Integrating Safety and Lessons-Learned Data with Human Performance for Successful Management and Oversight – 8053

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ABSTRACT

This paper documents the improvements Fluor Hanford, Inc. (Fluor Hanford) is making in analyzing and using safety-related and lessons-learned data in cleaning up the U.S. Department of Energy's (DOE's) site at Hanford in southeastern Washington state. Results of the application of Statistical Process Control (SPC) and Dashboards to support planning and decision making have been shared at past Waste Management conferences. Recently, Fluor Hanford has implemented and refined a process called the "Data Analysis Working Group" to integrate data from several sources, including opinions from subject-matter experts. The process also includes a risk-ranking tool used to prioritize potential risks and past problems for management and oversight of the Hanford cleanup. Human Performance and Lessons Learned information also is included in this process.

Fluor Hanford has applied SPC in a non-traditional (that is non-manufacturing) manner. Dr. Shewhart's 75-year-old control-chart methodologies have been updated to modern data processing, but are still founded on his sound, tried and true principles. These methods are playing a key role in safety and quality at Hanford.

The performance-indicator system used by Fluor Hanford has been featured by several professional societies in their publications, primarily the American Society of Safety Engineers and the American Society for Quality. The system also has been featured in past Waste Management conferences. Eleven years ago, Fluor Hanford's statistician produced 300 data files and accompanying charts a month. Today, those numbers exceed 3,000 a month, almost one chart for every employee. This activity also includes entering data for approximately 500 safety inspections each month. The challenge is in effectively analyzing and prioritizing this information and providing it to senior management to make pro-active decisions and policies. That challenge is being met by Fluor's Data Analysis Working Group process.

INTRODUCTION

Statistical trending of safety, quality, and occurrence data continues to play a key role in improving safety and quality at what has been called the world's largest environmental cleanup project. The U.S. Department of Energy's (DOE's) Hanford Site played a pivotal role in the nation's defense beginning in the 1940s, when it was created as part of the Manhattan Project. After more than 50 years of producing material for nuclear

weapons, Hanford, covering 586 square miles in southeastern Washington state, is now focused on three outcomes:

1. Restoring the Columbia River corridor for multiple uses
2. Transitioning the central plateau to support long-term waste management
3. Putting DOE assets to work for the future.

The current environmental cleanup mission faces challenges of overlapping technical, political, regulatory, environmental, and cultural interests. Fluor Hanford, Inc. (Fluor Hanford), a prime contractor for the DOE, has the responsibility for cleaning up a large portion of the site. The emphasis has to be on doing work safely, delivering quality work, controlling costs, and meeting deadlines.

Successes to Date

Presentations and articles on the 11-year effort by Fluor Hanford to reduce its OSHA occupational injury rate by more than 80 percent to less than 1 case per 200,000 hours have been published in the proceedings of previous Waste Management conferences [1], the American Society for Quality [2] [3], and the American Society of Safety Engineers [4] [5]. Training on the methods used by Fluor Hanford has been provided to several other commercial and governmental organizations: Bechtel Corporation, Boeing Company, Schweitzer Engineering Laboratories, Pacific Northwest National Laboratory, Washington State Department of Social and Health Services, AREVA, Lawrence Berkeley National Laboratory, Los Alamos National Laboratory, and the University of Washington. Many of these groups are moving forward with applying the training materials. The training covers methods originated by Drs. Shewhart and Deming as further refined and implemented at Fluor Hanford to improve the safety and quality of the site's cleanup work.

Fluor Hanford has also received positive accolades for its safety and quality analyses and their application to the workplace. In 2005, DuPont performed a Workplace Safety Assessment of Fluor Hanford and reported: "performance measurements are evident throughout the Site, are posted in most office and operating areas, and are reviewed at various meetings… extremely data rich organization with great statistical capability."

