The Business Case for VPP - A Value-Added Program

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Introduction

This paper, which is being presented at the Twenty-First Annual National Voluntary Protection Programs Participants' Association (VPPPA) Conference in Dallas, Texas in August 2005, is based on four previously published Department of Energy (DOE) reports, which are listed below.

- *Value Added of the DOE Voluntary Protection Program*, DOE/E-647, June 2002, (Authors: Rama Sastry, Rex Bowser, and David Smith)

- *Summary of the Department of Energy VPP Annual Reports for 2002*, DOE/EH-0672, July 2003 (Authors: Rama Sastry, Rex Bowser, and David Smith)

- *The Value Added of the DOE VPP Program, 2004 Update*, DOE/EH-0690, December 2004 (Authors: Rama Sastry, Rex Bowser, and David Smith)

- *Statistical Analysis of Occupational Safety Data of VPP and Non-VPP Sites*, DOE/EH-0696, April 2005 (Authors: Rama Sastry and Holger Schwender)

The above reports can be obtained from the DOE Voluntary Protection Program (VPP) web site: http://www.eh.doe.gov/vpp.

We have gathered and analyzed a substantial body of evidence from the experience of DOE VPP member sites and organizations that indicates that workplace injuries and illnesses can be significantly reduced through VPP implementation, which, in turn, subsequently leads to improved productivity and development of a safety culture. The Department has found, as have others (see References), that investing in safety can improve a company's bottom line and offer other intangible benefits that are discussed in the above referenced DOE reports: *Value Added of the DOE Voluntary Protection Program* and *The Value Added of the DOE VPP Program, 2004 Update*. Those interested in further information should also examine the material available on the DOE VPP website, particularly the pages Business Case for Safety and Value Added of VPP.

The purpose of this paper is to present the results of the Department's analysis of injury and illness rates that demonstrates the value-added of VPP. The paper describes the methodology we used to arrive at our conclusions, including graphs and charts that illustrate our findings.

Injury and Illness Rates at DOE VPP Sites

Currently, 25 site organizations around the DOE complex have received approved status in the DOE VPP: 23 have achieved Star status and 2 have achieved Merit status. These levels of recognition parallel the Occupational Safety and Health Administration (OSHA) VPP, on which the DOE VPP is modeled. Figure 1 compares Total Recordable Case (TRC) rates and Days Away, Restricted, or Transferred (DART) rates (formerly known as Lost Workday Case rates) for DOE VPP sites and private industry, and Figure 2 shows the comparison of the average TRC and DART rates over the past three years (2002-2004). As the figures illustrate, the TRC rates and DART rates of DOE VPP sites were significantly lower than those of private industry.

In Figures 1 and 2, the TRC and DART rates for each DOE VPP site is compared to those of comparable private industry organizations as determined by the Bureau of Labor Statistics' North American Industry Classification System (NAICS) codes. For example, the research laboratories, Pacific Northwest National Laboratory (PNNL) and the Oak Ridge Institute for Science and Education (ORISE) are compared with private industry using the NAICS activity code 5417, *Research and Development in the Physical, Engineering, and Life Sciences*. Similarly, several sites whose primary activity is environmental remediation are compared to private industry using NAICS code 5629, *Remediation Services, and Waste Management*. Because of the unique operations and activities conducted at DOE sites, selecting comparable private industry can sometimes be difficult.

Figure 1. Comparison of TRC Rates of DOE VPP Sites and Comparable Private Industry

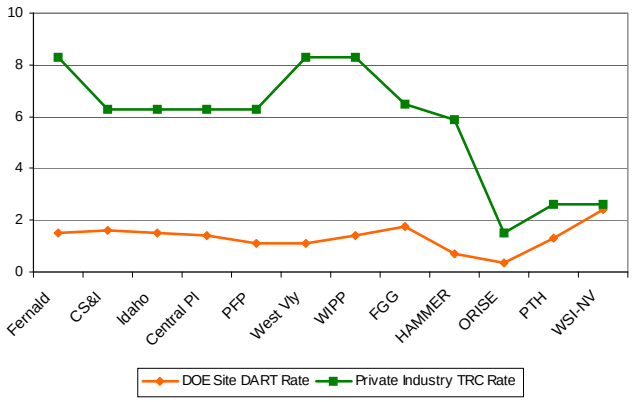
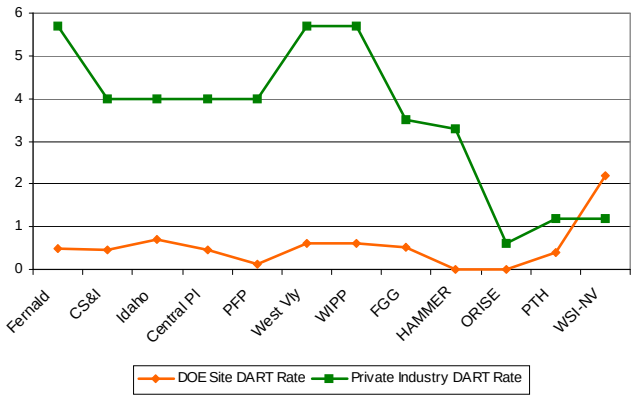


