SPR Operations & Maintenance Benchmark Study

Jeff Haverly
General Physics Corporation
400 East 86th Avenue
Merrillville, IN 46410
Phone: 219-793-9912
E-mail: jhaverly@genphysics.com

Casimiro (Cas) Izquierdo
Strategic Petroleum Reserve
Office of Fossil Energy (FE-42)
U.S. Department of Energy
Washington, DC 20585
Phone: 202-586-9353
E-mail: CASIMIRO.IZQUIERDO@HQ.DOE.GOV

ABSTRACT

This paper is based on the “Benchmark Study of Operations and Maintenance at the Strategic Petroleum Reserve” final report, dated February 16, 2001, that was conducted by the GP author under direction of the DOE author. This paper, and the presentation, will:

- Introduce the important maintenance process and equipment reliability requirements of the Strategic Petroleum Reserve (SPR),
- Detail the maintenance process elements required to maintain the SPR in a high state of readiness, and
- Describe the critical benchmark study processes that were implemented and which contributed to the success of the Study.

The Department of Energy (DOE) Strategic Petroleum Reserve was established in 1975 to store substantial quantities of crude oil in an environmentally responsible manner to diminish the vulnerability of the United States to the effects of a severe petroleum supply interruption. To meet this mission requirement, the SPR must maintain the equipment reliability and availability, operational readiness, and maintenance management processes such that design drawdown of crude oil can be achieved within 15 days of a presidential order.

To give a sense of scale, the SPR currently stores and monitors a stockpile of ~570 million barrels of crude oil at four major locations along the Gulf of Mexico. The crude is stored in underground caverns, leached out of mammoth salt domes. Each cavern is approximately the size of the Empire State Building. The SPR URL is http://www.fe.doe.gov/spr/index.shtml.

To support the continuous improvement of the SPR readiness mission, the DOE commissioned the performance of a benchmarking study of SPR operations and maintenance (O&M) functions. This Study was commissioned to ensure that the organizational alignment and the management, human performance, and O&M processes are consistent with those in place in comparable and competitive markets. The objectives of the Benchmark Study were to:

- Compare the SPR O&M strategies and practices with private industry best practices, and
• Evaluate O&M performance through the use of various analysis tools to identify opportunities to reduce non-value-added activities, improve productivity and quality.

The Study was initiated through the performance of an information acquisition phase that identified the O&M processes and practices at each of the four SPR storage network sites, and the New Orleans SPR Program Office.

Based of this information, a detailed benchmarking questionnaire was developed. The questionnaire was based on:

• The (then) current SPR O&M processes and practices, and
• An organized compilation of recognized world class operations and maintenance program attributes from sources including the Malcolm Baldrige National Quality Award, Industry Week Best Plants, Shingo Prize, Benchmarking Exchange criteria, American Society for Training and Development, American Chamber of Commerce, various maintenance management sources, and internal DOE and consultant data.

The questionnaire, and the resulting Study, focused on twelve best practice categories:

1) Demographics
2) Customer
3) Strategy & Development
4) Organizational Design & Development
5) Performance Measures & Rewards
6) Process Design
7) Quality
8) Maintenance Management
9) Equipment & Technology
10) Materials Management
11) Environmental, Safety & Health, and
12) Continuous Improvement

During the data acquisition phase of the Study, the questionnaire (which included 446 questions in the 12 best practice categories) was utilized to obtain baseline data on O&M practices at the SPR sites, and then gather comparable benchmark data from the five (private industry) volunteer benchmark facilities.

During the data analysis phase, the current best practices were identified for each question, where applicable, based on documented proven industry information (as defined in the Benchmark Study documentation). The data was then analyzed, compared, and presented in three ways:

• The first comparison was made between the SPR sites and the identified best practices
• Secondly, SPR O&M processes and practices were compared to the five benchmark companies in order to identify unique practices that may be of performance improvement value
• Lastly, SPR O&M processes and practices were evaluated, site-to-site, when unique practices were identified at one site that warranted being considered for broader application.

By comparing the internal review, conducted at the SPR sites, with identified best practices and documented best practices at the five private industry benchmark companies, the SPR was able to identify operational and maintenance improvement alternatives that can be used to improve SPR operational and financial performance.

The paper, and presentation, identify and discuss the lessons learned from the Study, as well as the application of benchmark processes to operations and maintenance issues in private industry.