

The Value Added of the Department of Energy Voluntary Protection Program (DOE-VPP)



**Report from the
Corporate Programs Team
Voluntary Protection Program Group**



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This document is an overview and assessment of the value added by Voluntary Protection Programs (VPP) within the Department of Energy (DOE) with supporting experience from the general economy as documented by the Occupational Safety and Health Administration (OSHA) and by various states that operate OSHA approved occupational safety and health programs. This report initially presents an assessment of the value added by the DOE-VPP using methods that are consistent with the analyses used by OSHA and private sector companies to evaluate the value added of VPP. The final section of this report presents a general discussion or overview of the value added by VPP to participating businesses in the private sector. The intent of this report is to support decision making for improving safety and health and to advance the mission of the Department.

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The Value Added of the Department of Energy Voluntary Protection Program (DOE-VPP)

I. PURPOSE

The objective of this report is to identify the benefits of the Department of Energy Voluntary Protection Program (DOE-VPP), and present a summary overview of the value added by Voluntary Protection Programs (VPP), with supporting experience from inside the Department of Energy (DOE) and from private industry.

II. THE DOE-VPP: BACKGROUND

The Voluntary Protection Program (VPP) was created by the Occupational Safety and Health Administration (OSHA) in 1982 to foster greater ownership for safety and health at the nation's work places. The Department of Energy, as excluded from OSHA, adapted this program separately in 1992. The DOE modified and applied the OSHA methods to fit the special circumstances of DOE's contractual relationships. Additionally, DOE instituted improvements to OSHA's approach, which OSHA subsequently incorporated.

In DOE, the core of the OSHA program was directly applied. Full participation, shared manager/worker ownership, and disciplined control of work, and control of the workplace, are its key operating principles. Likewise, establishing the work environment for quality performance, where top management drives the safety and health program consistently and provides to their employees authentic empowerment for owning safety. Using VPP in DOE has demonstrated the value added of a self operated and maintained safety program over the DOE's traditional compliance based inspection approach.

Currently, nineteen DOE contractors have implemented the DOE-VPP. Each incorporated their Integrated Safety Management System (ISMS) into their VPP and they evaluate their own value added at least annually. Each contractor prepares an annual status report which provides a view of the scope and value of their program's self-management. Following the format of the VPP structure, these annual status reports assess the vitality and impact of safety and health management. They additionally identify associated accomplishments for the previous calendar year, and establish goals for the upcoming year. The Bureau of Labor Statistics (BLS) performance statistics for recordable accidents and injuries are also presented with comparisons to general industry performance, both for the current year and for the averages of the past three years.

III. METHODS FOR DEMONSTRATING THE VALUE ADDED BY VPP

Businesses measure the value added by their VPP by comparing the costs before and after the implementation of VPP. This comparison commonly addresses both financial and non-financial elements. Businesses have developed criteria and models that can quantify value added from a business point of view. DOE has likewise developed a cost model using the available reported statistics.

For financial comparisons in the DOE-VPP, calculations were performed exercising two models: one from DuPont and the one from DOE. Both models are in common usage and are self-explanatory. They are attached in tabular form along with their comparison as appendices:

Appendix A – Savings due to DOE-VPP; An Estimate of Annual Injury Costs Based on the DuPont Model,

Appendix B – Savings due to DOE-VPP; An Estimate of Annual Injury Costs Based on the DOE Cost Index model, and

Appendix C – A Comparison of the results of the DuPont Model and DOE Cost Index Model.

Additionally, organizations may elect to review potential savings or cost avoidance using other non-modeling methods, by costing out each cost-generating element separately. For example, several of the following areas could be selected for a pre-VPP and post-VPP comparison.

- Employee turnover rates – as measured by cost of hiring and training new personnel
- Absenteeism – as measured by a company’s cost estimates for lost work time
- Worker compensation costs
- Waste, poor quality, rework costs
- Output, productivity, completed work on schedule – as measured by a company’s cost estimates versus actual costs

Comparing other cost generating areas that are easily identifiable can also develop another picture of the value added. For example, comparisons can be made of pre-VPP and post-VPP costs by examining:

- Numbers and amounts of fines and penalties assessed
- Results of external inspections (number/types of hazards identified)
- Cost of thievery, pilfering, property damage and affect or cost on insurance premiums

In undertaking such reviews and comparisons, it is important to be aware of certain fundamental issues that must be addressed in selecting functions or operations for

comparison. In general, the selection of functions or operations for comparison should include consideration of the following:

- Which parameters are meaningful measures given the particular business or operation?
- Can data be easily collected for the selected parameters?
- Is data available for these parameters both before and after VPP implementation?
- What is the cost associated with collection and comparison of this data?
- Is it feasible to routinely collect and compare this information?

