 171 line-item Environmental Checklist (U.S./State EPA requirements)
- 58 line-item Fire Prevention/Preparedness Checklist (NFPA/Factory Mutual standards)

The checklists were modified for international use by incorporating local requirements, ISO principles and, in some cases where specific non-US regulations were identifiable and accessible, creating a country-specific checklist.

Realizing the importance of setting high but attainable goals, we started applying the following internal criteria:

- The minimum acceptable safety/environmental metrics score is 70 percent.
- All facilities must improve metrics scores by seven percent per year until scores in the mid-90s percent or greater are achieved.

An interesting and vital anecdote from our use of safety metrics was that the more we employed them, the more senior management used them as part of the review process for their direct reports. An additional correlation was eventually noted in the boardroom. Facilities with high SHEA metrics were almost always the leaders in financial metrics as well. SHEA leaders were also leaders in on-time delivery, profitability and low cost of quality, and a decline in SHEA metrics or financial metrics was predictive of an existing or soon-to-be problem with the other. While safety was always reviewed by the board, it became and is now the first agenda item for every meeting.

## **A Quantum Leap Forward**

The compliance component of SH&E management will allow you to become the best of the average, but will never provide a foundation for the best in class, let alone world-class performance. Metrics scores represent the level of regulatory compliance and general condition of your SH&E infrastructure, while audit observations tend to represent real-world conditions on the shop floor, and (at least initially) indicate most critical actions for accident prevention. By combining the two and driving improvement in the numbers, we began to make major improvement in all areas of SHEA performance on an annual basis.

In 1997, while the safety leader in our industry; we began using our Safety and Environmental Compliance Checklists as a specific performance metric. Results were highlighted in reports to facilities, division management and corporate management. Goals were developed, and intracompany peer comparison began.

We developed a series of objective formulas to interpret the many data points being collected and assigned an understandable descriptor of “Outstanding,” “Very Good,” “Good,” “Fair,” or “Unsatisfactory.”

These easily understandable terms were effective in clearly communicating to everyone, from the shop floor to the boardroom, the performance of each site, product group and division. The competitive nature of most humans became a driving force in itself, often resulting in plant management at each facility broadcasting excellent audit results to peer locations shortly after the audit close-out briefing. In many cases, this became self-perpetuating.

## Millennium Improvements and Another Leap Forward

Dashboards for presenting key manufacturing, quality and financial metrics are an important tool in communicating, quickly and clearly, performance versus goals, and it is critical that the SH&E function communicate to all levels of management using methods that they readily understand/accept. With that in mind, we created a SHEA dashboard for the corporation and each site using the criteria below:

- Develop a set of realistic items to consolidate on a scorecard/dashboard
- Include the things you underperform in and the good things you want to make even better
- Develop a set of best management practices, and track implementation scores/results
- Drive the metrics numbers

The dashboard focused on both leading and lagging indicators. The leading indicators are:

- Safe behavior observations
- Internal safety audit scores/results
- Safety training sessions completed
- Safety meetings attended
- SH&E audit results
- Best management practices implemented
- Pollution prevention/waste minimization successes
- Regulatory compliance percentage scores

The lagging indicators include:

- Lost-time accident rate
- Total recordable accident rate
- Lost-time accident severity rate
- SHEA audit results
- Workers' compensation costs per work-hour

## The “Big 3” Success Factors

With the universal accessibility of email, internally developed safety training modules and the creation of our internal Flowsolve SHEA Department website, we were able push multilingual safety training to the entire corporation, combined with acceptance of the “Big 3:”

1. An active safety committee

2. Regularly scheduled, relevant safety training (at least every other month)
3. Semi-annual (at least), plant-level self-audits of workplace safety conditions and work practices

We were able to create an expectation and culture of safety and environmental performance improvement, and see the dramatic, positive affects those expectations could create. The vast SHEA metrics data collection effort provided opportunities to develop correlations, spot trends (positive and negative), and leverage conclusions into further continuous improvement. Perhaps the most important correlation was the one showing a direct linear relationship between the regulatory compliance metrics scores and TRR. In 2000, the average compliance metrics score (safety, environmental, and fire prevention combined) was 83 percent, and corporate-wide TRR was 4.6. By 2002, our metrics score was 88 percent and the TRR was 2.3. By 2006, metrics scores reached 95 percent for the first time, and the TRR had declined to 1.1. At the end of the first decade of the new millennium, metrics scores of 98 percent produced a TRR of 0.69.

## **Safety Training for the New Millennium**

By 2003-2004, The Roger's Learning System was getting old for most learners (many associates having taken all of the modules at least 10 times) and, as a company, we crossed the threshold where > 50% of sales dollars were from operations outside North America. Clearly we had to think global and multilingual more than ever before, if we were to continue to post record low LTR and TRR numbers each year.

Like all forms of software, on-line learning programs/packages had advanced far beyond the level of sophistication seen even just five years prior. After an 18-month review of the market, we chose PureSafety and partnered with them to create a safety training platform consisting of:

- Customized "Introduction to Safety at Flowserve" presentation
- 32-course suite in six languages (English, Spanish, French, German, Italian, and Mandarin Chinese)
- Five-year implementation
- Dutch and Portuguese added a year later
- 90-percent training calendar completion target (93 percent for 2012)
- Total investment of approximately \$2 million

The plateau in accident/injury performance that we had seemed to hit in 2005-2006 became a steep decline again, registering a 48 percent decline in LTR and 54 percent decline in TRR during the implementation period.

