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Safety At Fluor Hanford (B) Case Study

Prepared by Thunderbird School of Global Management

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

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SAFETY AT FLUOR HANFORD (B)

We had no roadmap for the massive cultural change that had to occur. We had to get people aligned to the values of Fluor, with safety as the lead one. The neat thing is that we led with safety. Safety was the common ground that we could use with the union and the workforce. Safety became the change agent. Once we built trust in the safety program, we could make other changes. Safety was touching every aspect of our work and was common ground for developing a dialog.

Director, New Safety Programs, Fluor Hanford

One year into the Hanford contract, Fluor had learned a number of hard lessons very quickly. Although the Hanford remediation contract was in many ways a new endeavor for Fluor and a different kind of contract, the organization moved quickly to increase communication with all employees, attack head-on what it considered unsafe and inappropriate safety practices, and strongly inject its own corporate cultural beliefs into the Hanford organization. It wasn't easy, and it didn't happen overnight.

From the beginning, Fluor established processes and programs to drive down injury rates. For example, whereas the previous contractor's approach to injuries had been passive, Fluor took a much more aggressive approach to worker injuries. The previous contractor had established a practice of sending injured workers home with the basic directive "to come back when you are well." Instead of using outsourced medical assessment, Fluor internalized it and evaluated all claims aggressively. Legitimate claims were quickly settled, and management moved to identify "repeat offenders" when it came to reportable safety incidents. In the first year of Fluor's management, reportable injuries dropped from 5.37 to 2.99 per 200,000 man-hours.

Despite the drop in injury rates, the safety record at Fluor Hanford was not at a level that met either Fluor or the Department of Energy's expectations. Earlier in 1997, Fluor Hanford's proposed safety program was rejected by the DOE. The DOE was not satisfied with Fluor Hanford's proposal for various reasons, including insufficient worker involvement and a lack of accountability. With the need for change clearly established, Fluor Hanford management embarked on a decade-long mission to change the safety culture and improve safety performance. This case describes the key changes and their impact on Fluor Hanford.

Worker Involvement

After establishing clear work rules and procedures for safety, Fluor Hanford management addressed the issue of employee involvement. A key activity related to worker involvement was the creation of the union safety representative program. For several years, the unions had been asking for greater involvement in safety. In 1997, the safety rep program was initiated. The program grew out of the numerous union and management meetings that took place during a long and difficult union contract negotiation. From these meetings, a level of trust was established between union and management, and a decision was made to experiment with a new program. The safety rep program allowed the union to select one of their bargaining union members to be assigned to one of the site's major projects. This individual would have access to senior managers at Fluor Hanford and also at the DOE. As a manager explained:

If I had to put my finger on one thing that Fluor was able to do that previous contractors could not do it was that Fluor worked hard to engage the work force and listen to the work force. If you really want true ownership and partnership between the union and management, you need to allow the union to select the people who will sit on the safety committees. That is what we did with the union safety reps. The first safety rep had the right to change the people who were sitting on these committees. We were building trust into the relationship between management and labor.

The first union safety rep echoed management's views:

During the first union negotiations, Fluor realized that there were so many outstanding grievances and arbitrations that it would take millions of dollars to resolve. Fluor said, "Can't we try to work this out?" The president of the local said, "Why don't you put one of our guys on the safety committee?" The VP of Safety agreed and said, "Let's write an agreement. The union and the company will work with the DOE to take care of safety problems at the highest levels."

When I was offered the position, I wanted it to work but I was skeptical about it. In the first year, I knew there were going to be some battles. Slowly this started working. I resigned as chief steward and have never sent a grievance in on safety. We worked out safety issues between us. It is a 50-50 deal. This was a big gamble. They are taking a big gamble in reaching their hand across the table. No other contractor ever did that. You just don't do that out here.

We knew we had to change something, and within a year or so we started to use the term safety culture. I got an office right next to the VP of safety. Things started to change. We had a chance to meet senior management. We had never met senior management before. There were open minds at senior management. The HR industrial relations guy was also open. This is like walking death to a labor person. He was the guy who kicked butt at Fernald. He sat down with me and asked, "What do you need?"[1]

There is much more involvement with the workers. They will be involved in writing procedures. Before Fluor, the procedures were developed by engineers. Now, if things go wrong, the workers are heavily involved through the union safety rep program. The safety reps watch for the safety of the bargaining unit people.

The safety rep's access to senior management, however, was initially viewed with some skepticism by Fluor Hanford middle management.