In August and September 2006, DOE's Office of Independent Oversight conducted an inspection of Environment, Safety &Health at Fluor Hanford, with the following positive attribute noted:

> *[Fluor Hanford] FH has established and implemented a robust and effective performance monitoring program. Managers conduct routine, formal analysis of event/incident and non-event performance data and metrics that are identifying reportable recurring events, adverse safety trends, and emerging issues. . . 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 FH corrective action management system. This process is an effective means to identify and address declining performance and proactively address emerging potential safety issues. . . FH has also developed robust processes for performance analysis and performance indicators that fulfill the requirements of DOE Manual 231.1 and contractual requirements.*

Chart Production

The primary trending charts used in safety, quality, corrective-action management, and occurrence reporting are made by the company's statistician (an author of this paper). These charts are created using Statistical Process Control (SPC) techniques developed by Dr. Walter Shewhart, and refined by Dr. W. Edwards Deming. Pareto charts and histograms also help to portray the data when the processes are stable. The direct costs of producing charts are very low as data retrieval has been highly automated through Microsoft Visual Basic ® programming with connections to existing site databases. The data are retrieved from Microsoft Access ® files, copied to Microsoft Excel spreadsheets. The SPC baseline averages and control limits are calculated in Excel ®, and the results emailed to customers both inside and outside of Fluor Hanford.

The list of active performance indicator charts does change with time. In addition, special request charts and reports are provided in a timely manner to managers, subject matter experts, and workers as needed. The average response time for such requests is currently less than one working day, and is itself trended as a performance indicator. As performance indicators outlive their need, they are dropped from the active list, and new performance indicators are developed to reflect the needs of current programs and projects.

Routine chart production is completed within ten working days each month. Therefore, the direct costs of chart production are very low, and excess capacity still exists even with a ten-fold increase in analytical tasks in eleven years. The challenge is: once the charts are complete and sent to the hundreds of customers, how can the company analyze the results and develop a prioritized listing of vulnerabilities and successes?

Integration of Data Streams and Stovepipes

Operating experience data in the DOE traditionally has included "Lessons Learned," Corrective Action Management, Independent Assessments and Management Assessments. These data sources can provide important information for avoiding events and injuries, and improving performance. Traditionally, these groups have tended to work independently of one another, staying within their own "stovepipes." Each function has been managed as a program, and each has been challenged in recent years to document its ' individual value of each program. Each program has established its own working groups across the DOE complex, such as the Society for Effective Lessons Learned

Sharing (SELLS) and various Energy Facility Contractors Group (EFCOG) working groups.

Each group produces large quantities of data. After most significant events, it is noted with 20-20 hindsight that if more attention had been given to certain signals within the available mass of data before the event, perhaps the event could have been avoided. Before the event, however, the impact of the information is less obvious, and often overlooked in the overload of data provided to decision makers. This situation makes it imperative to establish a process for consolidating and integrating the data, and assessing its significance to assure that actions to be taken can be prioritized.

DATA ANALYSIS WORKING GROUP

The first Data Analysis Working Group (DAWG) at Fluor Hanford was formed in 2004. The members of the DAWG were drawn from many disciplines: Quality Assurance, Assessment, Lessons Learned, Corrective Action Management, and Project personnel were included as the subject matter experts for the DAWG. The group's original aim of the DAWG was to review operational data on a quarterly basis and help develop schedules for future assessment. The impetus was twofold: finding "emerging trends" while still "in the grass." and ranking the issues reviewed by the DAWG for presentation to senior management.

At the same time the DAWG was being formed, an effort was undertaken to review all incoming data for the Corrective Action Management (CAMS) process, and categorize the items by key words. The incoming data stream is known as the Authoritative Source Log, or AS Log. The CAMS database already contained "trend codes" and "cause codes" for binning data, but CAMS representatives made these entries, which could lead to inconsistent "interpretations" for grading the data. Assigning one person to apply key words to the AS Log file allowed better control and clarification of the meaning of each keyword.