A sample of this type of value added information from the private sector and other organizations is presented in Appendix D. A like study of value added for the DOE-VPP sites has not been conducted, but there are generalizations from the private sector that can probably be applied to DOE on a facility like basis.

IV. DOE-VPP INTRINSIC VALUE ADDED OBSERVATIONS

As reported by DOE Site Operations and field offices, DOE contractors implementing the VPP have witnessed vast improvements in the quality of work products and the safe performance of tasks. Additionally, they report that as contractors begin formal implementation of a VPP effort, they immediately realize a reduction in the number of recordable injury and illness cases as well as a reduction in first aid cases. Overall, DOE field offices have noted that installing VPP has resulted in the following types of improvements:

- More worker involvement;
- Greater worker ownership in the safety program resulting in improved quality and productivity;
- Improved labor/management relations;
- Enhanced positive image of management leads to greater worker trust;
- Lowered accident rates, reduced worker compensation, and other related costs;
- Enhances the mission to assure continuous improvement;
- Improved employee motivation to work safely, leading to better quality, improved productivity, and a happier work force;
- Improvement in existing programs; not only safety, but all other areas;
- Increased partnership and mentoring opportunities with DOE sites, OSHA and community companies;
- Improvement in lost workday case rates at sites, directly relating to real dollar savings;
- Created a positive “behavioral” impact where employees work safer at home as well as work; and
- Clearly improved, positive national and community recognition and interaction for the company and their corporate organizations.

V. DOE-VPP ACCIDENT/INJURY RATES IMPROVEMENTS

One of the basic requirements of the DOE-VPP is that the site's average (three-years) injury illness rates (both Total Recordable Case Rate and Lost Workday Case Rate) should be below comparable private industry (Bureau of Labor's SIC) rates to qualify for the STAR. The DOE STAR sites are not only below the private industry rates, but most of them are 50% or 75% below the private industry rates. The injury illness rates of DOE-VPP sites are approximately on the average 38% below the non-VPP sites in DOE.

The DOE-VPP requires the participating sites to conduct annual self-assessments of their programs to maintain continuous improvement of safety performance. For example, INEEL, a DOE-VPP STAR site experienced approximately 40% reduction of recordable cases (TRC rate in 1995, 3.8, decreased to 2.32 in 2001) reflecting the results of VPP's employee involvement, and recordable case rate of INEEL in the first quarter of 2002 decreased by 39% as compared to the same quarter in 2001. The DOE CAIRS data indicate similar achievements of other DOE-VPP sites.

