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Application of Management Systems to SH&E

Submitted by:

DynMcDermott Petroleum Operations Company

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THE ROBERT W. CAMPBELL AWARD - 2006 CASE STUDY SUBMITTAL

DynMcDermott Petroleum Operations Company
Application of Management Systems to SH&E

EXECUTIVE SUMMARY

DynMcDermott (DM) Petroleum Operations Company, located in New Orleans, LA, is the Management and Operating (M&O) Contractor for the Department of Energy (DOE) Strategic Petroleum Reserve (SPR) and is responsible for operating and maintaining the government owned facilities. Our profits are generated by meeting specific, performance based goals, many of which are directly related to Safety Health & Environmental (SH&E) outcomes. As a result of our adoption of a Baldrige-based business management model, married with the “best practice” Safety, Health & Environmental (SH&E) management systems of ISO 14001, the EPA Performance Track Program, and the OSHA Voluntary Protection Program, DM has delivered excellent SH&E performance during our contract tenure. We believe that these four management systems complement and support each other, resulting in top business performance over the past 13 years because of (not in spite of) our focus on the worker, the public, and the environment.

DynMcDermott Petroleum Operations Company received the prestigious Malcolm Baldrige Quality Award for 2005; the nation’s highest honor for business Performance Excellence and is the only federal government prime contractor to have received this recognition. Our facilities have also won analogous awards on multiple occasions from the states of Louisiana and Texas. We believe that adopting a Baldrige-based management model has improved our performance company-wide.

Formed in 1993, DM successfully re-competed after our initial ten year contract period and in April 2003 received a new contract through 2008 with renewal options through 2013. DM has held the SPR contract longer than any preceding contractor. As a condition of this contract, DOE requires that DM have no other customers.

The contract is performance based – meaning that all allowable operational costs are paid by DOE. We generate profit from an annual award fee, based on obtaining DOE mission-driven, specific targets for our

service and performance results. Of the 31 DOE Performance Evaluation and Measurement Plan (PEMP) FY2006 performance measures; 11 (35%) are SH&E related.

Simply put, the better our SH&E performance, the more profit the company generates. This performance based contract is a key driver in the evolution of our high performing, results oriented culture. Since 2000, the SH&E performance has met or exceeded 100% of our performance targets enabling the company to receive 100% of the SH&E performance award fee and avoid any deductive measures; in 2005, this amounted to an impact of almost \$1,000,000. The total award fee score for the year was 98, resulting in a record high award of \$3,139,366. In addition, reductions in waste generation and spill incidents have accounted for another \$3,878,000 in cost avoidances and savings since 2000, when the ISO 14001 Environmental Management System and EPA Performance Track programs were put in place. A similar cost avoidance has been experienced for the reduction of recordable accidents from 34 in 1994 to 4 in 2005, an 88% reduction.

Marrying the Baldrige model with the “best practice” SH&E management systems of ISO 14001 and the Voluntary Protection Program has allowed us to achieve excellent results in safety, environmental, and health performance. DM has been continuously certified by a third-party registrar to the ISO 14001 standard since 2000, when it also became a charter member of the Environmental Protection Agency’s (EPA) National Environmental Performance Track (NEPT) program. Our two Texas facilities have since become the very first two Certified National Leaders in the Clean Texas, Cleaner World Program. We have won Environmental Excellence Awards from the National Association of Environmental Professionals for Environmental Management and Best Available Environmental Technology; from the U.S. EPA for Outreach, from the Department of Energy for Environmental management, Downstream Product Stewardship, and Waste Management from the state of Louisiana for Mercury Reductions, from the State of Texas for Emergency Preparedness, and from the Louisiana Quality Foundation for Environmental Management. DM employees serve as Board Members and Officers in various regional and national professional organizations that advance SH&E stewardship, including a member of the editorial board of the National Safety Council publication, Safety+Health.

The DM storage sites have been Star facilities in both the OSHA and the DOE Voluntary Protection Programs (VPP). Since their initial acceptance into the programs in 2000, our four sites have won 20 Star

among Stars awards from OSHA Region VI for achieving Total Recordable Incident case rates and Days Away/Restricted Time (Lost Workday) case rates between 50% and 90% below the average for our NAIC category, 49319 (formerly SIC 4229). All four sites were recertified in both VPP programs in 2005-2006. Different aspects of the SH&E management system have won the DOE Fossil Energy ESS&H Excellence Award five times in the past five years. Our OSHA trained, Special Government Employees (SGEs) have also been recognized by awards for their assistance with mentorship and appraisals. Our sites have won multiple awards from the National Safety Council over the years for our safety performance.

DM has not had a Notice of Violation against our environmental programs at any of our six facilities since 1995. DM has never been cited for an OSHA violation.

DM believes that by using the employee-owned SH&E programs of VPP and Behavioral Safety and ISO certification within the Baldrige management model, we have developed balanced, effective, and value-added SH&E management systems.

INTRODUCTION

This case study speaks to two levels of management systems: organizational systems at the strategic level and the specific SH&E management systems that govern our work performance. DM believes that an organization is only at its most productive if these two types of management systems are aligned.

1. BUSINESS PROFILE

DynMcDermott Petroleum Operations Company (DM), headquartered in New Orleans, LA is the Management and Operating (M&O) Contractor for the Department of Energy (DOE) Strategic Petroleum Reserve (SPR). DM operates and maintains the government owned facilities that make up the SPR. DM received its initial contract in 1993 and successfully re-competed for a new contract 2003, winning a new contract through 2008 with renewal options through 2013. As a condition of this contract, DOE requires that DM have no other customer. This unusual requirement places all of DM's profit under the control of our customer, DOE.

The United States is a member of the International Energy Agency (IEA), composed of 26 member countries. Membership requires that the United States meet international standards for emergency oil reserves equivalent to at least 90 days of net oil imports for the previous year. **The SPR, resulting systems, processes, and measures are based on this strategic, global requirement.**

Product, Service, and Delivery. Established by the Energy Policy and Conservation Act of 1975 in the aftermath of the 1973 Arab oil embargo, the SPR is unique and has become a global benchmark in oil storage. The SPR is the largest emergency crude oil reserve in the world and is a critical option for the President when oil prices rise or when global conflicts cause a potential of oil supply interruptions.

