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Construction Management at the SP-100 Ground Engineering System Test Site

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**CONSTRUCTION MANAGEMENT AT THE
SP-100 GROUND ENGINEERING SYSTEM TEST SITE**

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INTRODUCTION

The SP-100 Ground Engineering System (GES) Test Site is planned for construction at the U.S. Department of Energy's Hanford Site in Southeastern Washington. This project provides the Hanford Site contractors with a unique opportunity to showcase a number of design and construction innovations that significantly lower the design and construction costs while providing a facility that will effectively meet all of its design objectives.

This paper will explain the organization and management of the SP-100 project, specifically those activities relating to facility design modifications and construction management, as performed through the joint efforts of Westinghouse Hanford Company (Westinghouse Hanford) and Kaiser Engineers Hanford (KEH).

ORGANIZATION AND RESPONSIBILITIES

The SP-100 GES Test Site Facility design and construction activities are managed within the framework of the Hanford Site project management system. The U.S. Department of Energy Richland Operations Office (DOE-RL) provides overall project management and coordinates the activities of the prime contractors. The SP-100 GES Test Site activities are managed through the Assistant Manager for Environmental Management, by the Technical Services Branch of the DOE-RL Project Management Division.

As the Operations and Engineering Contractor and principal performer on the SP-100 GES Test Site, Westinghouse Hanford has a staff dedicated to the overall construction management of this major project. Westinghouse Hanford is the focal point for construction planning, coordination, technical direction, and integration with other public or private agencies involved with the SP-100 project, whether at the Hanford Site or at other government installations.

As the Hanford Site Engineer/Constructor Contractor, KEH will provide architectural and engineering services for building and utility modifications and will manage and perform construction activities, either through a combination of fixed-price competitively bid subcontract packages, or through its own construction forces. Work that is well defined and not subject to change will be performed by subcontractors; KEH construction forces will perform work of a more uncertain nature, such as work in contaminated areas.

A number of initiatives and innovations for the existing Hanford Site management systems are being used to manage the facility modification effort. These management initiatives and approaches to new projects have enabled the Hanford Site construction forces to perform in exemplary fashion in recent projects such as the following:

- Well installation in support of the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act groundwater studies in potentially or actually contaminated sites.
- Asbestos removal and replacement projects required to upgrade aging facilities.

Management system innovations are outlined in the following paragraphs.

Dedicated Team Approach

The most important innovation is the concept of a dedicated SP-100 project team, as opposed to the conventional matrixed organization. Personnel assigned to the project are dedicated to SP-100 and cannot be removed, reassigned, or assigned to projects in addition to SP-100 without the knowledge and consent of the project manager. This dedicated team approach fosters an attitude of project ownership and facilitates closer communication and coordination among the various design disciplines.

A significant amount of thought and effort was put into staffing this dedicated team. Individuals were hand-picked for their specific skills and experiences relevant to the project, particularly experience in the commercial nuclear industry sector. As part of this recruitment endeavor, KEH reached outside of the traditional Hanford environment to find a project manager with extensive experience in the commercial nuclear industry who could bring fresh insight and innovation to the management of the SP-100 project.

Every effort is being made to provide this team with the environment and tools necessary to nurture maximum productivity. This includes locating the design team near construction activities and making sure engineers have the right equipment to do their jobs properly.

Cost and Schedule Reporting

Costs, schedules, and their relationship to the project baseline are continuously monitored and reported through the Kaiser Engineers Management System (KEMS). The KEMS is a menu-driven software system that can collect and report cost and schedule information in an easy-to-read format to help project management keep abreast of project performance. Through the use of KEMS, potential problems will be identified and resolved early enough to prevent them from becoming major obstacles for project completion.

The KEMS scheduling module with "what if" capability allows KEH to predict the impact of schedule delays and changes on the overall schedule. The schedule shows the logical design sequence, complete with the primary and subordinate activities. Design critical paths are identified in such a way as to allow management to concentrate on providing the appropriate resources at precisely the right time and at the right place to keep the project on track.

Upfront Planning

Upfront planning during the design stage is the key to eliminating potential delays during construction. Work has been divided into distinct "Facility Modification Packages" to provide better interface between actual construction activities and their respective design activities. Each of these packages has its own clearly defined scope of work and corresponding schedule, which ensures that those deliverables needed first are completed first by the design team. This approach also makes it easier to determine the effects of postulated design changes on both cost and schedule. Another benefit is that long-lead procurement items can be identified sooner, allowing initiation of the procurement process before start of construction.

Careful Definition of Interfaces

Design and construction of the various modification packages are scheduled and controlled by the same management system (KEMS). Because this system evaluates and separates work elements into clearly defined and identified work packages during the design stage, physical interfaces can be more clearly defined and areas of potential problems can be identified sooner. The result is that construction work can be put out for bid based solely on the required expertise and the cost/schedule submittals that are most beneficial to the overall project.

In the event that construction interfaces cannot be clearly defined, construction work is awarded to the onsite construction forces. This ensures that immediate corrective support will be available to solve potential problems without having to negotiate between two or more contractors, which often causes needless delays and cost overruns.

The interface between construction and engineering is initiated as soon in the design process as possible. Through periodic constructibility reviews and input from construction management throughout the design process, potential problems and unforeseen interferences during construction are greatly reduced.

Communication among the various engineering disciplines is also improved. Frequent interdisciplinary reviews are held for engineers to review progress and the coordination of their work with the other disciplines. This ensures a better product by minimizing design review comments, design verification problems and interferences, and common interface problems, such as poor communication.

SUMMARY

The construction management approach used by the project team for the SP-100 GES Test Site provides the optimum construction deliverable. The success of this effort can be attributed to the innovations, proven successful on environmentally sensitive projects, that transcend traditional Hanford Site construction activities:

- A dedicated project team that remains with the project through a completed phase or package.
- Accurate and up-to-date cost and schedule performance reporting through the KEMS computer system.
- Careful, upfront planning of the design and construction activities through the use of packages with logical and clearly defined scopes.
- Clearly defined and evaluated physical and design interfaces during the early phases of the project.

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