Chart 1 – Injury Illness rates of DOE-VPP sites, 1999-2001

Chart 2 – INEEL (VPP STAR site): Trend

Chart 3 – Comparison of Kansas City Plant (VPP STAR site) with LANL and Sandia

Chart 4 – Comparison of PNNL (DOE-VPP site) with other Science Laboratories

Chart 1 –

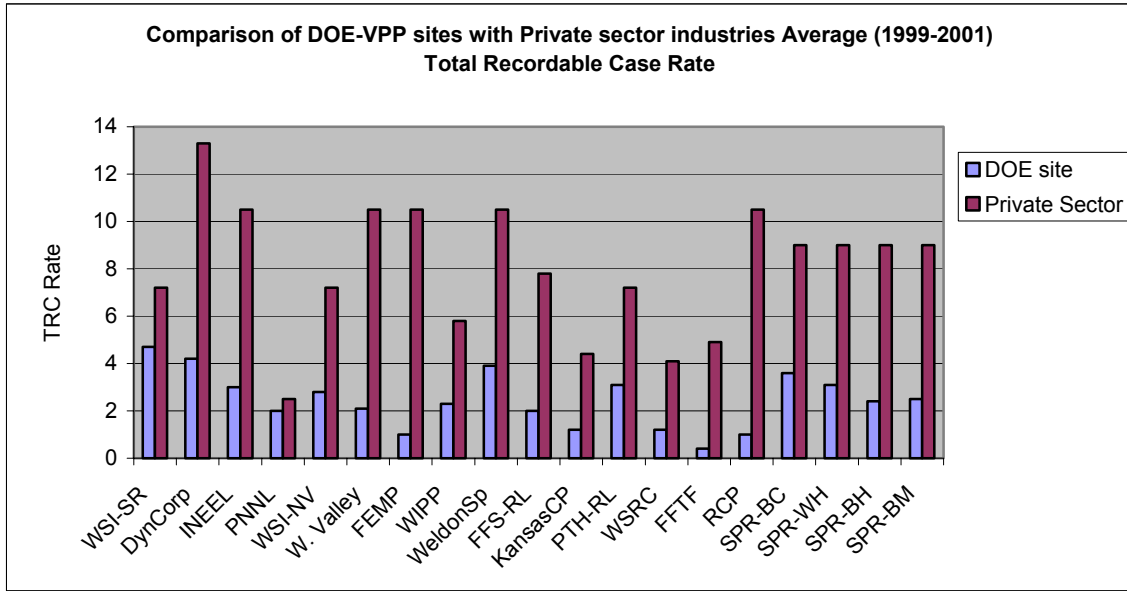


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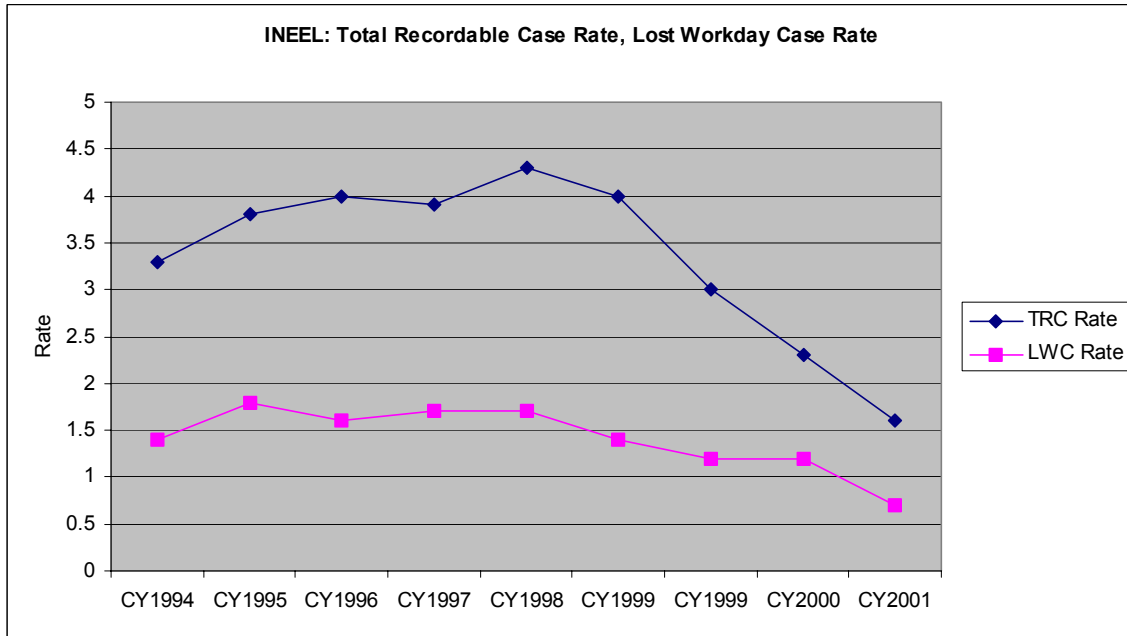