There were some challenges accepting Fluor's changes. It almost seemed like the line of authority went from the president to the CEO to the safety VP, down to the bargaining unit rather than the old traditional hierarchy. Eventually, we realized that safety was so important that it didn't matter if the safety side of the house got involved in it.

It took me about three years of being a doubting Thomas... When the safety rep program first started, my initial reaction was that it was an erosion of my management responsibility. You now had some bargaining unit guy out there keeping book on you, running up to the safety VP with issues, causing you trouble, and you were supposed to be in charge. This was just another distraction. Is this guy going to be circumventing me and going to the VP? After awhile, I came to realize that a good safety rep can make your management job easier. The safety rep can help the supervisor work through issues with the bargaining unit. They are invaluable if you use them right. They are an ally and are not there to steal your authority with your people.

The safety reps have open-door access to any manager they want. They have scheduled meetings with senior managers. As a safety professional, I had to change my perspective: I am the safety professional. Why aren't they coming to me?

As management acceptance for the safety rep program grew, safety grievances from the union stopped. From just one safety rep, the program eventually grew to 12 safety reps in all the major site projects. As the program was being implemented, there was some suspicion among union members that this was "just another program, the flavor of the month." An incident in late 1997 helped convince union members that management was serious about working more closely with the unions. At one of the site facilities, storage canisters were needed for radioactive materials. The previous contractor had promised that the canisters would be made on site. In 1997,

[1] Casewriter Note: These two individuals developed a strong personal friendship that has endured even after the industrial relations manager moved on to another Fluor site.

the DOE decided the canisters should be made off-site because the site fabrication facilities were too small. Despite Fluor management's arguments, the canister fabrication job was put out for bid. If the job was moved off-site, it could have resulted in some workers losing their jobs. Fluor Hanford's then-director of industrial relations explained what happened:

> *I refused to allow the canisters to be made off-site. We had just had a new union contract ratified [in August 1997], and I told the DOE that we would lose our credibility if we allowed this to happen. We had a summit meeting at the DOE, and I had to get Fluor Hanford senior management to intervene. We kept the fabrication on-site, and the union knew we were serious about keeping our word.*

This event helped convince the union that the safety rep program and other new initiatives that increased union involvement were serious and not just a new temporary program. Over the next decade, the safety rep program helped increase employee involvement, improve lines of communication, and strengthen employee commitment to safety.

Increased Communication

A key element in the successful implementation of the various programs was improved communication. For a variety of reasons—some historical, some institutional—open communication between management and labor had not been present for a number of years. Yet one of the cornerstones in all initiatives to improve safety was clear and direct communication. One example of how safety and communication went hand-in-hand was described in the following story by a Fluor Hanford Senior Executive:

> *When I arrived on-site, the workforce was not used to wearing helmets while working. I discovered this on my first day when I personally investigated an injury event—an electrician stood up under a window air conditioning unit and cut his scalp, requiring stitches. I immediately took the step of requiring helmets to be worn while working. This was met with considerable resistance pretty much across the board.*
>
> *A life-saving incident occurred shortly after helmets were required: a rock about the size of a large potato shot out from under the side of a truck tire—it struck a worker on the side of his helmet with such force the helmet was cracked; the worker sustained only a minor injury. The attending doctor made a statement that the helmet saved his life. Following that incident, there was little push-back on the implementation of other safety suggestions that I introduced.*
>
> *I also learned an important lesson myself—the need to engage the workforce with the reason. I felt strongly that change was required. My door was always open to union stewards as well as the safety reps. This ability to dialogue became a powerful tool in helping to guide future safety initiatives.*

This and other experiences were noted and repeated by many over and over in the following years. The following comments help capture the spirit of the communication:

> *Management would rent auditoriums and have all-hands meetings. We had to get the big hockey arena. The DOE said they would not pay for it so Fluor said they would pay for it.*

> *The culture of senior management getting involved and going out there had a big impact. Senior management is holding the VPs accountable so they start knocking on the next level.*

> *When presidents used to visit the field, we would spend a few weeks cleaning up and getting ready for the visit. We started having presidents just show up in the field. When the workers are seeing the president and VPs coming out to the field, they are a bit scared to talk. I tell them it is OK, you can talk.*

> *There is a lot more communication between senior management and the guy out in the field. That is done through programs like VPP [Voluntary Protection Program]. Through those committees, the working folks are identifying the safety hazards before they happen.*

> *The best thing I have seen is putting people together in the same room and getting them to talk.*

Fluor also moved to simplify the organizational complexity of the Hanford contract. The original organizational structure of 1+6+6 was reduced in following years to roughly three major subcontractors under Fluor Hanford's integration management. Although the original concept of integrating a number of organizations for "best-in-class" capabilities was sound, the ability to integrate and effectively communicate one safety culture and plan had proven problematic. Communication was key.