On Presidential order, the SPR sells and distributes crude oil to refineries. This is known as "Drawdown." Following the terrorist event on September 11, 2001, President Bush ordered DOE to fill the reserve to capacity; we are currently in the process. As of June 2006, 690 million barrels of oil is in storage. Total SPR storage capacity is about 700 million barrels. The oil is stored in 62 large

underground salt dome caverns at two sites in Louisiana and two sites in Texas. These storage caverns, each of which holds approximately 11.2 million barrels of oil, were created by solution mining salt domes with fresh water injected at high pressure; a storage approach recognized worldwide for being less expensive and environmentally safer than other large-scale storage methods.

Our four oil storage sites are industrial in nature. Our storage caverns extend 4,000 feet underground, identifiable only by piping at the surface. Originally designed for 20 years of service, a five-year, \$330 million Life Extension Program extended the life of our facilities through 2025. This program reduced cost, improved efficiencies, and reduced risk through a standardized site infrastructure, which limited the pieces of equipment in our system and reduced spare parts requirements. **DM's SIC code is 4229 and our NAIC Code is 493190**, both are "Other Warehousing and Storage," which includes cavern storage.

In addition to corporate management staff, DM employs a maintenance and operations workforce responsible for the storage facilities, including the infrastructure of pipelines, pumps, motors, and other equipment. SPR facilities are connected to oil refineries and other processing facilities through a nationwide commercial pipeline and terminal distribution network. This network can move the oil quickly to designated points of need within mandated timeframes. The only emergency sale of oil authorized by the President was during Operation Desert Storm. However, in 1999, a 30 million barrel drawdown was ordered to offset high heating oil costs in the U.S. Northeast. Following hurricanes Katrina and Rita in 2005, the President ordered the drawdown of 11 million barrels to prevent disruption of supplies to petrochemical companies.

Nature of Work, Facilities, and Hazard Exposures. New Orleans employees work in an office environment. All employees have personal computers, local area network (LAN), wide area network (WAN), e-mail, and Intranet and Internet capabilities. DM employees use computer modeling and simulation to manage operational requirements, estimate future needs, and model the oil industry. We use SAP for our business processes. Management office employees are exposed to standard office-environment hazards; slips, trips, falls, electrical injuries, and (the most prevalent) musculoskeletal injuries and illnesses.

Each storage site has a dedicated staff including a Site Director, Operations Manager, Maintenance Manager, SH&E manager, site safety specialist and fire and emergency response specialist, maintenance craftspersons, and operators. The site conducts both office and field work with the majority of the maintenance work being done in-house. Hazard exposures to field personnel are similar to those in the oil industry and other industrial facilities including slips; trips; falls; electrical injuries; exposure to noise, fumes and crude oil; as well as musculoskeletal injuries/illnesses. Each site has a Site Safety Council, a VPP Committee, an Electrical Safety Council, and a Behavioral Safety Steering Committee made up of line workers. (*Note: the DM behavioral process includes environmental behaviors.*) Specialized training is provided to the members.

Regulatory Environment. The SPR storage facilities are located in environmentally sensitive areas near the Gulf of Mexico and are subject to all federal, state, and local environmental, safety, and health laws. Our SH&E programs go beyond compliance through VPP and behavioral safety programs, proactive pollution prevention, energy conservation, environmental monitoring, ISO 14001 certification, and participation as a charter member of the Environmental Protection Agency's (EPA) National Environmental Performance Track (NEPT) program. Our two Texas facilities were the first two Certified National Leaders in the Clean Texas, Cleaner World Program. Our EMS is the only North American bulk petroleum storage system to have received ISO 14001 certification and one of only five certified DOE systems. All four storage sites have Star status in the OSHA and DOE Voluntary Protection Programs (VPP). Specific safety requirements are defined through formal job, task, hazard, risk, and Personal Protective Equipment assessments and administered through DM Integrated Safety Management (ISM), which includes the EMS, the Safety Management System (SMS), emergency management, and – most recently – Integrated Safeguards and Security Management (ISSM).

Customer and Market Key Requirements. Figure 1 highlights DM's customer requirements and Figure 2 the services provided. Successful accomplishment of these requirements is translated into DM performance measurements, which are linked to the DOE Performance Evaluation and Measurement Plan (PEMP). DM is evaluated annually in accordance with the PEMP, which drives our award fee. DM profit is directly based upon our success in meeting these measures. The five-year contract extension and

our consistently high Performance Fee scores (above 90%) indicate DOE's satisfaction with DM's superior performance.

Vision, Mission, and Values. The SPR (DOE) Vision, Mission, and Values, as expressed in the contract, are the genesis of DM's Purpose, Vision, Mission (Figure 3) and Core Values (Figure 4). Our company processes are directly aligned with DOE's. These values and strategies, which are also aligned with our SH&E management systems, guide all activities and decisions.

Employee Profile. DM employees are empowered. Anyone working on the SPR has the right and the obligation to stop work in an imminently dangerous situation. The VPP and Behavioral processes are employee-owned and operated with assistance from the SH&E professionals. Environmentally friendly behaviors are reinforced by incorporation in our Critical Behaviors Index.

DM's workforce of over 300 at our storage sites consists mainly of craftsmen and operators, most of whom have over 15 years of experience. At our New Orleans Project Management office, over 90% of all employees' average over 10 years of cross-functional experience. Lessons learned are widely circulated and used to ensure that process learning, mistake proofing, and performance reflects experience to enhance performance success.

The makeup of our diverse workforce is characterized in Figures 5, 6, and .7.

Strategic Challenges and Related SH&E Challenges. Strategic challenges are shown in Figure .8. Each strategic challenge is linked to strategic objectives and aligned with related success factors and core values in Figure .9. Sustainability has always been part of planning activities, such as maintaining a rolling, zero-based, 5-year, detailed, line item budget. Our budget planning addresses resource allocation to ensure SH&E critical processes, such as Emergency Preparedness, are funded. ***SH&E challenges for FY2006*** are commitments to DOE at headquarters level.

Overall Business Results: DM generates profit based on obtaining specific targets for service and performance results, 35% of which relate to SH&E performance. Simply put, the better our SH&E performance, the more profit the company generates. Since 2000, the SH&E performance has exceeded or met 100% targets enabling the company to receive 100% of the SH&E performance award fee. DM is considered to be the global benchmark as indicated by our performance, as shown in Figure 10.