Chart 3 –

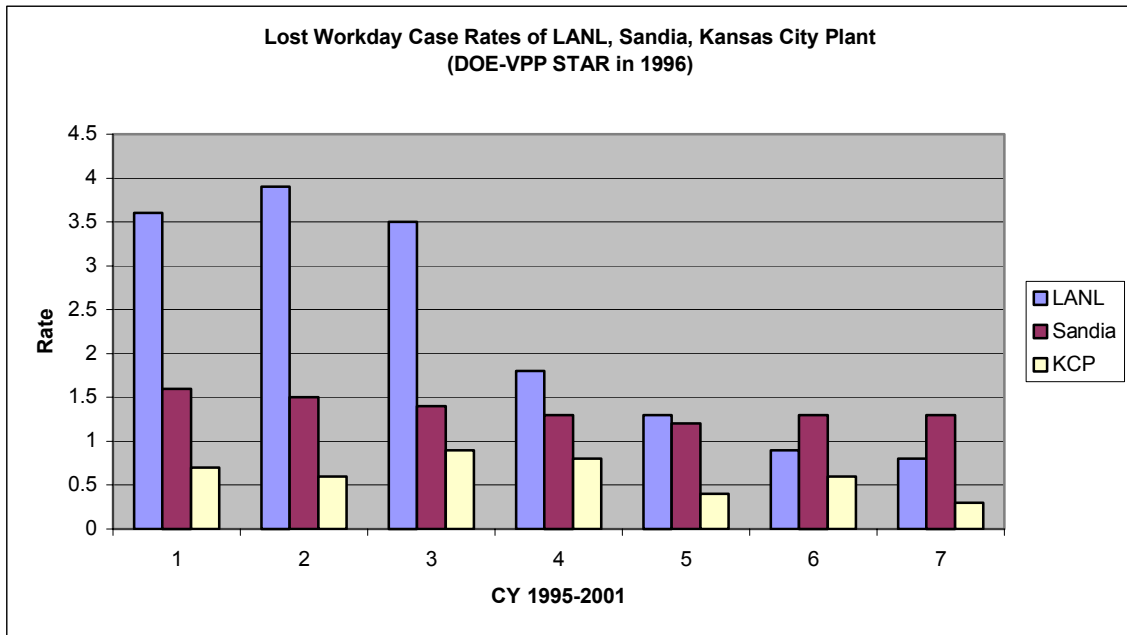
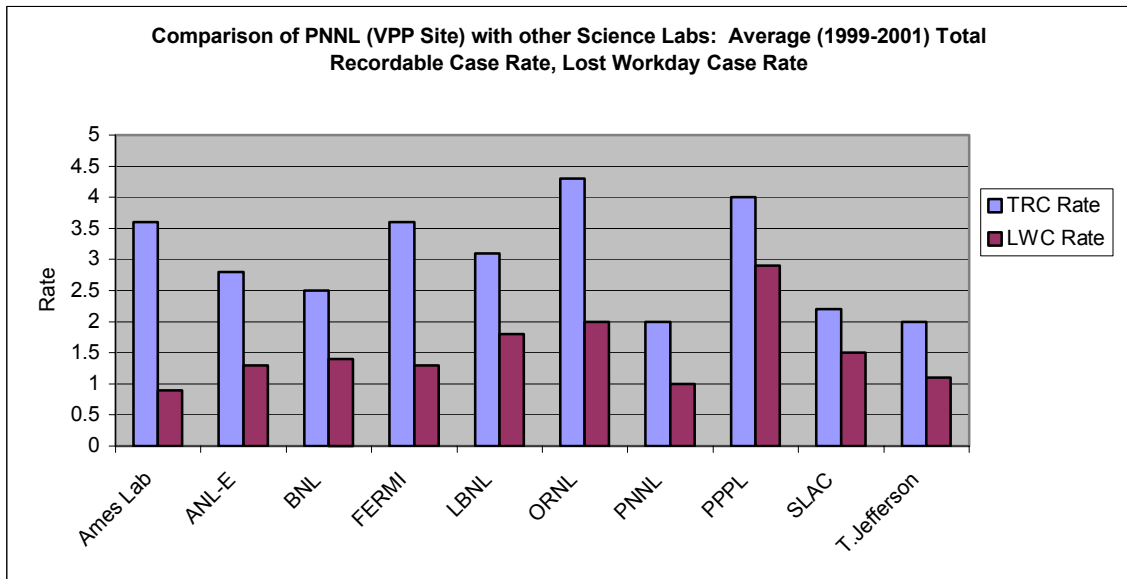


Chart 4 –



VI CONCLUSIONS

This study clearly demonstrates that the value added of the DOE VPP is substantial in terms of not only reduction of injuries, lost workdays, and the associated costs, but it further enhances worker involvement in safety programs, partnership and improved management-worker relationship. The participation of DOE sites in the VPP program should be expanded to include other contractors in DOE, especially from NNSA, SC. The diverse nature of work at the 19 DOE-VPP Star sites indicate that DOE-VPP is applicable to any other site in DOE.