Figure 2. Comparison of DART Rates of DOE VPP Sites and Comparable Private Industry



When we compared a site's safety performance before and after its approval into the DOE VPP, we saw improvements in its injury and illness rates as well. Some people have expressed the opinion that only companies with strong safety performance become members of VPP, which negates the significance of reductions in injuries and illnesses**.** Without scientific analysis to back their conjecture, however, their opinions must be discounted. VPP member sites must demonstrate continuous improvement in their safety performance to maintain Star and Merit status. The Department's Office of Environment, Safety and Health evaluates safety performance by performing on-site evaluations and by reviewing the annual progress reports that DOE VPP participants must submit.

The Department's Computerized Accident/Incident Reporting System (CAIRS) database provided the data we used to conduct this study. As with the VPP program definitions, DOE's recordkeeping and reporting requirements are consistent with OSHA's, including the definitions for TRC and DART case rates. DOE contractors maintain OSHA 300 logs and report occupational injuries and illnesses according to the standard, 29 CFR 1904, *Recording and Reporting Occupational Injuries and Illness*.

In 2004, DOE adopted the new North American Industry Classification System (NAICS) to replace the Standard Industrial Classification (SIC) system to better characterize and compare similar private-industry occupations. . Using NAICS data published by the Bureau of Labor Statistics (BLS), DOE can compare its safety performance with that of comparable private industry operations. When we compared each VPP site's safety performance to that of comparable private industry data, we found that the TRC and DART rates of DOE VPP sites are 50 to 75 percent lower than those of corresponding private industry rates. We found that the rates were also lower than other DOE sites that are not VPP participants, as shown in Figures 3 and 4, below.

As a preliminary analysis, we plotted raw time-series data of 10 VPP sites and 14 non-VPP sites on a graph to visualize the trend. Because the resulting graph contained 24 curves and was very crowded we averaged the data for the VPP and non-VPP sites and plotted graphs to show the trend of TRC and DART rates. We used a technique called Kalman filtering to smooth the time series. Figure 3 shows the trend for TRC rates among VPP sites as compared to non-VPP sites, and Figure 4 shows the trend of DART rates for the same comparison sets. For both figures, the time periods compared are from the first quarter of 1995 through the second quarter of 2004.

The charts in Figure 3 and 4 illustrate that TRC and DART rates at VPP sites were substantially below those of the non-VPP sites. They also show that injury and illness rates at VPP sites and

Figure 3. Mean TRC Time Series

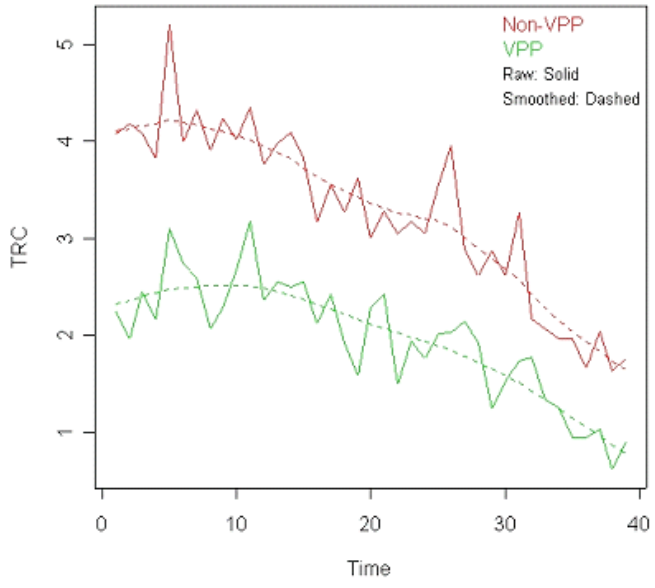
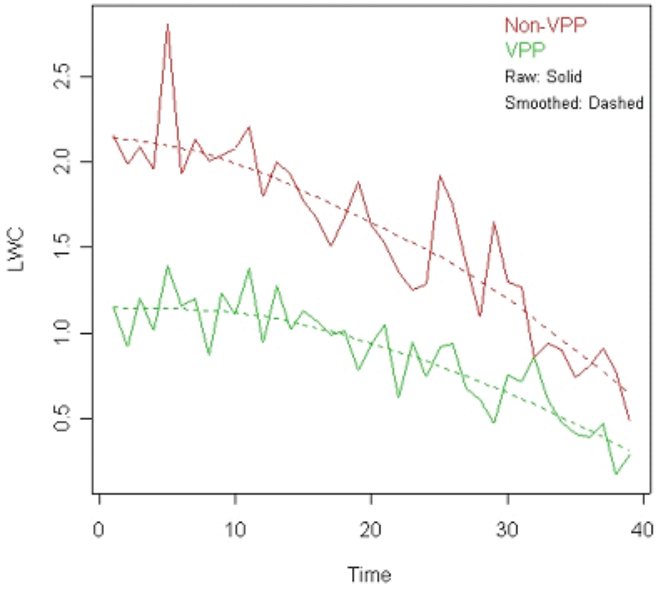