Some problems did emerge in the early DAWG sessions, such as weighting and ranking the data. Because multiple data sources were included in the assessments (assessment results published Lessons Learned, CAMS data, and several other data sources) each topic had to be ranked. To rank the topics, the number of entries for each topic in each data source was counted, and a weighting factor was applied to the raw number, depending on the data source. However, it soon became evident that the process for tracking CAMS data and the sheer volume of CAMS entries rapidly skewed the final scoring, causing a "piling on" effect. For example, an assessment would identify that corrective actions are needed, which would be entered into CAMS. The DAWG would then review the CAMS results next quarter, and determine an increasing trend was occurring. As a result, the DAWG would declare this a problem area, and call for yet further assessments of the area. Thus, another assessment could be scheduled prior to any corrective actions from the prior assessment were completed. Alternately, if no prior

assessments had been performed, there would be no CAMS data, and there would be no visible data to support performing assessments in that area.

What was needed for the DAWG at this point was a way to incorporate subjective data and opinions from the DAWG's subject matter experts and move away from scoring strictly on counts of data. Further, statistical trending needed to be applied so that an emerging trend would not be buried by the mass of other data from other sources. Finally, the DAWG needed to expand its scope of action beyond simply determining assessment scheduling.

Refining the DAWG Process

In the second year of its operation, the DAWG refined its approach and processes. Statistical Process Control (SPC) charts were introduced to the DAWG process. These charts were similar to the "FluorBoard" dashboard charts previously presented at Waste Management conferences, and also similar to the charts utilized in mandatory quarterly Occurrence Reporting and Processing System (ORPS) analyses provided to the DOE. Emphasis for review was placed on two types of charts: those that plotted statistically significant non-improving trends and those that showed stable performance but at levels needing improvement. SPC charts were included from the CAMS trend and cause codes, ORPS reporting criteria and cause codes, lessons learned, and observations performed by DOE's facility representatives. An example of an SPC chart is shown in Figure 1. Assessment data were not separately charted, but were part of the CAMS data.