APPENDIX A

DOE-VPP

**An Estimate of Savings Due to Reduced Annual Injury Costs
Based on the DuPont Model**

Site Name	No. Of *Employees	Savings Per Year	Per Capita Savings
PNNL	3233	\$329,000	\$102
INEEL	5805	\$738,000	\$127
FEMP	1633	\$371,000	\$227
Weldon Spring	580	\$129,000	\$222
WSI-NV	263	\$96,000	\$365
Kansas City Plant	2785	\$224,000	\$80
PTH-RL	300	\$81,000	\$270
WSRC	11215	\$686,000	\$62
WSI-SR	824	\$124,000	\$151
West Valley	1000	\$82,000	\$82
WIPP	600	\$11,000	\$18
DynCorp	818	\$134,000	\$164

* **Source:** Average (1999-2001) employment derived from total work hours reported by CAIRS may not be equal to exact number of FTE’s at the site.

The DuPont Company’s “Safety Performance Yardstick”, is a model developed to calculate annual injury costs using information from “Accident Facts,” published by the National Safety Council (NSC). Companies in the private sector, to estimate their injury costs, and to conduct trending analysis of injury rates, utilize this model. The NSC estimates the direct and indirect costs of injuries based on private industry experience. The direct costs involve the medical bills, lost wages, etc., and indirect costs involve the value of loss of productivity etc. For example, the cost of a single OSHA recordable incident was estimated to be \$8,066, on the three input parameters in the DuPont model. These estimates are consistent with other cost estimates published by experts such as R. Miller Ph.D., as well as the estimates used by the Department of Navy, Department of Transportation, etc.

The DuPont methodology requires 3 years of input data: number of injuries requiring days away from work, number of OSHA recordable injuries, and the number of lost days. The DuPont model calculates the average injury cost using injury data for three years, and multiplying by the cost estimates: \$32,263 per injury requiring days away from work,

\$8,066 for each OSHA recordable case, and \$1,532 per lost day. These values are built into the DuPont model, and the user simply inputs the injury data to calculate total costs.

In order to determine the impact of DOE VPP or calculate the cost savings due to VPP, six years of data were obtained from CAIRS for each DOE VPP site. The DuPont model was run two times: inputting 3 years of data prior to the year of achievement of VPP STAR, and with 3 years of data after the STAR. The results are presented in the above table.

Data for the 4 SPR sites, and for the River Corridor Project (RCP), Fluor Federal Service (FFS), and FFTF are not presently available and therefore, cost savings for these 8 sites were not estimated.

As one can see by the attached table, large sites such as WSRC and INEEL appear to save more money than smaller sites. However, the per capita savings at smaller sites such as WSI - NV, and WSI-SR may be higher than the savings at the large sites. In any case, the impact of the DOE-VPP is positive, and the business results, or the value added, of DOE-VPP is significant.

APPENDIX B

DOE VPP

**An Estimate of Savings Due to Reduced Annual Injury Costs
Based on DOE Cost Index Data (CAIRS)**

Site Name	No. Of Employees	Savings Per Year	Per Capita Savings
PNNL	3233	\$267,000	\$83
INEEL	5805	\$756,000	\$130
FEMP	1633	\$352,000	\$215
Weldon Spring	580	\$83,000	\$143
WSI-NV	263	\$84,000	\$319
Kansas City Plant	2785	\$76,000	\$27
PTH-RL	300	\$105,000	\$350
WSRC	11215	\$642,000	\$57
WSI-SR	824	\$109,000	\$136
West Valley	1000	\$73,000	\$73
WIPP	600	\$27,000	\$45
DynCorp	818	\$70,000	\$86

DOE Cost Index (CAIRS) method for estimating savings due to VPP

The Department of Energy’s (DOE) occupational safety database, the Computerized Accident/Incident Reporting System (CAIRS) has been collecting and publishing data as a “Cost Index” for the past 10-15 years for all DOE contractors. Although DOE contractors are required to maintain OSHA 200 logs to record and report data on the injuries and illnesses, there is no OSHA or other external requirement to calculate and maintain this cost index.