Safety Principles

Safety, although one of the most critical elements of any activity, business or otherwise, is a topic of considerable debate. In many organizations, safety frequently suffers from a lack of management and employee interest and attention. That is, until there is a significant safety failure. An illness or injury incident results from interactions between people and their working environment.[2] The specific objective of any safety management process is, therefore, to reduce incidents triggered by unsafe or at-risk systems or behaviors. Most theoretical views of safety management focus on *behaviors and systems.*

If accidents and illness result from the *failure of behavior,* then changing behavior—either through education or incentives—is the probable solution. This was indeed at the forefront of Fluor's concerns when first coming on-site, and was part of the communication and trust challenge it faced with workers. Workers still believed that failures in behavior were an issue of blame, not process. With the increasing trust and communication between workers and management, this barrier was overcome. An added insight of behavioral safety is the growing recognition that isolating the cause of the incident is only a first step. Successful safety management solutions or interventions depend upon the engagement of all stakeholders in the solution step.[3] This had clearly been the hurdle cleared with the safety rep program.

If accidents and illness result from *systemic failures* tied to a process used to accomplish a specific task, redesigning the process and systems is the solution. As part of system design, a change in the use of technology and equipment—either in the equipment itself, or in the procedure for its use—may be needed. Systems redesign proved to be an opportunity for both learning and improvement at Hanford. For example:

> *We had a growing series of injuries accumulating from workers putting in protective posts and property lines. They were using a sledge hammer to pound the posts into the ground, and we were getting a lot of injuries. So we moved quickly to get them better tools. We got a pneumatic hammer for them to use in putting in the posts. Both safety and efficiency improved quickly. We thought we were done.*
>
> *Just when we thought we had the problem solved, we had a worker with a very serious injury when he hammered a post into his foot. We sat back down with the worker to find out how that could happen. It turned out that we should have talked to the workers right upfront.*
>
> *There was nothing wrong with the hammer; it worked fine. But it was extremely heavy. The worker used a harness attached to his chest to move it. Well, instead of moving the hammer to the new spot, and then taking it off to use it, the workers were simply moving to the new spot, and then leaning way back to bring the hammer up in front of them in order to hammer. But then they couldn't see their feet. Voila. Sometimes it really makes sense to talk to the workers who are actually using the tools or executing the processes.*

K-Basins Cleanup

The K-Basins cleanup at Hanford is representative of how worker involvement through open lines of communication can merge safety principles and practices with business design and execution.

The K-Basins were basins of water attached to the K nuclear plant located in the 100K area of the reservation adjoining the Columbia River. Each basin had been used for the storage of spent nuclear fuel—the irradiated slugs—produced by the nuclear facility. Originally intended as a temporary storage step in plutonium processing, the sudden production stop at Hanford in 1988 had left highly radioactive materials and sludge in the basins for

[2] M. Dominic Cooper, "Behavioral Safety Interventions," *Professional Safety,* February 2009, www.asse.org.

[3] This full-engagement solution process is the basis of one program widely used in industry today, CLEAR: Clarify objectives, Locate the problems, Execute the change strategy, Assess current progress, Review and adapt the process.

many years. The basins now held roughly 80 percent of the DOE's remaining spent nuclear fuel (SNF). It was estimated that more than 15 million gallons of contaminated water had leaked from the basins over time. The basins were a mere 400 yards from the Columbia River.

The K-Basins had been the subject of highly visible Congressional hearings in 1997. An agreement had been reached between DOE and Fluor Hanford in 1999 that the SNF cleanup of the basins would be completed by 2004. This constituted a highly complex cleanup and remediation effort for Fluor Hanford. It also served as a good example of how an integrated safety plan and worker involvement would benefit both worker safety and the execution of the business. An outside observer wrote about K-Basins:

> *Send in your best-trained people to clean up aging facilities that were once part of the nuclear weapons-production complex. The two "K-Basins" and their contaminated contents pose a potential threat to the nearby Columbia River. The Basins are like indoor swimming pools, each holding more than a million gallons of radioactive water. Tens of thousands of irradiated fuel assemblies that once filled the cores of nuclear reactors are stored in the Basins. Those assemblies have become degraded, corroded, broken, and coated with radioactive ooze. Many are swollen or stuck inside canisters originally designed to protect them as they sat for decades in underwater storage. After repackaging the fuel and removing the canisters to a safe location, your crew must find a way to analyze the exact nature of the thick layer of contaminated sludge that's formed across the bottom of one deep storage pool. It's a mixture of nuclear material and settled silt. It's clearly hazardous and must be cleaned up. The building is old, and lighting is less than ideal for the current mission; the water is so cloudy that workers use underwater cameras to see what they're working on. The environment demands personal protective equipment that is bulky and will restrict movement. Most tasks can be done only from high platforms by awkwardly reaching over railings. Because much of the work is unprecedented, the best possible tools must be found or fabricated quickly. Finally, the one thing firmer than the expectation to get the job done rapidly is the absolute requirement to get it done safely.*[4]

The first problem was that the two basins, K East and K West, were a half-mile apart. Each basin posed a complex combination of material, liquid, and basin lining remediation needs. The actual liquid in the basins contained highly radioactive sludge, which required a separate filtration and cleanup process from the spent nuclear fuel and assorted physical debris at the bottom of the basins. After the basins were emptied and liquids drained, the actual basin walls would have to be stabilized and removed.

During 2000 and 2001, as communication and worker involvement increased, the K-Basins project was one of the first beneficiaries. A working team composed of Fluor Hanford and onsite workers created a plan to pump the liquid sludge from the East basin to the West basin via a one-half-mile-long double-walled line so that the sludge removal process could be concentrated solely at the West basin. The idea, originating from the site workforce, resulted in a significant reduction in the risks, costs, and time associated with basin remediation. Throughout the process, workers were integrally involved in the design and development of new tools and processes needed to remove more than 105,000 individual spent fuel elements.

The worker involvement and engagement at K-Basins was seen in an additional development: workers creating their own tools.

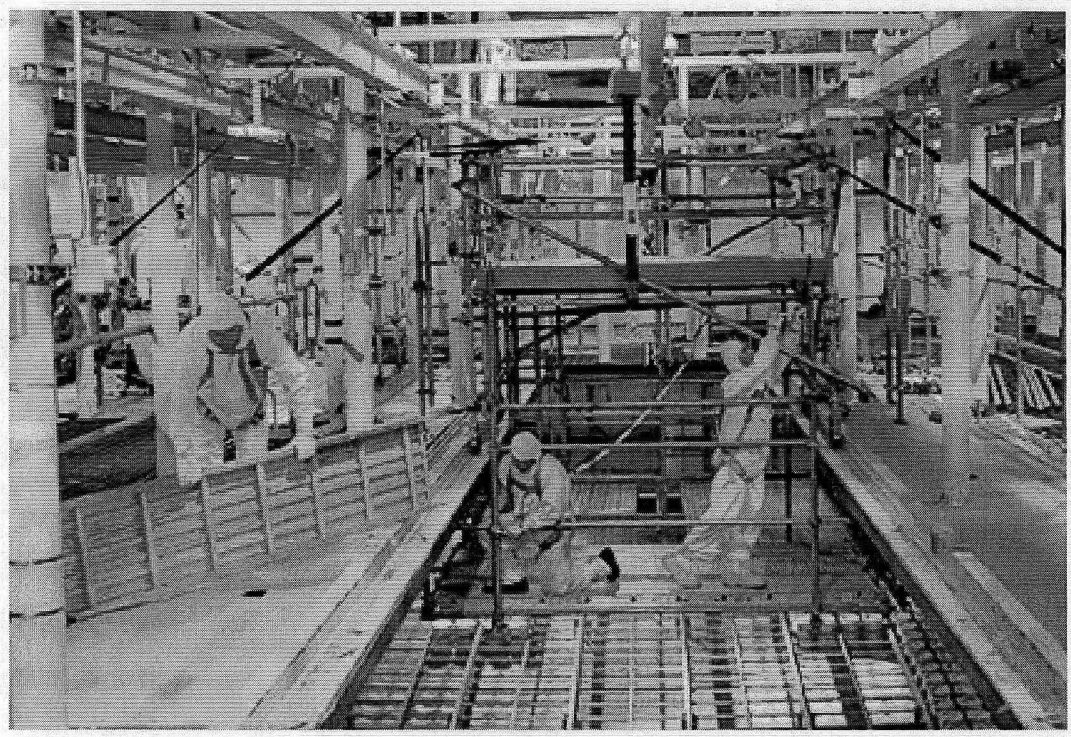
> *During the sludge-pumping endeavor, workers devised new "end effectors" to fit onto the ends of the pumping hoses. Different shapes and sizes were used in different conditions. Workers gave these tools comical names and even named them for each other. Leon Jackson invented the "Leon Potato-Masher," a device with long "fingers" above a potato-mashing bottom, to break through small debris and prevent large particles of sludge from clogging the hoses. Chris Bunker invented the "Bunkenator," and Manuel Guzman, the "Guzenator."*[5]