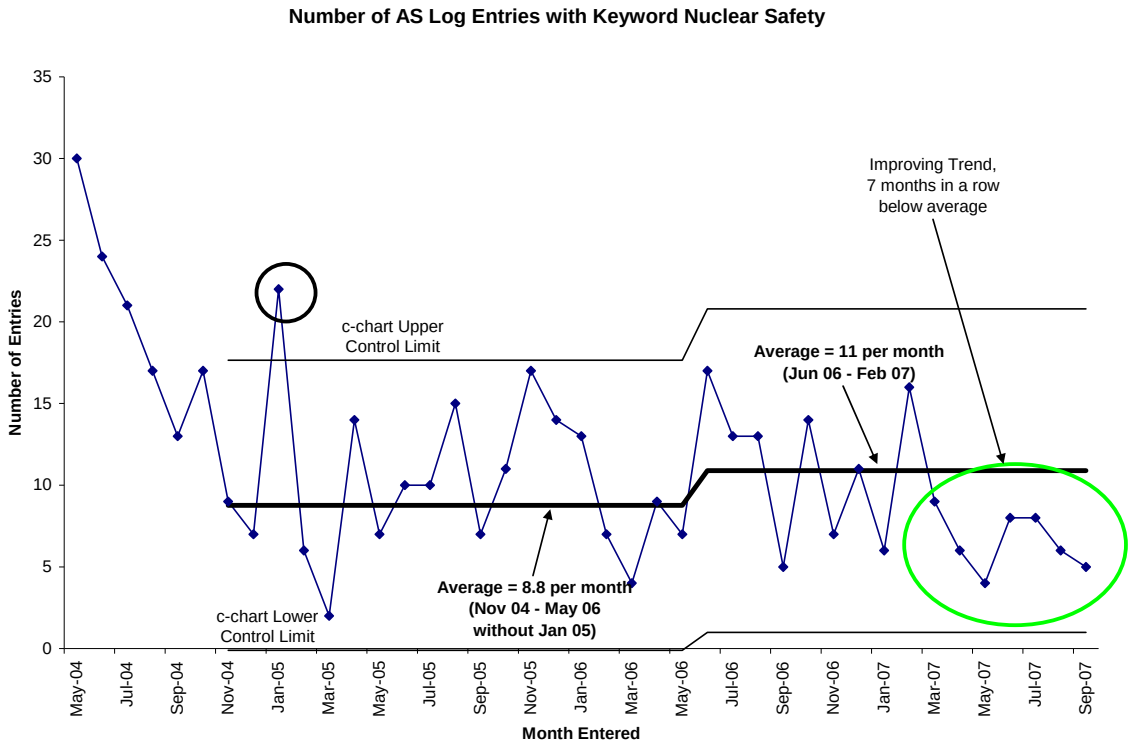

Fig. 1. The DAWG reviewed SPC charts such as the one shown above.

A tie was established between the Functional Area Forum (FAF) and the DAWG. The FAF was formed to review ORPS-reportable and non-reportable data to fulfill DOE ORPS analysis requirements. The FAF meets monthly, but only reviews higher-level data. Actions taken as results of trends in ORPS analysis were provided to the DAWG for its review. This strengthened the review of data, as the FAF tends to review higher-consequence data, and the DAWG a much larger volume of lower-consequence data.

A decision was also made to create a combination method of ranking the risk of the issues reviewed by the DAWG. This method would link the subjective opinions of the DAWG members with the objective statistical analysis data.

THE DAWG METHOD FOR RANKING RISK

The way the DAWG ranks risk is based on the concept that risk is the product of the probability of an event's happening and the severity of that event. While there are more formal and sophisticated ways of analyzing risk, such as Failure Modes and Effects Analysis, the DAWG wanted a simpler tool. Five probability factors and four severity factors were chosen. Each factor is given a score of one to five, with one the least important.

Probability Factors

Table I lists the five probability factors scored by the DAWG.

Table I. The DAWG Applies Five Probability Factors to its Analysis

Score	Past-Performance Data	Prediction of Future Performance	Past Corrective Actions	Past Assessments	Extent of Condition
1	Has not occurred in the past year	Unlikely at all	No new actions needed	Assessed within past quarter	Isolated to one facility
2	Has not occurred in the past quarter	Unlikely to occur in the next quarter	Corrective actions being implemented	Assessed within past year	Isolated to one project / one functional area
3	Has occurred in the past quarter cycle, and is stable or improving within past quarter	Likely to occur, but number should go down in the next quarter	New corrective actions identified, but not implemented	Assessed within 2 years	Currently in one project / functional area, but predicted to grow to more areas.
4	Stable within the past quarter, and in need of improvement	Number likely to stay the same in the next quarter	Past corrective actions have been ineffective (or are in question)	Assessed within 3 years	Currently in multiple projects / multiple functional areas

5	Non-Improving trend within the past quarter cycle	Number likely to increase in the next quarter	No corrective actions have been taken, and actions are needed	Greater than 3 years since last assessment	Systemic problem (all projects/ all functions)

The first column, "past performance data," incorporates the objective data from the SPC charts. Trends are determined by the statistical trending rules used by Fluor Hanford in its control charts. The highest score, five points, is assigned to topics whose performance charts have statistically significant trends in the non-improving (adverse) direction. The second highest score is assigned to those charts showing stable performance but in need of improvement.

The second column, "prediction of future performance," allows the DAWG members to predict future performance. The chart is used as a starting point, but the expert knowledge of the members is applied to the prediction.

The third column, "past corrective actions," captures the current status of corrective actions for the topic. If there are active corrective actions being taken, a low score results. If past actions are deemed ineffective, or no actions are being taken, a higher score is given.

The fourth column, "assessed within the past year," gives credit for topics that recently have had formal assessments conducted. This helps to counteract the previous problem of "piling on." If a prior assessment results in an increasing trend of corrective action data, resulting in a 5 score in the first column, this assessment column will only receive a score of 1, due to the completion of the prior assessment. Longer time intervals since the last assessment also increase the uncertainty of the condition of the topic. The score of 5 for a topic without an assessment in the past three years increases the probability score, reflecting both uncertainty, and also counteracts the potential lack of hard data as a result of not assessing the topic.