The CAIRS Cost Index represents the approximate amount of dollars lost (direct or indirect) per 100 hours worked for all injuries/illnesses using the following formula. The coefficients used in the formula are the weights derived from a study of direct and indirect dollar costs of injuries. The Index is not commonly available or used by private industry. DOE sites use this Index to measure their progress in worker safety and health. Federal employee data is not included in this Index. The formula for the Index is as follows:

$$\text{Cost Index} = \frac{100 (1,000,000 D + 500,000 T + 2,000 LWC + 1,000 WDL + 400 WDLR + 2,000 NFC)}{\text{HRS}}$$

Where:

D = number of fatalities

T = number of permanent transfers or terminations due to occupational illness or injury

LWC = number of lost workday cases

WDL = number of days away from work

WDLR = number of restricted workdays

NFC = number of nonfatal cases without days from work or restricted workdays

HRS = number of hours worked

The procedure adopted to derive the savings due to VPP based on the CAIRS Cost Index data includes the following steps:

- Step 1. Compute the average Cost Index (CI); of three years prior to the year a site received DOE-VPP STAR recognition (before VPP), and compute the CI for the three-year period after the site received DOE-VPP STAR recognition (after VPP).
- Step 2. Calculate the difference; $CI \text{ (before VPP)} - CI \text{ (after VPP)} = \text{DELTA}$
- Step 3. Net savings due to DOE-VPP = $\text{DELTA} \text{ (HRS/100)}$

APPENDIX C

DOE-VPP

A Comparison of Estimated Savings Due to Reduced Annual Injury Costs Utilizing the DOE Cost Index Data (CAIRS) and the DuPont Model

Site Name	No. Of Employees	Savings Based on DOE Cost Index	Savings Based on DuPont Model
PNNL	3200	\$267,000	\$329,000
INEEL	5600	\$756,000	\$738,000
FEMP	1700	\$352,000	\$371,000
Weldon Spring	550	\$83,000	\$ 129,000
WSI-NV	250	\$84,000	\$96,000
Kansas City Plant	3500	\$76,000	\$224,000
PTH-RL	300	\$105,000	\$81,000
WSRC	11100	\$642,000	\$686,000
WSI-SR	800	\$109,000	\$124,000
West Valley	1000	\$73,000	\$82,000
WIPP	625	\$27,000	\$11,000
DynCorp	800	\$70,000	\$134,000

In Appendix A, the Dupont model was used to calculate the savings due to DOE-VPP. In Appendix B, the DOE Cost Index (CAIRS) was used to calculate savings due to DOE-VPP. In this Appendix, the results of using each model are compared. In reviewing this information, readers should keep in mind that there are significant differences between the two methods:

DOE CAIRS is extremely sensitive to the number of fatalities and the number of transfers or terminations due to occupational injuries or illnesses. The Dupont model does not consider these two factors in estimating the cost of injuries. Fortunately, the number fatalities that occurred during the period covered in this study were very low (one (1) fatality occurred in Idaho in 1998 and another one (1) at Savannah River).

The weights used by CAIRS for calculating the cost index were established by EG&G Idaho in 1986 or 1987, and have not been updated. Based on our initial use of these two methods or systems, we would suggest that in estimating such cost savings, users might wish to consider dropping both fatalities and terminations from the Cost Index to avoid controversy and to maintain consistency with other models and studies commonly employed by the private sector.

Additionally, in using the DOE Cost Index method there is a significant advantage in computing the differences (See “Step 2” for calculating the DELTA in Appendix B, above) in that the method is almost invariant to the values imputed as weights in the Cost Index formula. Thus the Cost Index is very robust in estimating the DELTA. A similar advantage may exist for those using the Dupont model, as long as one calculates the differences.

Readers and potential users of these methods are reminded that in conducting an analysis using either of these two models, the injury and illness data should be examined for “outliers” and for significant impacts, such as sudden changes in the organizations, FTE levels, etc.

APPENDIX D

VPP VALUE ADDED EXPERIENCES

Provided here is a summary of VPP experience from a variety of sources. These examples demonstrate the scope of the continuing recognition the value added of VPP.

1. Value Added to Environment, Safety and Health Programs – EPA/NASA

The “value added” of implementing VPP and achieving excellence in the area of occupational safety and health is translated into excellent performance in other environment, safety and health program areas. Case in point, the Environmental Protection Agency (EPA) recognized the potential of the VPP “culture of quality” over six years ago, and after participating in numerous VPPPA national and regional conferences, began to pilot several different environmental programs patterned on the VPP model. The National Environmental Performance Track (Performance Track), EPA’s newest major partnership program that is less than 2-years old, is based largely on the VPP model. It is structured around an Environmental Management System (EMS) approach that incorporates employee involvement to achieve a “culture” that results in excellence in environmental performance. The end result being that an organization develops a systematic effort to meet all environmental requirements and exceed mere “compliance” in improving overall performance to a level of excellence.