Soon after the K-Basins cleanup was started, however, there was a continuing series of worker injuries. The cleanup effort required workers to use a variety of tools at the end of 20-foot poles extended down into the

[4] "Retooling at Fluor Hanford," by Thom Spencer, *Occupational Health & Safety*, June 2006, Volume 75, No. 6, pp. 123-126, www.ohsonline.com.
[5] "Fluor Finishes Major Cleanup Project at Hanford," *FYI Link*, Volume 3, No. 10, October 2006, p.6.

retention pools, with visual manipulation often through the simultaneous use of cameras lowered into the highly radioactive pools.[6] Workers had to manipulate the poles to move waste and refuse to the desired outcome. The efforts, however, resulted in a growing series of back and other physical problems for workers as a result of the stress on the human body from the extended task. An alteration of the process, the result of an in-depth ergonomic health safety study and analysis by external and internal health safety consultants, resulted in a reengineering of the process and the reduction of these workplace injuries. The SNF cleanup in the K-Basins was completed in October 2004 at a total cost of more than $1.7 billion.

Exhibit 1. The K-Basins Cleanup at Hanford



Integrated EHS Management System

After failing to meet the DOE's expectations for a safety plan, Fluor succeeded in quickly developing a safety plan that became a benchmark for others in the industry to emulate. The Integrated Environment, Safety, and Health Management System (ISMS) became the centerpiece of the organizational effort to improve safety. ISMS is a systematic and structured approach to integrating safety, health, and environment into planning and doing work. ISMS incorporated a variety of programs, including employee job task analysis, automated job hazard analysis, safety improvement plans, occurrence reporting system, and an employee concerns program.

A significant component of the success of the integrated safety system was a "Stop Work" policy. Any time work is being performed, any person who has a concern about whether the job is being performed in a safe manner has the authority and responsibility to stop the work immediately. Where OSHA and the DOE require "Stop Work" authority for imminent hazards, Fluor Hanford's policy goes beyond those requirements. Any employee may issue a "Stop Work" for any hazard that is causing a concern. In addition, that employee is then involved in finding solutions to performing the work more safely.

The ISMS implementation was enhanced by pursuing and earning DOE-VPP recognition. As evidence of the success of ISMS, Fluor Hanford, in cooperation with the DOE, provided senior managers and safety

[6] One worker's comment characterized the challenge: "The sludge didn't go where we wanted it to go, it didn't behave the way we wanted it to behave, and it didn't stay where we wanted it to stay."

professionals internationally with the development of their own VPP programs, including Chernobyl Ukraine's Building a Job Hazard Analysis Program and the Ignalina Nuclear Power Plant Training Center in Lithuania.

Continuing Initiatives

In addition to the union safety rep program and the integrated safety program, Fluor Hanford initiated several other important programs over subsequent years to provide the impetus for continuous improvement and to maintain organizational momentum.

Voluntary Protection Program. The *Voluntary Protection Program* (VPP) was created by OSHA to promote effective worksite-based safety and health. In the VPP, management, labor, and OSHA establish cooperative relationships at workplaces that have implemented a comprehensive safety and health management system.

To participate in the VPP, a company's safety and health programs must exceed OSHA safety requirements and pass a rigorous third-party review. The company must also demonstrate a healthy partnership among management, workers, and regulatory agencies. Achievement in the DOE-VPP system consists of three levels of recognition: *Star*, *Merit*, and *Demonstration*. While the Star level is the highest, Merit status is seen as a stepping-stone level in which a contractor has shown good safety and health programs but needs time and DOE guidance to achieve Star status. The Demonstration level is expected to be used only rarely, and exists to allow DOE contractors and organizations to be recognized for achievements in situations in which the DOE needs to learn more before approving requirements for the Star level.

Nine Fluor-managed projects have passed a rigorous on-site review and been awarded *Star* recognition, the highest level of safety recognition under the DOE's VPP. An added development arising from Hanford's VPP program was an employee-based self-assessment process, essentially closing the loop for worker involvement and performance evaluation.