The fifth column, "extent of condition." accounts for how widespread the topic may be through the company. As a topic impacts more areas, the more likely an adverse event may happen in the topic in the future.

Severity Factors

Table II lists the four severity factors scored by the DAWG.

Table II. The DAWG Applies Four Severity Factors to Its Analysis

Score	**Compliance**	**Current Operational Impact**	**Emerging Work Scope / Problem Growth**	**Expert Opinion**

1	No impact	No impact to operations	There is no new work in this area anticipated.	No concern
2	Administrative (paperwork) issue, very little impact	Minor impact to operations (delays)	No impact on any new work, no likely growth in severity	Of concern to SME / DAWG
3	Noncompliance with Fluor Hanford requirement, likely to be a Deficiency	Intermediate impact to operations (recovery time)	Some impact on new work or might grow in severity if not corrected	Of concern to Fluor management
4	Noncompliance with contract or regulatory requirements, Non Conformance Tracking System (NTS), Significant Issue	High impact to operations (significant rework efforts, budget or schedule impact)	Will impact new work or will grow in severity if not corrected	Of concern to the local DOE office
5	DOE targeted areas, DOE letter of concern, Conditional Payment Of Fee	Severe Impact (Stand-down, shutdown)	This has impacted other locations and will impact similar new work in the next year.	Of concern to DOE Headquarters, Defense Nuclear Facilities Safety Board

The first column, "compliance," covers the likely severity of the topic. If the topic is likely to be considered a "low-threshold deficiency" in CAMS, the score is a 3. CAMS "significant issues" and NTS items score a 4. Topics that could result in DOE's taking actions against the contractor are scored as a 5.

The second column, "operations impact," covers the likely impact to operations, costs, and schedule. The third column covers emerging scope of work. The topic may not affect current tasks at Fluor Hanford, but consideration is included of potential impacts to new tasks and new scope of work.

Finally, the fourth column, "expert opinion," attempts to capture the level of concern with the topic. Is it only of concern to the DAWG members, or has company management, the local DOE customer, or DOE headquarters become concerned?

Calculating the Risk Rank Value

The average of the five probability scores is calculated. Then the average of the four severity scores is calculated. These two numbers are then multiplied, giving a score between 1 and 25. This product then has 1 subtracted from it, and is multiplied by 100/24: Risk Rank Value = ((Average Probability Score x Average Severity Score) - 1) x 100 / 24. The results are then sorted from highest to lowest.

Use of an arithmetic average for the probability and severity scores may have some limitations since the data are discrete rather than continual. However, due to ease of calculation and understanding by the decision makers, this method appears to be a reasonable compromise. This method was adopted from a previous risk ranking methodology used at Hanford, and was presented at a previous Waste Management conference [6].

CHOOSING TOPICS FOR RISK RANKING

So far, this description has been reasonably objective and straight-forward. A harder question is: how does one choose what topics to rank in the first place? The DAWG process recognizes topics from two sources. The first source is a keyword, cause, or other categorization field from an existing data source. For example, the AS Log currently uses 82 different keywords. Histograms are made up of the data by keyword, and the top 47 are inserted into control charts. The control charts are constructed using a local Fluor Hanford procedure, and this procedure has also been posted on the internet [7] [8]. Originally, the DAWG would review all of these charts, and many more from other sources. To streamline this process, a summary table is made listing the trends from all 47 charts and their current baseline level.

The DAWG does use the SPC statistical trend signals (including points above the Upper Control Limit, and seven points in a row above average) as a trigger to bring the subject to the attention of the DAWG. The assumption is made that the trend represents a changing condition, and may represent increased risk to the company. Therefore, these subjects are reviewed by the DAWG, and a new risk score developed to reflect the changing risk level. Also, a decreasing trend may reflect a decreasing risk, and again, an adjustment to the risk score is needed. The summary chart from DAWG number 12 is shown in Table III.