As a result of their experience in VPP, and in recognition of the value added by such initiatives, several DOE-VPP facilities became “Charter Members” of the EPA National Environmental Performance Track when it began. DOE facilities include the Kansas City Plant, the Waste Isolation Pilot Plant (WIPP), the West Valley Demonstration Project; and the Bayou Choctaw, West Hackberry, Big Hill and Bryan Mound storage sites for the Strategic Petroleum Reserve as operated by DynMcDermott Petroleum Operations Company for DOE.

Other value added examples include the “exporting” of VPP from one organization to another based on the latter organization’s recognition of the value added. A prime example of this is the exporting of VPP from the contractor organizations supporting the National Aeronautics and Space Administration (NASA) to the Federal NASA offices and their Federal Employee Occupational Safety and Health (FEOSH) program. As a result, several of NASA’s Federal offices became the first organizations admitted into the OSHA VPP for Federal agencies.

2. VPP Value Added to ISO 9001 and ISO 14001

Likewise, within DOE there are several examples of using the quality culture built through VPP participation for enhancing other programs. For example, several DOE-VPP Star sites utilized the momentum of the “cultural” change brought about by

implementing VPP at their sites to move their environmental compliance efforts a step beyond mere compliance with EPA standards. In four cases, Star sites within the Department went on to achieve certification with the International Standards Organization (ISO) 14001 environmental management standards. DOE-VPP Star sites that utilized the momentum of VPP to help them achieve ISO 140001 certification include the WIPP site, the Kansas City plant, the Savannah River facility and the four storage sites at the Strategic Petroleum Reserve. While this type of value added is not unique to the Department in that many OSHA VPP sites have experienced similar successes in the environmental arena as a result of their participation in VPP, it is important to note that DOE has been proactive and at the forefront in this area.

Additionally, the cultural change fostered by participation in VPP often results in improvements in other program areas not directly related to the overall environment, safety and health program. Again, examples within the Department include several DOE-VPP Star sites, such as the Strategic Petroleum Reserve sites, and the Kansas City Plant that achieved ISO 9001 business systems certification after gaining VPP recognition. In each of these cases, the sites' management openly acknowledged that they used the "cultural change," and the momentum and desire of the workforce to achieve quality that resulted from implementation of VPP to "fuel" their efforts in these other program areas.

3. Management and Employee Views of Value Added -VPPA

Managers at VPP sites freely state that "empowered" employees suddenly become willing to share ideas in other areas of operations and the result is improved production and new, innovative approaches to tasks and routine processes. Employees at VPP facilities report that VPP is not another "layer" of requirements or new tasks, rather it is a method by which those requirements and tasks can be completed more efficiently. Employees state that the empowerment associated with implementing VPP helped them to identify and eliminate redundant work. Additionally, both management and workers state that "empowered" workers not only function to share the management of work place risk, but they begin to take on and perform other management and organizational functions greatly improving productivity.

So the strongest attribute of VPP participation, in the opinion of both management and employees, appears to be that it changes everyone's belief and concept about safety and safety programs. Changing an individual's belief or their basic feelings results in a direct change in behavior. That change in behavior whether directly measurable or observable or both, equates to a positive result. Simply stated, VPP changes individual beliefs and feelings about safety and health, and that in turn creates an organization that possesses a "safety and health culture."

4. Value Added by VPP - OSHA¹

It is OSHA's position that resources used to promote the Voluntary Protection Programs benefit both workers and the company's "bottom line." Every person entering a worksite

is protected from potential safety and health hazards when a worksite institutes and implements VPP. In addition, OSHA states that other improvements follow the implementation of VPP at worksites. According to OSHA, establishing and maintaining safety and health programs on the VPP model usually results in substantially lower than average worker injury rates.

For example, OSHA reports that injury incidence rates decline. According to OSHA, the VPP sites in their program had only 45% of the injuries expected, or were 55% below the expected average injury rate for similar industries. Additionally, OSHA reports that overall, VPP sites have only 49% of the lost workdays expected, or they are 51% below the expected average lost workday rate for similar industries.