We feel there is significant additional improvement on the table but to date have been unable to negotiate implementation of this vital and successful training with our recalcitrant German labor unions. If and when that happens, we believe that our German facility accident rates (currently 4 times

Flowserve's global rates) can be cut in half within 18 months and reach the level of the rest of Flowserve in less than three years.

In the meantime, we have continued to improve our SHEA audit process, report format, and corrective action process. Currently, all facilities are audited at least annually (more frequently for underperformers, a topic in itself on the value of peer comparison and shame). Our annual "Dirty Dozen" (DD) list of worst-performing facilities was championed by a former CEO who heard the term while visiting a corporate SHEA staff meeting, and insisted this internally discussed list become very public, very quickly!

Locations on the list were required to implement a detailed safety improvement plan for the following year, complete with monthly updates. These locations were invited to a meeting with the CEO if they felt their current performance was acceptable or if they felt that significant, rapid improvement was not possible. The result was a typical 40-percent accident/injury and SHEA metrics improvement by the members of the "DD List" in the year after their making the list.

## The "Big Four"

With time and additional scrutiny of the safety metrics data, we were able to transform the "Big Three" into the "Big Four":

1. An active safety/environmental/sustainability committee:
  - ▶ Consists of management and labor (preferably more labor than management)
  - ▶ Meets monthly
  - ▶ Produces written meeting minutes with action items
2. Frequent safety training:
  - ▶ Meets *at least* every other month (preferably monthly)
  - ▶ Focuses on compliance and site needs
  - ▶ Oriented toward accident prevention oriented
3. Workshop-driven safety/environmental/sustainability inspections:
  - ▶ Meet a minimum of quarterly
  - ▶ Use a checklist
  - ▶ Report and measure results
4. A facility general manager that spends at least 15 minutes per day on the shop floor promoting safety/environmental/sustainability excellence

Combining the above with our annual corporate SHEA facility audits yields another valuable correlation. Within Flowserve, a facility that diligently follows the above principles is five times less likely to incur a recordable accident at Flowserve.

## Raising the Bar at Local Facilities

During the many years of site audits, numerous hours of face-time training had been conducted with local facility SHEA personnel. The success of our programs had enabled elevation of the recognition of the corporate SHEA group, and to some degree that of SHEA personnel at plant level. However, recognition of their vital role in both compliance and success in SHEA excellence was not optimal.

Perhaps one of the most important elements of our recent SHEA program success, and a critical component for future success as well, has been the creation of a two- to three-day certification program for the facility-level SHEA coordinators/managers and their embrace of the training.

It is universally recognized that successful organizations have the best people. It is incumbent, therefore, to focus on local SHEA manager/coordinator development (an activity always pursued but never with the deliberate course of action we started in late 2009). We developed and implemented a two-day training program for individuals at smaller locations that had collateral duties such as quality control (QC), maintenance, etc., and a three-day course for individuals whose primary or full-time duties were SHEA-related.

To date, we have trained over 300 individuals in 16 sessions around the world, with many locations eventually training numerous individuals from the operations manager to the maintenance foreman, along with the site SHEA personnel for whom the course was initially intended.

The elevation of the SHEA position at the local level, the goodwill and cooperation created as a result of the training and the sharing of best practices and lessons learned by the attendees alone has been worth the effort the corporate SHEA staff spent writing the training program in our spare time over the course of two years. Its success has resulted in creation of a one-day refresher course to be implemented this year and a four-hour senior-manager SHEA orientation program as well.

Additionally, a SHEA-army of trained individuals is being dispersed throughout the corporation and, as some are promoted into other positions, the training is going with them. The operations managers, engineers and black-belt 6S experts who have attended training are moving up within the organization, carrying the lessons learned and the networking with other trainees to implement far better solutions to safety challenges that the corporate SHEA group could have ever accomplished on its own.

## Conclusion

We are far from perfect, and safety, like quality, is a journey, not a destination. Each new facility, whether constructed or acquired, presents a new set of challenges as we integrate them into the Flowserve SHEA Management Program. The journey continues; I will let others judge if we have reached the goal I set over two decades ago: a sustainable, world-class SH&E performance program.

We continue the journey; if we are short of the goal, we can look back and celebrate the following milestones along the journey:

- Won over 825 awards from the National Safety Council
- Named one of America's Safest Companies in 2010 by *EHS Today* magazine



- Reduced lost-time accident rate by 93.6% (>70% less than our peers)
- Reduced lost workday severity by 97.7%
- Achieved workers' compensation costs >75% less than U.S. manufacturing average of 3.21% of payroll
- Reduced U.S. workers' compensation costs by \$18 million
- Reduced solvent emissions to the air by 90%
- Reduced hazardous waste and machining coolant shipments by 70%
- Reduced solid waste disposal by 50%
- Achieved a total environmental savings of over \$50 million while growing from \$300 million in sales to \$4.51 billion
- Prevented 8,514 recordable injuries (over half of the company headcount) and 39,391 days (19.6 work-years) away from work, based on historical statistics since the creation of Flowserve in 1997