2. LEADERSHIP

At the strategic level, DM's company leadership is guided by DM core values. These are the basis of governance, organizational culture, and leadership actions. As reflected in these values, DM's leadership is committed to providing a safe and healthful workplace, responsible environmental performance, and protecting the public. DM's leadership uses and measures organizational readiness, defined in terms of "the company's culture" (such as the leadership system), whether the workforce is aligned to the organization strategies and goals, and knowledge sharing (i.e., best practices and lessons learned). DM's Vision and Values are incorporated in the Strategic Planning Process (SPP) (Figure 11.). The strategic planning team includes employees, key suppliers, and partners. Both the Vice President for ES&H and the Safety & Health Manager are team members. It is important to note that our first value, Mission Readiness, specifies that operations will be both safe and environmentally responsible. Our fifth value addresses Environmental and our sixth addresses Health and Safety (Figure. .9).

At the highest level, the CEO defines the leadership culture. He sets the tone and drives the pace for senior management actions. DM ensures value is created for all stakeholders through a multi-faceted, two-way communication system.

DM considers organizational leadership effective when senior leaders use a structured management system to set and deploy values, provide short-term and long-term direction, and achieve performance expectations. Agility in this effort is particularly important, allowing us to meet changing client expectations, evolving SH&E standards and regulations, and our commitments to our employees. This management system includes the strategic planning process (Figure 12), implementation plans, management of key value creation and support processes (Figures 13 and 14), and performance reviews with employees, key suppliers/partners and DOE.

An improvement culture based on Deming's "Plan, Do, Study, Act" (PDSA) model provides a systematic review of organizational performance through regular senior staff meetings, utilization of an effective Performance Measurement Management System, and performance oriented interfaces with the DOE. Senior leaders reinforce these systems by empowering employees through such processes as behavioral

safety and pollution prevention, encouraging initiative, and promoting continuous improvement. Figure 12 illustrates how DM leadership integrates essential elements in pursuit of organizational excellence.

DM's Commitment to Corporate Citizenship. One of DM's core values is "Social Responsibility," defined as operating in a manner that protects employees and the general public and benefits local (key) communities. DM takes this commitment seriously and demonstrates it by our actions. To provide a few examples, we host an Environmental Advisory Council made up of community leaders and experts in environmental protection. We brief them on upcoming activities, changes in environmental impacts and aspects and they, in turn, provide this information to their communities. DM is ISO 14001 registered, demonstrating our commitment to go beyond compliance to best management practice and our willingness to be assessed regularly by outside auditors. Our storage sites are members of both the OSHA and DOE Voluntary Protection Programs (VPP). DM is also a charter member of the Environmental Protection Agency's (EPA) National Environmental Performance Track (NEPT) program and our two Texas facilities are the first Certified National Leaders in the Clean Texas, Cleaner World Program. The Environmental Manager is currently the President of the Performance Track Participants' Association and is allowed time and travel funds to perform this national service.

DM's Management's Commitment to SH&E goals. Leadership commitment to SH&E goals begins at the strategic level through alignment in the contract with DOE and the DM Core Values, but it is also reflected in very real ways to our employees at "ground" level. As part of the VPP process and ISO 14001, management is required to demonstrate their support. In support of the VPP, management has allowed ten company employees to be trained and serve as Special Government Employees (SGEs), augmenting OSHA and DOE teams' facility appraisals and mentoring other sites interested in becoming VPP participants.

DOE and DM management have funded employee travel to allow participation in special SH&E training, conferences, and associations. Management representatives participate in VPP and behavioral meetings, conferences, and environmental and safety award ceremonies. For example, the DM CEO, Robert McGough, presented the Keynote address at the 2004 annual Performance Track Participants Association meeting. Most recently, the Vice President for ES&H, Dr. Kirkland Jones, accepted the 2006 National Performance Track Outreach Award for DM from EPA Administrator Steve Johnson.

The most important demonstration of management commitment has been providing the hours of time the front line employees spend to train, implement, and support VPP, behavioral safety, ISO 14001, NEPT, and other “best in class” programs. In recognition of their value, DOE made support and participation in these areas a requirement for the SPR management and operator contractor, including them in their *ES&H Manual*, cornerstone of the SPR SH&E requirements and in the Critical Few Criteria, DM performance measures, and milestones.

Labor/Management Relations. The annual Employee Satisfaction Survey measures the quality of our labor/management relations. The survey is anonymous and the data is compiled and reported by an outside service. In 2006, employees scored Safety and Health in the 90’s (100 is perfect) in every category, indicating their belief that the safety management system is working and advantageous to them. Employees responded with an average of 95% that “*corrective action is taken when unsafe conditions are brought to management’s attention,*” “*safety rules are carefully observed,*” “*employees are encouraged to report all injuries no matter how small,*” and “*DM is a safe place to work.*” The ES&H overall average satisfaction score on a 7 point scale was 6.25. Overall, DM senior management was rated 5.54 with 25% of the employees responding they were *Very Satisfied*, showing that while improvement is possible, most employees believe in management’s commitment to them, particularly in the area of SH&E. DM management feeds the results of the survey into the strategic planning process, ensuring that action will be taken on employee concerns.

The response to Hurricanes Katrina and Rita directly reflected management and employee relations. DM’s employees were determined to carry on despite a disastrous emergency situation. With Katrina’s landfall imminent, DM transferred its operations center to Baton Rouge. When Baton Rouge was swamped with evacuees, we moved to a site near Beaumont, TX. Our workforce continued to work and to keep the sites operational even when they didn’t know the status of their own homes – or, already knew that they had lost everything but what was in their suitcases. Two weeks, later, with Rita poised to hit Texas, DM moved operations back to Baton Rouge. When the President ordered a partial drawdown, DM was able to answer and began pumping oil five days after being hit by two major hurricanes.

Despite the damage to SPR facilities, there were no employee injuries or environmental releases during or after these two hurricanes. We believe that this was a direct result of the SH&E systems and culture.

3. SH&E MANAGEMENT SYSTEM

DM's SH&E management system is based on the ISO 14001 environmental management system (EMS) and the OSHA Voluntary Protection Program (VPP) safety management system, married under the umbrella of DOE's Integrated Safety Management (ISM) System. ISM requires that SH&E be an integrated, but discernable, part of all business systems.