Safety Councils. Fluor Hanford has more than 50 Employee Zero Accident Councils. In these safety councils, employees take ownership of and identify safety concerns, issues, and opportunities for safety improvement. Operating according to written charters, the councils are responsible for reducing hazards and preventing accidents.

Right to Participate. The Hanford Worker Safety and Health Program has a number of guaranteed rights for employees. These include the right to job planning, hazard analysis, pre-job briefings, stop work responsibility, and feedback/critique after the job.

Human Performance Improvement Initiative. The most recent organizational effort has been the introduction of the Human Performance Improvement (HPI) Initiative. One senior Fluor Hanford executive described HPI:

> *The program stresses that the average person makes five mistakes an hour, and 75 percent of all mistakes are the result of error precursors or latent organizational weaknesses in the workplace that are either not identified or are overlooked on a daily basis.*

Using HPI, Fluor has focused on identifying, and then eliminating, these precursors to prevent accidents and injuries.

Performance Measurements and Information Management

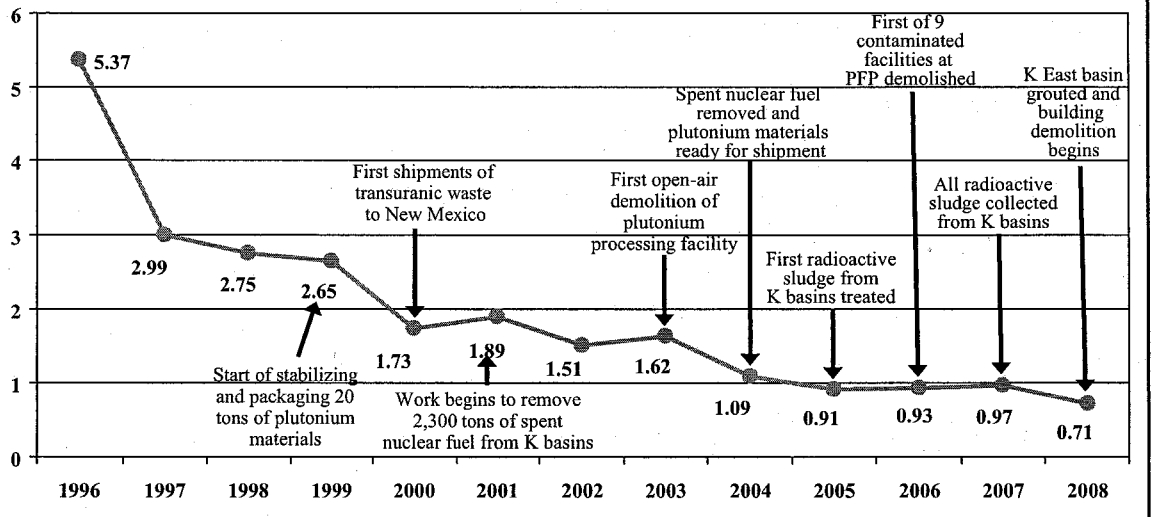
Without valid data on safety performance, it is impossible to make effective decisions. Thus, a key element in any effective safety program is the quality and appropriateness of performance measurement, data collection, and information management. Fluor Hanford took advantage of Fluor Corporation's world-class safety performance, and implemented a variety of new systems. These systems are regularly audited internally and externally. Evidence of the success of the safety measurement and information management systems is stated in a DOE-Headquarters review by the DOE Office of Independent Oversight.

Fluor Hanford has established and implemented a robust and effective performance monitoring program. Quality assurance and safety and health personnel and functional area managers conduct routine formal analysis of event/incident and non-event performance data and metrics that identify reportable recurring events, adverse safety trends, and emerging issues that require further monitoring or evaluation or directed corrective or preventive actions. Results of this iterative process of data collection and analysis are documented in quarterly performance analysis reports, and newly identified issues and actions are managed through the Fluor Hanford corrective action management system. This process is an effective means to identify and address declining performance and proactively address emerging potential safety issues.

A Strong Safety Culture

Between 1996 and 2008, Fluor Hanford's safety record improved significantly and dramatically, as illustrated in Exhibit 2. Recordable injury cases per 200,000 hours dropped from 5.71 in 1996 to 0.71 in 2008. Fluor Hanford was now consistently and dramatically outperforming the DOE complex.