Table III. The Summary Table of AS Log Trends Reported to DAWG 12

AS Log Keyword	Current Baseline	Improving Trend	Non-Improving Trend
Calibration	2.2 per month	**Re-baselined to a lower rate**	
Corrective Action Management	5.8 per month		
Chemical Management	1.1 per month		**Above the Upper Control Limit (UCL) with 15 in July**
Configuration Management	1.9 per month		
Conops	8.4 per month		
Contamination	4.3 per month		
Criticality Safety	9.1 per month	**Apr 07 - Sep 07 > 4 of 5 below 1 standard deviation**	**Aug 07 close to UCL**
Critique	0 per month		
Design Documentation	4.6 per month		
Document Control	4.8 per month		

Documented Safety Analysis	4.6 per month	**Re-baselined to a lower rate**	
Emergency Management/Response	9.2 per month	**Dec 06 - July 07 below average**	
Environmental Protection	5.8 per month		
Equipment	6.7 per month	**Re-baselined to a lower rate**	
Fabrication	1.4 per month		**July above UCL**
Fire Protection	11 per month		
Hazard Identification	3.2 per month		**July above UCL**
Hoisting and Rigging	1.8 per month		
Inadequate Corrective Action	2.4 per month		
Inspections	3.2 per month		
Labeling/Marking	2.7 per month	**Re-baselined to a lower rate**	
Logging Practices	1.0 per month		
Lockout / Tagout	5.1 per month	**Feb 07 - Aug 07 6 out of 7 below 1 standard deviation**	
Mgmt Assessment Adequacy	1.3 per month		**July above UCL**
Material Control	0.9 per month		
Nuclear Safety	11 per month	**March through Sep 07 7 below average**	
Occupational Safety	13.5 per month		
Postings	2.5 per month		
Procedure Implementation	57 per month		
Procedure Inadequacy	17 per month		
Procurement	7.6 per month		
Rad Con	26 per month		
Records	15 per month	**June, July, August below 2 standard deviations**	
Respiratory Protection	6.0 per month		
Sampling/Analysis	4.4 per month		**April, May, July, and August are above 2 standard deviations**
Software	1.2 per month		
Subcontractor/Vendor	6.6 per month		
Suspect Counterfeit	1.4 per month		**August and September are above 2 standard deviations**
System Engineering	3.5 per month		
Testing	2.3 per month		
Training/ Qualification	16 per month		
Transportation	4.0 per month		
Unreviewed Safety Questions	2.1 per month		
Waste Management	4.1 per month		

Welding	0.7 per month		**May and July are above UCL**
Work Management	5.5 per month		**June and July above 2 standard deviations with July above the UCL**
Total AS Log Entry Trend	149 per month	Re-baselined to a lower rate	

The DAWG members then decide from this table which new topics to consider for incorporation. The second method by which a topic may be introduced for risk ranking is members' brain-storming. There may be some variability in levels of optimism or pessimism in the individual DAWG members. Any member may bring forth a new subject. When the subject does make it to risk ranking, the variability between DAWG members will be balanced out by the consensus method of risk ranking. The first meeting of the DAWG for the quarter is usually a brain-storming session. Any member may propose a topic for consideration, based on their experience and concerns over the past quarter. The company Lessons Learned Coordinator is included in the session to overview recent Lessons Learned published. The Assessment Coordinator provides a description of recently completed assessments from all sources, and assessments scheduled for the following quarter.

The DAWG may also request that management owners and/or subject matter experts meet with the DAWG and provide a briefing about their topical area and answer questions from the DAWG members. On occasion, the DAWG has also formed its own sub-teams in order to further inquiries into certain topics.