SH&E and the Strategic Planning System. DM's *Strategic Plan* provides a set of values that defines and aligns how the strategic objectives, including SH&E objectives, enhance competitive position, performance, and future project success. The DM plan is based on a set of six defined Core Values with seven related Success Factors that define specific areas of focus. As an example, the *Social Responsibility Core Value* has the related Success Factor to *Operate in a Responsible Socially Beneficial Manner*, which has an Objective of *Promote Proper Environmental Practices*, which is achieved through the *ISO 14001 Environmental Management System*. Safety and health is addressed through the Core Value of *Employee Development & Diversity* and its related success factor of *Human Capital Optimization* has an Objective of *Enhance Employee Well Being & Satisfaction* which is achieved through the *Safety Management System*, using OSHA and DOE VPP programs, behavioral safety, and human performance improvement (HPI). ISM unites environmental and safety management systems.

This management model enables us to achieve our Mission and Vision. Our key objectives (with related strategies), key plans, and performance indicators (with defined targets) are aligned and linked. The strategic planning system is fully integrated with program planning, implementation, and evaluation, establishing the basis for program performance standards, defining requirements that drive budget and resource management decisions, and providing full accountability for all processes and outcomes. Of the 31 critical performance measures established by DOE, 11 (35%) are SH&E related. Our success in meeting all of the targets is a major factor in determining DM's award fee (profit) and had an impact of approximately \$1,000,000 in FY2005. The total award fee for that year was \$3,130,366, resulting from a record score of 98.

S&H planning is aligned with budget development to assure that resources are available when needed.

All proposed projects are ranked with safety and environmental projects placed at the top of the funding

list. Current and potential risk mitigation are used to allocate project funds. Special funding projects may be requested. Most recently the client asked for a strategic plan for expansion of the SPR to a billion barrel capacity. This required Environmental to forecast impacts, regulatory requirements, potential spill dispersion, and similar factors.

Strategic Development and Alignment. SH&E responsibility drives Core Values that contribute to our strategic development and require alignment from company philosophy, planning, and action. To this end, the Vice President for ES&H and the Safety and Health Manager are formal team participants in the development of our *Strategic Plan*. Figures 12, 13, and 14 illustrate this planning process.

Decision Making. DM's commitment to safety, environmental responsibility, and security affects all of the decisions made by management and its employees. DM is willing to pay more, take longer, and be more conservative if an act could negatively impact safety or the environment. In the long run, such decisions usually result in resource savings, rather than losses; a reflection of the fact that responsible SH&E is a business value contributor. Two examples of generating savings by going beyond regulatory compliance are:

- Hazardous waste reduction from 9,256 lbs in 1999 to 49 lbs in 2005. The associated cost avoidance (waste disposal only) more than pays for entire environmental program.
- Accident reduction from 45 in 1998 to 7 in 2005 resulted in reduced Workers Compensation claim costs of approximately \$500,000 per year.

Information Management. DM uses the CENTRA on-line system for maintaining business, engineering, and authoritative directive documents under control and in their latest revision. This includes the DM *Accident Prevention Manual* and the DM *Environmental Instructions* which specify SH&E requirements. Maintenance of outdated documents and data is controlled under the federal government retention program.

SH&E Management Implementation. DM implements our integrated environmental and safety & health management systems using demonstrated, well-tested and accepted management systems. The environmental management system is ISO 14001. The safety management system is built on the VPP

criteria. The effectiveness and performance of our SH&E management systems are validated or certified by outside auditors and registrars. We believe that meeting “best practice” criteria and external validation combine for an excellent business reputation. We believe that this value-added reputation increases our value to DOE and enables us to compete successfully for the SPR contract in the future.

In the interest of continuous improvement, we have performed gap analyses on OHSAS 18000 and ANSI Z-10. Based upon client input, we have established milestones for self-certification in ANSI Z-10 by September 30. When Z-10 registrars have been established, we will arrange for external certification. Implementation of Z.10 will enhance direct management involvement in the safety management system.

SH&E Evaluation. DM has established the following assessments/audits/evaluations to measure SH&E performance: ISO Registrar inspections, OSHA and DOE VPP appraisals; DOE Headquarters Audits/Assessments; internal Organizational Assessments; Process Safety Management Assessments; ISM Implementation Assessments; VPP annual Self-Evaluations; and External Expert Evaluations. All of the findings from these audits and any others conducted during the year are reported, tracked in a computerized Action Tracking System, and trended annually in the *ISM Annual Review and Update Report*, which provides management the opportunity to recognize and resolve systemic problems and evaluate the effectiveness of ISM.

Communications. DM has developed multiple avenues of communication. The President of the company makes a monthly video that is distributed to all DM employees via our Intranet. The company newspaper, the *Esprit*, is published monthly also. Environmental topics, Off-the-Job Safety, Close Calls, and other safety news are included in each month’s issue. All Hands Meetings are held at the sites to communicate urgent issues or announce good news like winning the Secretary of Energy’s Gold Medal. In addition to formal Project and Performance Reviews, DM has informal counterpart meetings weekly and daily contact with the client. Safety related avenues of communication include Site Safety Councils, VPP Committees, the Tripartite Safety Council, annual SPR Safety Summits, Behavioral Steering Committees, and a Behavioral Resource Team and VPP Advisory Council that deal with issues that cross site lines. Environmental hosts the Environmental Advisory Council, a very special group of community representatives that provide a direct conduit to the public. DM Senior Staff visit all five sites once a year to provide a sounding board for employees’ concerns and discuss our performance goals for the year.

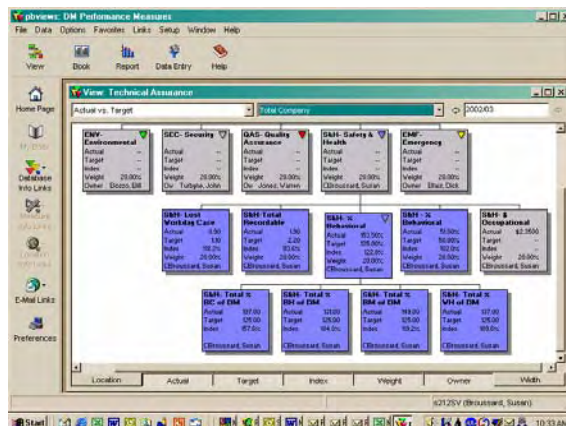
4. Performance Measures and Information Management

DM establishes key strategic level and operational performance measures in the annual *Strategic Plan*, which is linked to and consistent with the DOE Critical Performance Measures (CPMs). DOE issues annual Work Authorization Directives (WADs) that identify organizational functions and technical requirements; provide funding; and specify levels of acceptable performance and targets. The WAD “measures” are selected by DOE with input from DM. DM then aligns, integrates, and tracks the performance measures, which are the quantifiable part of our contract. WADs may contain work requirements, performance objectives, minimum performance levels, and targets. Resources to meet plan objectives are allocated through our annual budget formulation process. Additional targets are provided in the DOE PEMP. Revised annually, the PEMP establishes incentives and deductions for special emphasis goals, with target, “stretch” and “super stretch” levels; some of which allow us to earn 125% of an incentivized amount.