Figure 4. Mean LWC Time Series



the non-VPP sites trended downward, suggesting that overall safety performance across the DOE complex has improved, which is consistent with the general trend of private industry in the United States, according to the latest information from the BLS. In 1995, DOE developed and implemented a safety program called the Integrated Safety Management System (ISMS) and directed its contractors to adopt it. Another program, the Behavior-Based Safety (BBS) program, was adopted by several DOE contractors. However, with the exception of two VPP contractors (at the Strategic Petroleum Reserve (SPR) and Savannah River Sites), none of the VPP sites practiced BBS. The second tenet of the DOE VPP, which describes the role of worker participation, has the same objective as BBS**.** Since ISMS is common to all DOE contractors, (whether VPP or non-VPP), we concluded that the reduction of injury rates shown in Figures 3 and 4 can be attributed to VPP.

Some non-VPP sites may have satisfied the general DOE VPP criterion by having three-year averages of injury and illness rates that are below those of comparable private industry; however, it is only the initial criterion for application to the DOE VPP, and the five tenets of the DOE VPP must be satisfied as well.

Methods for Demonstrating VPP's Value Added

In the private sector as well as in DOE, businesses measure VPP's value added by comparing the costs of injuries before and after achieving VPP status. This comparison commonly addresses both financial and non-financial elements. Accordingly, the business community has developed criteria and models that can measure value added from a financial or business point of view.

For this paper, we performed financial calculations using the DuPont model, which is widely used by private industries to estimate the cost of injuries. A brief description of this model is given below and also available on the DOE VPP web page at http://www.eh.doe.gov/vpp/articles/yardstick.html. In the report published in 2002 (*Value Added of the DOE Voluntary Protection Program*, DOE/E-647, June 2002), these calculations were performed using two methods: the DuPont model and the "Cost Index" extracted from CAIRS. However, DOE elected to discontinue this index in 2004, so we did not use the Cost Index model in this paper. With the discontinuance of this Cost Index, DOE has lost this metric.

We used a macroeconomic approach to our analysis, using national averages rather than state or regional cost-of-living information. We chose this approach because the alternative, a microeconomic approach, while arguably more accurate, would have required us to collect injury data at the company level, including workman's compensation data, some of which is considered business confidential and therefore proprietary.

Many organizations compile cost data by category; for example, several of the following areas could be selected to compare an organization's safety performance before and after achieving VPP status.

- Employee turnover rates – as measured by the cost of hiring and training new personnel;
- Absenteeism – as measured by a company's cost estimates for lost work time;

- Worker compensation costs;
- Waste or rework costs; and
- Output, productivity, completed work – as measured by a company's cost estimates versus actual costs.

In addition, private-sector organizations may also compare other expense categories to gain another perspective of VPP's value added. For example, organizations can compare their performance before and after achieving VPP status by examining:

- Numbers and dollar amounts of fines and penalties assessed for safety infractions;
- Numbers and types of hazards identified during external inspections; and
- Cost of theft or property damage and its effect on insurance premiums.

In performing value-added comparisons, it is important to be aware of certain fundamental issues when selecting functions or operations for comparison:

- Which parameters are meaningful measures given the particular business or operation?
- Can data be easily collected for the selected parameters?
- Are data available for these parameters both before and after achieving VPP status?
- What is the cost associated with collecting and comparing these data?
- Is it feasible to continuously collect and compare this information?