Exhibit 2. Fluor Hanford Safety: Steady Improvement Despite Growing Complexity



Recordable cases per 200,000 hours.

In 2007, the DOE conducted a review of the VPP at the Plutonium Finishing Plant Closure Project (PFP), one of the major Hanford site projects. Excerpts from the DOE's review are as follows:

> *Interviews with the PFP managers, from the project Vice President down through the project organization, all demonstrated a clear commitment to the safety and health of every member of the project. Managers indicated, and the safety record confirms, that managers within the project view safety as an integral aspect of work. The project Vice President was ardent in his expectation that workers not only have "stop work authority," but a "stop work responsibility." This attitude was evident throughout the workforce, contributing to a safety-conscious culture.*
>
> *Over the course of the past five years, the safety statistics have improved dramatically. This safety record confirms that managers within the PFP view safety as an integral aspect of work. A system of policies and procedures defines how work is accomplished, and includes the integration of safety into all work. There is a clear policy on safe and healthful working conditions. Managers have obtained and provided the necessary resources to provide safety incentives, and ensure effective communication with workers. The project is structured to effectively and safely accomplish the project mission.*
>
> *A strong and active safety culture at PFP is evident by the employee commitment to the DOE/VPP safety process. A strong sense of family was noted, and all employees who were interviewed indicated that they "actively care" for their fellow employees. Employees and managers have formed a strong partnership over the past several years, and this is evident in their commitment to safety.*

Effective communication between employees and managers in addressing on-the-spot safety issues and concerns is commendable. There is strong employee involvement in the Automated Job Hazard Analysis (AJHA) process.

Safety as a Continuous Challenge

Fostering a safety culture is a long-term process. Fluor Hanford faced many continuing challenges over the years 1996-2008. Significant improvements in safety were made and, in the Fluor Hanford culture, safety became much more important. To conclude, we offer some reflections from Fluor Hanford employees:

The first-step change was getting back to basics and the union safety rep program. The next was expanding the safety rep program from one individual to five. There was credibility, and it was gaining momentum. The next big change was the Voluntary Protection Program. This was a DOE-adopted program from OSHA.

The biggest understanding I have learned from Fluor is that there are two paths to safety. There is the procedures and process side of safety, and there is the people side of safety, the ownership and responsibility.

Now, when things go wrong, we ask the question: How did we set that guy up so his mindset put him in a position to think the move he was about to make was the correct one? People do not do those things intentionally. We try to identify the organizational changes that will prevent it in the future. There is much less focus on individual blame. This is probably the biggest change.

You often hear that a great safety culture is something that is driven by management. That is wrong. A safety culture has to be inspired by management from the ground up. Safety is about the people out there working. When they can stand up and know they are safe, then you have a safety program.

Appendix 1. The Financial "Costs" of Safety

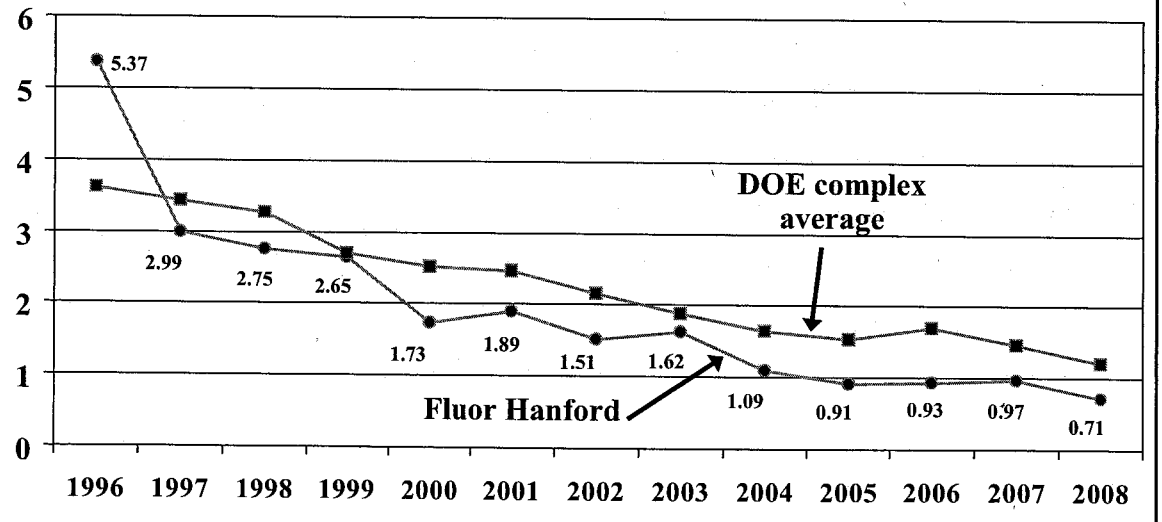
Question: Our moral and ethical obligations aside, how can we demonstrate the relative value added by strong health and safety performance?