Selecting, Collecting, Aligning, Integrating Performance Measures. DM continuously improves the selection, analysis, integration, accessibility, reliability, integrity, and consistency of data on performance and operational issues. DM collects far more data than is required by our contract. Data improvement has been accomplished through such actions as implementing an enterprise-wide client-server computer network, business software that automates data collection, a software repository, an electronic document management “library,” and software to manage our performance measurement management system. Figure 9 identifies key organizational performance measures with related success factors, selected measures, approach methodology, use, and results. SH&E measures are highlighted.

DM’s Quarterly and Annual Self Assessments are required by contract. These submissions include performance data based on the objectives and criteria established for the WAD and PEMP major performance areas. The reports are DM’s summary of how well we performed during the subject time period. They also serve as an opportunity to discuss areas of achievement or weakness not addressed by the required performance measures. For instance, the elimination of silica as a blasting agenda, thus removing a potential carcinogenic exposure, or the decision to use “green building” criteria when replacing office buildings at the sites.

As shown on the screen view to the right, DM uses pbViews software to manage and present performance data and narrative commentary. The real time, “dashboard,” performance database holds over 1,000 linked measures. It tracks performance measures from the individual and work group level to the Strategic Plan goals and to the organization’s Success Factors and Values. PbViews is available to all SPR employees through any PC connected to the network. Measures are displayed in a hierarchical structure similar to an organization chart. Failure to meet a performance goal is reflected upward to the organizational level; i.e. failing to meet an accident rate target or waste management limit carries (color) identifiers upward to the ES&H Directorate, to DM Project Management, and finally to the DOE Assistant Project Manager for Technical Assurance responsible for surveillance of that program area.



Performance Analysis and Reviews. DM uses many leading and lagging indicators to monitor and improve performance. See Figures 17 and 19. We use cause-and-effect indicators at all levels of the organization, from storage site workers (e.g., rising accident rates may reflect systemic procedural problems and, ultimately, the ability of the site to operate) to top leaders (e.g., employee survey results indicate satisfaction and may improve productivity, or environmental performance measures are not being met and may lead to a NOV, and so forth).

Performance reviews range from the organization level to “ground level,” individual performance reviews. Demonstrated SH&E performance is included in all of our annual employee reviews from the most senior level to the employee in the field and is addressed at the strategic level as part of every process. Organizational performance reports are available to everyone through the Intranet in CENTRA.

Conclusions based on the organizational reviews are validated through analytical methods ranging from simple operational analysis to sophisticated statistical sampling, system modeling, and advanced Six Sigma experimental tools. Mission critical action plans and their changes are tracked in our Project Controls System; which is a priority-based, milestone system used to schedule, monitor, and manage the

progress of specific projects. For example, there is a Level III milestone for self-certification to ANSI Z-10.

DM has integrated the use of other instruments - award application feedback reports, self-assessments, external assessments, and employee and client surveys - to assess organizational performance. Results are linked to operational decision making using successively more detailed plans, performance measures, and reviews. The analysis of maintenance and operations costs that led to the Life Extension Program is an excellent example. Based on cost studies, the SPR embarked on a lengthy program that standardized operations across the sites, reduced the amount of equipment and parts required, and enabled us to keep operating costs low, ultimately reducing the risk of operational upset and improving the frequency of correct response.

We systematically review overall organizational performance, including performance on key business results and strategic objectives, at bi-monthly Project Reviews; joint meetings of DOE and DM senior staff. At these reviews, we analyze deficiencies and improvement possibilities and, together with our client, make decisions that are reflected as changes in action plans, work assignments, and milestones. Figure 14 shows the regularly scheduled reviews and meetings we use to deploy organizational analysis throughout DM. Leaders also hold regular staff meetings and the DOE Program Office and DOE Project Management Office leaders have weekly videoconferences. We hold informal weekly “counterpart” meetings at directorate and departmental level; i.e., the DM Vice President for ES&H meets each week with the DOE Assistant Project Manager for Technical Assurance; the Safety & Health Manager meets with the DOE ES&H Director and safety staff, and so on.

Our hierarchy of plans, performance measures, and reviews flows from senior leadership to the operating level. For example, at the strategic level, our Process Engineering System provides consolidated site operating data to the DOE Project Management Office. We trend and analyze this data through our preventive maintenance program, failure analysis program, and occurrence reporting system. At the work performance level, site employees report unsafe acts through the line control safety program that provides data to site safety councils, where the data is analyzed and corrective actions are taken. Either an appropriate organization is tasked with making improvements or an improvement team is formed to work on the problem and create an action plan.

Performance Review Findings Resolution All performance review findings are prioritized based on risk, functional area, impact on the integrated safety management system, and results. These prioritized findings provide opportunities for technical, business, and operational innovation. The *Annual ISM Review and Update Report* summarizes all audit findings for the fiscal year and validates the effectiveness of ISM implementation. The report allows management to see relationships and trends across all business functions and identify and resolve any systemic problems.

Subcontractor Performance Measures. DM also monitors subcontractors' performance. Bidding contractors' insurance risk factor and previous accident rates are reviewed and the contractors are determined to be "responsible" (or not) in the area of SH&E based upon that data. Every subcontract includes an S&H requirements (boilerplate) section and one for Environmental requirements. Contract language requires the primary subcontractor to flow down all of the SH&E requirements to their sub-tier contractors. A written evaluation of the subcontractor's performance is prepared at the end of the contract. Subcontractors who fail to meet SH&E performance requirements are barred from bidding on future DM contracts.