Consolidation, Culling, or Deferral

After the brain-storming session and chart reviews are completed (this usually requires two meetings of two to four hours each), each proposed new topic is reviewed. The DAWG members then have one of four options for the topic:

1. Cull it from the list. Remove it from consideration as no value.

2. Consolidate the topic with an existing topic from past DAWG analyses.

3. Defer the topic awaiting further information. For example, the DAWG members may wish to interview the management owner of the topic or other subject matter experts to find out more information.

4. Start a new topic. New topics are assigned a tracking number for risk ranking. Usually the topic is immediately risk ranked while the subject is fresh in their minds.

Risk Ranking

The final action is to review existing topics. Existing topics from previous DAWG analyses are reviewed. In some cases, there may be corrective actions being implemented, and the DAWG places those topics in a "parking lot" for review after the

corrective actions are in place and effectiveness reviews completed. "Victory" may be declared on a topic, and it may be removed from the listing as actions completed or further information shows it is no longer of concern.

Past topics not removed or placed in the parking lot have their risk rank scores reviewed. The DAWG members are asked if there is any basis to change the existing scores, including development of new trends, implementation of corrective actions, and completion of new assessments. Scores are modified as necessary. A final sort of the active topics is then performed. Parking lot, deferred, and removed items are segregated.

The final results from DAWG number 12 are shown in Table IV.

Table IV. The Risk Rank Values for DAWG 12 Results are Provided in a Final Report

	FINAL SCORE	QDAWG 11	Status
607 Managing Change	**64**	**64**	
1101. Conduct of Maintenance at Fire Systems Maintenance	**45**	**36**	Refined to cover just Fire Systems Maintenance.
1104. Central Procedure Development and Change	**40**	**45**	
1201. Technical Safety Requirement Related Issues	**38**	**New**	
413. Management Control/Performance of Subcontractors	**36**	**36**	
1102. Effectiveness of Corrective Actions	**35**	**39**	Made more generic (all corrective actions)
1103. Facility Technical Procedure Development and Change	**33**	**36**	
1105. Injury Rate Improvement	**30**	**33**	
1002. Configuration Management	**29**	**33**	
1107. Shift Routines and Turnover.	**23**	**34**	

904. Software Management	**Parking Lot**	**30**	Parking lot until Quality Assurance assessment and DOE assessment processed. Should be ready for DAWG 13
1001. Safety & Health Issue Management	**Parking Lot**	**Not Ranked**	Parking lot until owner's assessment is completed. A DAWG member was assigned to check on date.
702. Criticality Safety	**Parking Lot**	**Parking Lot**	Parking Lot until Effectiveness Review done at Waste Stabilization & Disposition project (Spring 2008).
609. Hazard Identification	**Parking Lot**	**Parking Lot**	Parking Lot until completion of actions - June 2008
602. Combustible Controls, Fire Protection Issues	**Parking Lot**	**Parking Lot**	Parking Lot until Effectiveness Review (March 2008)
401. Hazardous Energy Control	**Parking Lot**	**Parking Lot**	Parking Lot until Effectiveness Review for HAMMER Event Nov 07.
502. Respiratory Protection	**Parking Lot**	**Parking Lot**	Parking Lot until Effectiveness Review Dec 07.
703. Vital Safety Systems	**Parking Lot**	**Parking Lot**	Parking Lot until Owner Assessment completed, expected Dec 07.
1205. Groundwater Project	**Deferred**	**New**	Bring in owner for interview. Past Corrective Action from Subcontractor issues.
1202. Personnel Proficiency	**Deferred**	**New**	An Opportunity For Improvement, but not seeing adverse effects yet. Lots of transfers of personnel. Hold for DAWG 13
1203. Fast Flux Test Facility Emerging Issues	**Deferred**	**New**	Technical Safety Requirement Violation, Radiological Controls assessment, loss of personnel. Hold for Independent Assessment.
1204. Maintenance, including Calibrations	**Deferred**	**New**	Split out from 1101. Hold for next DAWG. Maintenance Manager Board being reborn.
1003. Decontamination & Decommissioning (D&D) Activities	**Deferred**	**Deferred**	D&D assessment was dropped from schedule as unnecessary. Deferred "one more time".
1006. Material Control	**Removed**	**Deferred**	Lines Of Inquiries provided to owner, actions complete. Drop.
1106. Chemical Management	**Removed**	**19**	Deleted by DAWG 12, no longer an issue.
302. Nuclear Safety	**Removed**	**Parking Lot**	Deleted by DAWG 12. See also 1201