Consider: A worker falls on the job resulting in a lost-time injury. What is the typical cost?

Direct incident costs * First aid, ambulance, area, affected workers	**$2,540**
Investigation costs * Investigation, reports, paperwork, fines, and premiums	**5,000**
Damage costs * Assessment, repair, cleanup, replacement	**760**
Replacement costs * Hire, relocate, and train replacement worker	**3,760**
Productivity costs * Lost productivity of new worker and old on return	**7,600**
Total safety incident cost	**$19,660**

Source: "Safety by the Numbers," by Arran James, Fluor Corporation, 2008.

Appendix 2. Fluor Hanford Safety and the DOE Complex



Recordable cases per 200,000 hours

Appendix 3. Changing Management at Hanford

Time	Government Agency Overseeing Hanford Site	
1943-1949	Manhattan Engineer District (MED) U.S. Army	
1947-1974	Atomic Energy Commission (AEC)	
1975-1977	Energy Research and Development Administration (ERDA)	
1977-today	Department of Energy (DOE)	
	Private Industry Contractors	**Services**
1942-1946	E.I. DuPont de Nemours and Company	All site functions
1946-1965/66	General Electric Company (Hanford Atomic Products Operation, HAPO)	All site functions
	Private Industry Contractors	**Services**
1965-present	Battelle Memorial Institute (BNWL) (later Pacific NW National Lab, PNL)	Environmental monitoring
1965-1990	U.S. Testing (January 1965-1990)	Bioassay and environmental sampling
1965-1975	Computer Sciences Co. (CSC)	Data management
1965-2004	Hanford Occupational Health Foundation (HOHF) (later Hanford Environmental Health Foundation, HEHF)	Medical services
1965-1973	Douglas United Nuclear (DUN) (joint venture of Douglas Aircraft Co. and United Nuclear Corp.)	Reactors operations and fuel fabrication
1973-1977	United Nuclear Industries (UNI)	Reactor operations and fuel fabrication
1966-1967	Isochem (joint venture of U.S. Rubber Co. and Martin Marietta Corp.)	Chemical processing operations
1967-1977	Atlantic Richfield Hanford Co. (ARHCO)	Chemical processing operations
1966-1975	ITT Federal Support Services, Inc.	Administration and data management
1970-1996	Westinghouse Hanford Company (Hanford Engineering Development Laboratory, HEDL)	FFTF development
1975-present	Boeing Computer Services Richland (BCSR)	Administration and data management
1977-1987	Rockwell Hanford Operations (RHO)	Chemical processing and reactor operations
Consolidation (partial)		
1987-1996	Westinghouse Hanford Co. (WHC)	All site functions except those performed by PNL, HEHF, and BCSR
1994-present	Bechtel Hanford, Inc. (BHI) Environmental restoration and decontamination and decommissioning of 100 area inactive facilities; soil and groundwater remediation (1998-2002)	
1996-present	Fluor Daniel Hanford, Inc. (Project Hanford Management Contract—PHMC; name changed to Fluor Hanford, Inc. in 1999)	All site functions except PNL, medical and informational technology
1996-present	Lockheed Martin Services, Inc. (LMSI)	Information technology
	New Consolidation: Private Contractors	**Services**
1999-2008	CH2M Hill Hanford Group (CHG)	Tank Farm Operations
2000-present	Bechtel National/Washington Group International (BNI)	Waste Treatment Project
2004-present	Advance Medical Hanford (AMH)	Medical & health services
2005-present	Washington Closure Hanford (WCH	River Corridor Remediation
2008-2009	Fluor Hanford (FH)	Site-wide services and B Reacto
2008-present	Washington River Protection Solutions (WRPS)	Tank Farms Operation
2008-present	CH2M Hill Plateau Remediation Company (CH-PRC) Facility D&D, sludge treatment, solid and liquid waste, groundwater and soil remediation	
2009	Mission Support Alliance (MSA) (joint venture of Lockheed Martin Corp., Jacobs Engineering, and Wackenhut Corp.)	Site-wide support services, B Reactor, and IT

*This does not represent a complete listing of the contractors at the Hanford site.