Presentation of Performance Measures. As previously discussed, DM uses pbViews to provide performance information in a visual format. In pbViews, the structure illustrated in Figure 16 is called a "View." PbViews is accessible to all DM employees and DOE. The system contains briefing books and over 60-targeted reports. Within a View, measures are linked, weighted, graphed, trended, compared to performance since 2000, and, if applicable, compared to benchmarks. Process owners collect and enter data and provide narrative commentary for each measure, detailing specific activity performance. An automatic indexing system evaluates actual performance versus comparative data on desired performance. This comparison colors each measure. This "color coding" provides an immediate visual cue, enabling performance variances to be easily identified. In the illustration, the red triangle indicates that there are performance measures in lower levels that do not meet performance targets. Action plans are entered for any target not being met or in danger of failure. With our daily reporting system, pbViews is used by DM and DOE to provide a fact-based system for reporting and decision-making.

Availability and Accessibility of Needed Data and Information. Performance data and information is available and accessible to DM stakeholders through a secure network of information systems and

associated databases, an integrated electronic document management system, and an Intranet. Efficient and effective communication of critical data and information is provided to all SPR users via a secure networks; video conferencing; and daily, weekly, monthly, and quarterly meetings.

Data Security. Our Data Systems directorate, which manages our information infrastructure, consists of: Enterprise Architecture & Integration, Control Systems, Network Operations, Configuration and Asset Management, Cyber Security, Business Applications, and Technical Services. These departments ensure the confidentiality, integrity, and availability of process and business data according to DOE and regulatory requirements and industry-recognized best practices.

Daily Operations Data. All four operating sites hold daily status meetings to monitor key site operational and SH&E performance measures. Site operating data is recorded on a real-time basis in the sites' computerized data historians and is available for analysis in New Orleans through our Process Engineering System. A daily report is available on line and SH&E variances are recorded in Non-routine (minor) and Occurrence Reports.

Overall Performance. We use the SH&E performance measures (and others) in our Strategic Plan to track overall organizational performance, including both strategic and operational measures. Management reviews the measures at quarterly Project Reviews and Program Reviews. Directorates review individual measures based on risk: daily, weekly or monthly. We revise performance measures periodically because of changes in the external environment, strategic challenges, or because we develop better metrics.

Maintaining Relevance. The annual PEMP negotiation selects key comparative data and information used to report operational assessment and to shape strategic decision making. The Business Operations Directorate manages this process. Renewal and revision of the previous year's performance measures spans a period from July through August. During this time, strategic direction, key data and information, and performance measures are updated during a series of cooperative meetings with DOE.

Key Comparative Data and Information. DM uses a variety of comparative data and information appropriate to the subject to be measured or studied; global, national, industry, and internal benchmarking is a way of life. For example, in 2001/2002, we used a major benchmarking study of industry

maintenance practices to improve site operations. In another example, we exchange information during annual DOE visits with the Japan National Oil Company that administers Japan's strategic reserve. They have benchmarked against us and are adopting our competitive sales modeling process and strategy of using an early release of government oil stocks in an oil supply emergency. In 2002, we compared our S&H performance to that of all of the participants in the OSHA Region VI VPP, allowing us to benchmark against "the best of the best."

Nature of the Performance Data. Many of our WAD measures are "control measures." These measures have a lower control level, usually around 90 percent, which represents a minimum level necessary for maintaining full operation, and an upper control level, around 95 percent, which represents the highest level of sustainable performance attainable, given our financial constraints. The majority of our performance measure targets exceeds the upper limit and are controlled relative to the resources required. DOE concurs that it would be prohibitively expensive for us to perform above the upper level for a long period of time. An example is the Maintenance Performance Appraisal Rating (MPAR). In some cases, DM sets no upper control limit. For instance, DOE's FY2006 accident rate "super stretch" goals for FY 2006 are 1.25 recordable incidents and 0.5 lost work time incidents. **However, DM management's internal SH&E performance goals are zero accidents and zero environmental damage.**

Performance Improvement. Innovation and continuous SH&E improvement are ingrained in our culture and are systematically supported by our Performance Improvement (PI) system. DM's innovation processes are enhanced by the PI Department methodologies. Improvement in cost efficiencies and effectiveness at meeting goals and objectives are driven by analysis of comparative data and information provided by: audits and assessments, the customer satisfaction survey, employee feedback through the Workplace Assessment Survey, and PI and Six Sigma teams. The PI system generates ideas to make meaningful changes that improve performance. DM employees are encouraged to participate on PI teams and are financially rewarded after completing a successful PI activity. The PI system was used recently to streamline the safe work permit process, making it easier to use and eliminating some latent procedural errors. Figure 21 shows the results of two PI teams.

Keeping Performance Measurement Current. We evaluate the effectiveness of our strategic and major operational measures during bi-monthly Project Review and quarterly Program Reviews, through our

quarterly Self-Assessment Reports to DOE, and the DOE PEMP assessment process (which is how we obtain our award fee). To a certain extent, DM and our DOE counterparts negotiate reportable measures. Process owners ensure our performance measurement system is sensitive to changing needs at the action plan and WAD performance levels. DOE direction and budget changes can also precipitate changes in performance measures. We improve process and performance measures as a result of audits, improvement activities, and employee and client input..

Data, Information and Knowledge Quality: Leaders focus on data, information, and organizational knowledge to develop and deploy effective action plans. *Validity and integrity* are ensured through authoritative guidance provided in policies and procedures. Measures are validated through internal, customer, and external audits. *Timeliness* is addressed through the project management controls and scheduling system “owned” by our Business Operations Department. Timeliness is the focus of the Project Control Milestone System. The system ensures process owners are involved in monitoring and managing progress and performance. DOE requires that we have a high level of data security compared to industry. *Security and confidentiality* are addressed through a series of policies and procedures and “need to know” parameters.

Availability and Accessibility of Needed SH&E Data and Information. All information, including SH&E data and information, is made available and accessible to stakeholders through enterprise systems, multi-site video conferencing, and a series of daily, weekly, monthly, and quarterly meetings. Employees are provided Citrix tokens that allow them to access the Intranet from any compatible computer with complete security. This capability proved particularly valuable during last year’s hurricane season, allowing many employees to “telecommute.” During the 2005 hurricane evacuations, the SH&E staff worked from three different geographical “nodes” in Louisiana and Texas to ensure that safety and environmental controls remained effective.