Background information on the calculations and methods used in this report is given below. Additional details are contained in the DuPont Safety Yardstick program http://safety.dupont.com/forms/yardstick.html.

The National Safety Council (NSC) is the source of injury information used for cost estimates in the DuPont Safety Yardstick program. Each year, the NSC compiles fatal and nonfatal injury data and issues a report called Injury Facts®. The data reported in Injury Facts® are used to compute an estimated average injury cost. The manner in which the injury occurred, the degree to which the organization helps the employee get back to work, and other factors can affect this number.

Cost Savings at DOE VPP Sites

For this paper, we selected 12 DOE VPP sites (shown in Table 1) for calculating cost savings using the DuPont model. Of these 12 sites, four are part of the SPR, and their injury and illness data are combined. Our selection of sites was based on the availability of individual records and data in VPP applications and annual reports.

Injury data for the 12 sites from 2001 through 2003 were compared with data for the three-year averages prior to achieving Star status. The Yucca Mountain Project (YMP) was selected because of the excellent and reliable data it submitted to CAIRS, even though it is a relatively new VPP site, having achieved Star status in August 2003). We developed cost savings estimates for YMP by comparing its 2003 injury record with those of prior years and by assuming that YMP's safety performance will continue at a consistent level.

We also noted that during the period 2001 to 2003, safety performance at many DOE VPP sites significantly improved (for example, the Idaho National Engineering and Environmental Laboratory, now known as the Idaho National Laboratory, and at Savannah River Site), but at some sites the performance declined compared to the time period of 1999-2001.

Table 1 shows the estimated cost savings attributable to VPP at the 12 sites studied, using the DuPont model. The data for the four SPR sites were combined because they are small in size, engaged in similar operations, and operated by the same company.

Table 1. Estimated Cost Savings Due to VPP Implementation

Site Name	Number of Employees*	Savings in $1000s/year	Per Person savings ($)
Fernald Closure Project	2,400	193	80
Idaho National Laboratory	5,400	1,135	210
Kansas City Plant	3,000	454	151
Pacific Northwest National Laboratory	3,300	59	19
Strategic Petroleum Reserve (4 sites)	800	233	291
West Valley Demonstration Project	700	78	111
Nevada Test Site (security operations)	300	37	123
Savannah River Site	14,000	1,414	101
Yucca Mountain Project	1,800	99	55

***** Number of employees is estimated based on work hours

It is essential that DOE and its management and operating contractors review and validate the data submitted to CAIRS so that illness and injury data can be effectively used for performance trending, goal-setting, and program evaluation. For example, the DuPont model uses "lost work days" as one of the inputs for calculating injury costs. Although the TRC rates and DART rates may be low at a site; the lost work day figure could be extremely large due to a single injury case.

Obviously, a larger site such as Savannah River stands to realize a greater cost savings in absolute terms by implementing VPP than smaller sites although the smaller sites may have been equally or more effective in implementing VPP. For this reason, we normalized the estimated cost savings by using the number of employees, as shown in the last column of Table 1. By doing so, we found that Dyn McDermott Petroleum Company, a contractor for the SPR sites, gained the greatest benefit from implementing VPP of the DOE sites we studied. Other sites, such as Idaho National Laboratory and the Kansas City Plant (KCP), also achieved cost savings by implementing the VPP. All four of the SPR sites practice BBS as well, and it is possible that VPP combined with BBS produces better results, although Idaho and KCP do not practice BBS and yet achieved excellent results.

The primary objective of this study was to demonstrate that VPP can save companies money without quantifying amounts saved. Also, because the DuPont model was developed for use by

private industry, the assumptions built into it may not fully apply to DOE operations. The figures provided by the National Safety Council numbers that were inputs to the DuPont model may also require adjustment for cost of inflation or have been updated. In view of these limitations, the estimated cost savings presented in Table 1 should be treated as preliminary.

Conclusion

Our analysis showed that most DOE organizations participating in the VPP have significantly improved their safety performance and, by extension, have saved money by increasing productivity through fewer workplace injuries and illnesses. Clearly, we have demonstrated that value is being added by adopting VPP at DOE facilities. VPP fosters continuous improvement. Therefore, both by comparison, and by absolute improvement measures,we conclude that implementing VPP makes a significant positive impact on work place safety and health for DOE contractors.

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