FINAL PRODUCT AND FUTURE REFINEMENTS

The entire DAWG process is usually completed within four to five meetings averaging three hours each. Six to twelve DAWG members are at each meeting. Chart

preparations prior to the meeting cycle usually require 12 person-hours, and the report writing and presentation require 10 to 20 person-hours.

The DAWG Quarterly Report and Executive Management Briefing

Once the risk ranking is completed, the meeting notes are compiled and a final report is written. Usually a break point is established in the risk ranking, such as 30 and above, for detailed reporting to senior management. A typical DAWG report is about 12 pages long. A single page executive summary is part of the report.

A detailed description and recommendations for action are made for the topics scoring above the break point. Lower ranking topics are briefly described. The complete risk ranking table, and an overview of which scores changed and why is included as an appendix.

Following the publishing of the report, a senior management briefing is conducted. The Vice President of Environment, Safety, Health and Quality, the Operations Assurance and Quality Assurance Directors meet with the Fluor Hanford President and Chief Operating Officer. The briefing focuses on areas of high risk and areas where senior management focus will reduce risk. The status of critical corrective actions underway is reviewed, and the general health of the project is characterized.

Human Performance Improvement

Human Performance Improvement (HPI) techniques are being implemented by Fluor Hanford. HPI was developed in the U.S. nuclear power industry by the Institute of Nuclear Power Operations (INPO) to address plant and system safety. Fluor Hanford has adapted HPI to Health, Safety & Environmental programs as a tool to improve safety culture that engages the workforce in the planning stages of work to identify errors precursors and error likely situations that if left unmitigated, could result in adverse events.

Fluor Hanford has completed introductory training of personnel, and identified champions and implementation teams at each project within the company. Briefings of injuries at the monthly President's Zero Accident Council include HPI analysis of failed barriers and organizational weaknesses. Human Performance cause codes from the Department of Energy's Occurrence Reporting and Processing System (ORPS) are being applied to injury data and trending of these cause codes has started. The safety and health "leading indicators" have been modified to incorporate HPI data. This has been accomplished through modification of the company safety inspection program to not just observe physical conditions, but to also include observations of potential error precursors in the work being performed. These results are integrated into the monthly analysis of the project safety inspection results.

A future goal of the DAWG is to include more Human Performance Improvement information as HPI is implemented and becomes available. The DAWG also is

considering adding a column to the risk ranking criteria to incorporate the effects of error precursors and organizational weaknesses.

CONCLUSION

The DAWG process used by Fluor Hanford provides an effective means to analyze and integrate data from several sources, include a subject matter expert overview, and provide a final ranking of risk topics for senior management consideration. Each cycle through the DAWG process has led to refinements in approach. The DAWG has been successful in identifying vulnerabilities and areas for improvement, and communicating these to senior management. Fluor Hanford and DOE Management can then incorporate the DAWG analysis and recommendations in their decision making processes.

Fluor Hanford has seen benefits from the DAWG analyses and reports. Direct benefits have included improved bases for assessment scheduling, and reductions in occurrence reporting and corrective action management assignments. Quicker actions have been able to be taken on emerging trends, such as change management, nuclear safety, and occupational safety. The overall risk ranking scores have decreased over the past three years. Indirect benefits have included better communications with the DOE customer, increasing the credibility of Fluor Hanford as a contractor. Positive comments have been received in formal reviews and assessments by DOE and other third party assessors. In this way, the DAWG contributes to the successful completion of the DOE's mission at the Hanford site.

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