Data System Acquisition and Development. Data Systems analyzes business requirements, designs systems to meet the requirements, benchmarks best practice solutions, develops or purchases systems, and maintains the systems. The Occupational Exposure Index (OEI) is an example of a specialized database developed in-house to meet the need to track chemical, noise, heat, and other stressors’ employee-exposure data. It records sampling/monitoring results, the protocols used to measure exposure, the

Similar Exposure Group (SEG) monitored, who collected the data, when the data was collected, the results, the evaluation of the data, and communication of the data to the employee. The SPR Environmental, Safety & Health Management Information System, is a database system purchased externally, but specifically tailored to our needs, that tracks primarily environmental information, like the annual Chemical Inventories, waste data, and water and air quality data.

Measurement Definition. SH&E performance measures are shown in Figure 14, as they relate to our top level organizational success factors. Figure 17 provides examples of our leading and lagging indicators and the types of analyses performed.

Quantitative Safety and Health data: DM uses the Days Away/Restricted Time (DART) case rate and the Total Recordable Incident (TRI) rates to judge the frequency and severity of our accidents, both because these are rates – normalized data not dependent upon the size of the facility or number of manhours worked – and because historically they are the most frequently used data when comparing safety and health performance. The formulas used for both are defined by OSHA. The rates are easily accessible for benchmarking because they are used so universally. As an example, DM has used the rates of the facilities in Region VI who are part of the Voluntary Protection Program to benchmark our performance. We also use NAIC data for our industry code for comparison, which shows that for the past five years SPR sites have had accident rates between 50% and 90% below our industry average. We use the same statistics to evaluate the safety and health performance of our subcontractors. DM management believes that it is important to remember that each case reflected in the DART rate equates to one man or woman employed by DM who suffered an injury or illness at work severe enough to require them to miss work. Figure 20 shows our DART for 2000-2006. Our presentation and discussion of the cases with senior management reminds them that the data shown is linked to a specific human being who has been hurt. By humanizing the data, we make its impact more immediate.

Notice of Violation is a common environmental statistic, which offers the same opportunity for comparison with other entities. It is also highly visible. DM's goal is no NOV's and the SPR has had none for eleven years. Figure 27 compares SPR to three other DOE Agencies for a four year period ending 2005. The comparison of the total number of releases to the environment and notices of violations issued form 2002 through 2005 for the National Energy Technology Laboratory (NETL),

Albany Research Center (ARC), and Rocky Mountain Oilfield Testing Center (RMOTC). To see more of the types of data collected, analyzed, reported, and acted upon see Figure 28.

How is data captured and maintained? The data required by OSHA and the EPA must be recorded to remain compliant. This data is captured at each of the sites by a technical expert. Data is forwarded to New Orleans where it is collected, trended, acted upon, and ultimately reported to the client and the regulatory body. The client also requires that DM report specific SH&E data, as previously discussed. Finally, there is SH&E data that DM voluntarily collects to allow us to assure that our EMS and SMS are functioning effectively and efficiently. Much of this data is collected by site SH&E personnel and some by corporate SH&E. Other data is collected as a result of audits and assessments. Both leading and lagging indicators are used – for example, the behavioral safety contact rate (leading) and the number of lost time accidents (lagging) or the amount of hazardous waste disposed of (lagging) and the number of positive environmental behaviors observed (leading). Even lagging indicators can be used to prevent future problems when analyzed and acted upon. Some data is collected by specially trained line employees. For instance, behavioral safety observers have been trained to identify and provide feedback to “at risk” and “safe” behaviors, using class room presentation and one-on-one coaching. The Site ES&H Managers collect much of the environmental data. Three of the managers have Bachelor’s or Master’s degrees in Environmental Science or a related field; all four have many years of field experience.

Recordkeeping. DM maintains all of the SH&E records required by law and/or by DOE. In addition, DM maintains records of a large collection of additional data used to adjust SH&E management systems and keep them running effectively. The quality and integrity of the data is maintained through audits and assessments (both internal and external), self-evaluations, and scheduled resolution with comparative data like site accident logs or the DOE CAIRS system, a national accident/incident database.

5. SH&E RESULTS

Reporting Categories and Observation Periods. DM uses multiple source to capture SH&E results. Attachment 2 provides a sample list (not all inclusive) data. In addition to color coding, data may be

characterized by risk. Risk assessment is formalized and made consistent by using the SPR Risk Assessment Matrix (Attachment 3).

Trendline improvement over 13 years in S&E is illustrated in Figures 23 and 25. ***Sustained excellence over a five year period*** is demonstrated in Figures 20 and 22. Note that in Figure 20, which addresses both DM and our subcontractors, there were 18 accidents in 2004, and increase over 2003. Eleven of these were experienced by the Security subcontractor. Most of these occurred during training, physical qualifications, weapons practice, and field exercises. DM worked with the Security contractor to add additional hazard controls – detailed safety briefings, “walking” the exercise areas to remove hazards, stretching before strenuous physical exercise, monitoring physical conditions during strenuous tasks – and assisted them to significantly reduce their accidents the following year.

Payback in Cost Avoidance and Savings. In the first year of our EMS, DM sharply reduced waste from exploration and production by changing our approach; recycling nearly all of it. Hazardous waste was also reduced substantially over the first three years. In 2005, we had only 468 lbs for all six sites mostly due to source reduction. That is less than 80 lbs per site per year, or less than 7 lbs per site per month. Sanitary waste is “trash” and has been reduced steadily over the years by source reduction and recycling. DM also practices Affirmative Procurement, purchasing recycled content products. Where ever available, DM has moved to and maintained a 100% purchase rate of recycle content products in accordance with the definitions and guidelines of the EPA. DM put our EMS in place 2000. So, using 1999 as a baseline, we looked at cumulative cost reductions/avoidances for four easily measured indicators that directly relate to dollars. Figure 25 illustrates this impact.

6. LINKAGE BETWEEN SH&E AND BUSINESS PERFORMANCE

Business Systems: Overall business planning begins with DM’s *Strategic Plan*, which provides a set of Values that defines and aligns how the Company establishes strategic objectives and enhances competitive position, performance, and future success. The DM plan is based on the set of defined Core Values with related Success Factors that define specific areas of focus from which to address the key challenges illustrated in Figure 8.