While protecting workers from occupational safety and health hazards, OSHA VPP sites also experience decreased costs in workmen's compensation and lost work time, and often experience increased production and improved employee morale. Documentation of these assertions come from testimony given by safety and health managers during OSHA hearings on the Safety and Health Program Management Guidelines, from triennial reports of member sites, and from other data sources.

a. Examples of Company-wide Successes

Mobil Chemical Company – Between 1983 and 1987, Mobil Chemical Company brought all of its then existing plants (plastics production and chemical plants) into the VPP. During this period, recordable injuries for the company were reduced 32%. Lost workday cases were reduced 39%, and the severity of cases was reduced by 24%. In subsequent years through 1994, recordable injuries and lost workday cases have continued at these low rates.

Occidental Chemical Company determined that as their Safety Process Systems Implementation that led to VPP recognition decreased their Injury/Illness rate from 6.84 in 1987 to 1.84 in 1993, a 73% decline.

Mobil Chemical Company reduced its workers' compensation costs by 70%, or more than \$1.6 million, from 1983 to 1986, during the years it was qualifying its plants for the VPP. This reduction has been sustained through 1993.

b. Examples of Site Successes

In 1994, Mobil Oil Company's Joliet, Illinois refinery experienced a Lost Workday Case Rate (LWC) of 0.2. This is a significant reduction from the 3.8 LWC rate they experienced in 1987, the year before beginning VPP implementation.

In 1994, the LWC rate at Thrall Car Manufacturing Company in Winder, Georgia was 0.6. This is a decided decreased from 4.6 LWC rate at the company when it qualified for the VPP Star Program, and an even more significant reduction from

the 17.9 LWC rate at the site in 1989, when the facility first began preparing their VPP quality safety and health program.

In 1994 at Monsanto Chemical Company's Pensacola, Florida Plant, the LWC rate fell to 0.1. Rates have steadily declined during the period that the worksite has been implementing VPP. The LWC rate in 1986 was 2.7.

Further testimony from Georgia Power shows one site had reduced its total reportable by 24%, and its lost workday cases by a third. Another site reduced reportable by 56%, and its lost workday cases by 62 per cent.

OSHA states that reductions in injury rates lead to reduce costs. For example:

In 1992 Thrall Car's, Winder, Georgia plant, reported that implementation of VPP cut workers' compensation costs. This company reported that workers' compensation costs declined by 85%, from \$1,376,000 to \$204,000.

By 1993, Mobil Oil Company's Joliet, Illinois refinery reported that they had experienced a drop of 89% in its workers' compensation costs compared to previous years.

During three years in the VPP, the Ford New Holland Plant noted a 13% increase in productivity and a 16% decrease in scrapped product that had to be reworked.

At the Kerr-McGee Chemical Corporation in Mobile, Alabama, a VPP team found that at the same timework related injuries continued to decline, production hit an all time high that exceeded the manager's goal by 35%.

One Mobil Chemical Company plant manager has testified that the adoption of a single work practice change at his 44-employee chemical plant during the first three years of VPP participation resulted in increased volume of product, and a savings of \$265,000 per year.

Also, since approval as a VPP site, Mobil Oil Company's Joliet refinery reports a 25% decrease in absenteeism and the highest employee morale ever experienced; in the same period productivity and quality remained high.

1 OSHA has verified all of this data and the reported rates

5. Value Added by VPP – State Programs

Many states operate their own occupational safety and health program under the authority of the Occupational Safety and Health Act of 1970. A majority of these "State Plan states" have either adopted the Occupational Safety and Health Administration's VPP outright, or implemented a similar program that closely follows the principles and requirements of OSHA's VPP. State Plan states have reported observing the following

value added improvements at private sector facilities within their states that implemented VPP:

- **Commitment** – greater commitment by all employees resulting in higher-quality work;
- **Leadership** – increased responsibility and accountability by all employees;
- **Involvement** – all employees involved in decisions that affect work;
- **Respect** – increased respect and value for other’s ideas, backgrounds and capabilities;
- **Teamwork** – greatly increased teaming of employees to achieve mission and goals;
- **Communication** – honesty, civility and respect in all communications;
- **Partnership** – increase in building and maintaining effective partnerships; and
- **Balance** – a noticeable balance, fairness and reasonable approach in all dealings.