SH&E management is integrated and linked beginning with specific with specific characteristics that are defined in our strategic plan. *Environmental* is linked through Value 4, “Social Responsibility” and its related Success Factor to “Operate in a Responsible Socially Beneficial Manner” and *Health and Safety* is linked through Value 6, “Employee Development & Diversity” and its related Success Factor “Human Capital Optimization. This structure ensures Mission and Vision are linked to key objectives (with related strategies), key processes, and performance indicators (with targets). The *Strategic Plan* is fully integrated with program planning, implementation, and evaluation processes. It establishes the basis for performance standards, defines requirements that drive budget and resource management decisions, and provides full accountability for all processes and outcomes. The strategic planning process provides governance. It is a system that ensures linkage, alignment, controls, accountability, and effective allocation of resources.

By setting the framework for sound program management and accountability, the planning process provides guidance for the development of Action Plans. Figure 12 depicts DM’s Strategic Planning System, which includes development of strategy, objectives, and action plans, performance projections, assessments, and information for management review. This process enables DM to adapt to an ever-changing environment, improve performance, balance stakeholder value, and obtain our Vision.

Strategy Development Process. In 2002, DM senior leaders reengineered the strategic planning process to link directly to the DOE strategic plan to improve customer focus and set direction through a set of clear and visible values. The values, strategies, and performance expectations guide activities and decisions by employees at all levels and have produced DM’s best in class performance. Figure 9 depicts a system of plans and reports integrated with participative reviews where we assess progress, make adjustments, and initiate improvements. This approach is designed to promote employee involvement in decision-making and organizational flexibility in managing change. To ensure alignment with DOE, a DM employee serves on the DOE strategic planning team.

Strategic Planning Process A Strategic Plan Management Team updates the Strategic Plan annually in a participative process shown in Figure 13. The team consists of representatives from across the organization and includes members of management and staff. The Director of Operations and Engineering leads the team. The CEO, senior leaders, managers, and employees are key participants who provide

feedback. The team solicits input from key DOE staff, key suppliers, and the DM Contracts department. The process is designed to create a sense of buy-in from the customer and ownership from DM staff.

First, the team conducts a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, soliciting input from DOE and from all employees on customer requirements, operations, employee satisfaction, maintenance, engineering, budget, human resources, security, environment, safety, and health. Next, the team aligns all the input and the SWOT analysis with the DOE strategic and performance plans, the contract, the PEMP, and DM's defined Values and related Success Factors. Objectives are linked to success factors. (with related strategies), key processes, performance indicators, and targets. Then, the team prepares a draft, making sure that the plan links to the DOE SPR Strategic Plan, which is linked to the DOE Secretary's Annual Performance Agreement with the President of the United States. The team circulates the plan to management staff for comments and holds all-hands meetings to discuss it. Senior leaders review a final draft, after which the CEO and Senior Leaders sign the updated plan.

Key Factors in Setting Strategic Direction Our information and data gathering on success factors is represented by Figures 12 and 13, which show how our strategic planning, budget, operational planning, supplier management, work, and performance measurement are linked. We systematically analyze data and information and consider planning and operating environment factors in setting strategic direction.

Deployment. Responsible departments or work groups develop action plans. Cross-functional teams develop the action plans if more than one department is involved. The Project Controls Group deploys action plans via our project scheduling system. Our strategic planning process and change management system ensure implementation, adequate resource allocation, change control, and sustainability. Figure 9 lists our key action plans, related strategic objectives, and key changes in products, markets, and customers. Support/and subsidiary plans are linked to our Values and Success Factors.

Direct Cost Avoidance and Earnings. Spill cleanup is based on the amount of "oil spilled-time" is a unit cleanup cost. The volume of spill cleanup has steadily since the 1999 baseline creating cost avoidances. DM tracks waste by three categories which have separate targets. The trendline has declined since 1999. Cost avoidances are based on disposal costs avoided by reducing the amount of waste generated and

disposed. There is a cost to putting an EMS in place. Figure 25 shows DM's bottom line savings from 1999-2005 due to an outstanding EMS.

In 1994, DM had 34 accidents. In 2005, we had four, cutting estimated accident costs by 86%, Figure 23. Workers Compensation incurred cost in 1999 was \$623,937. In 2002 (the last date for which we have data), the incurred cost was \$26,901; a 96% reduction. Anecdotal evidence for 2005 estimates it at \$10,000.

7. OTHER FACTORS

DM's *Inherent Organizational Culture* facilitates our SH&E management systems. Both DM and DOE management actively demonstrate their support of SH&E. DOE expects us to make our top priorities safety, security, and environmental responsibility. There have been a number of *Changes to Business and SH&E Climates*, during DM's tenure on the SPR, requiring us to remain agile and adaptive. Some examples are early compliance with DOE ISM, the aging workforce, a significant "reduction in force," the adoption of the Baldrige management model, and – most recently – two hurricanes.

8. CONCLUSION AND RECOMMENDATIONS

DynMcDermott used both evolutionary and revolutionary change to evolve SH&E systems from after-the-fact, compliance driven, error intolerant, management-owned systems to proactive, shared, principal based systems. Safety changes started with the behavioral safety process, followed by the two VPP programs. The net effect was to transfer ownership of safety from the traditional safety department to the workers. Training workers in data analysis, scheduling and communication was an unanticipated, but happy, result of these programs. At the same time, workers were becoming involved in both work planning and design and hazard reviews for new projects, causing management to recognize the efficiencies to be gained from worker involvement throughout SH&E. This resulted in fewer accidents and lower costs associated with workers compensation and other related losses.

Initial environmental change was driven by a new requirement for federal systems to acquire an EMS. DM and local DOE management selected ISO 14001. Using modern management concepts, like those in ISO 9001 and Malcolm Baldrige, forced integration of environmental requirements into early project

planning.. Goal setting and worker involvement in performance improvement and strategic planning, in the face of headcount reduction, resulted in a sharp reduction in waste production and emissions. In fact, all aspects of SH&E performance have improved, including the focus on the resulting business success and our outreach to local communities.

Recommendations

While not all companies that have a good SH&E record have excellent management systems, companies with poor SH&E systems do not have good management systems. The use of excellent, recognized business systems such as ISO 14001, VPP, and Malcolm Baldrige, will force strategic planning, integration of safety and environmental protection into the business model, the use of performance measures, alignment of goals, management involvement and commitment, and worker participation, as well as systematic and continuous improvement. Programs such as behavioral safety, VPP, Six Sigma, pollution prevention, human performance improvement, and energy conservation will provide continuous improvement in the business systems and result in increased value and profit.