

Team Engineering for Successful Reuse and Mission Enhancement of a Former DOE Weapons Material Production Facility

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TEAM ENGINEERING FOR SUCCESSFUL REUSE AND MISSION ENHANCEMENT
OF A FORMER DOE WEAPONS MATERIAL PRODUCTION FACILITY

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ABSTRACT

This paper describes the team engineering approach used to resolve issues associated with converting a 50-year-old fuel processing facility into a decontamination facility. In only nine months, the multi-disciplinary team formed for this task has made significant progress toward both long-term and short-term goals, including conceptual design of two decontamination modules. The team's accomplishments are even more notable in light of frequent changes in scope and mission. Today, the team serves as a venue for troubleshooting operational issues, sharing vendor information, developing long-range strategies, and addressing integration issues within the facility's organizational structure. The team's approach could serve as a useful model to address the many issues surrounding the transition of the U.S. Department of Energy (DOE) and commercial complexes from a production and supply role to one of cleanup and environmental remediation.

I. INTRODUCTION

Built in 1943, T Plant was the first fuel processing facility to support atomic bomb development activities during World War II. In 1957, it was converted to a decontamination facility when more efficient fuel processing methods were established. Over the years, the facility became less and less important to the Site, eventually falling into disrepair. In 1991 safety concerns prompted T Plant management to restrict all activities pending a review of operating procedures and plant upgrades. Since that time the safety concerns have been addressed, and monies were obtained to complete necessary upgrades. Later that year, T Plant was selected

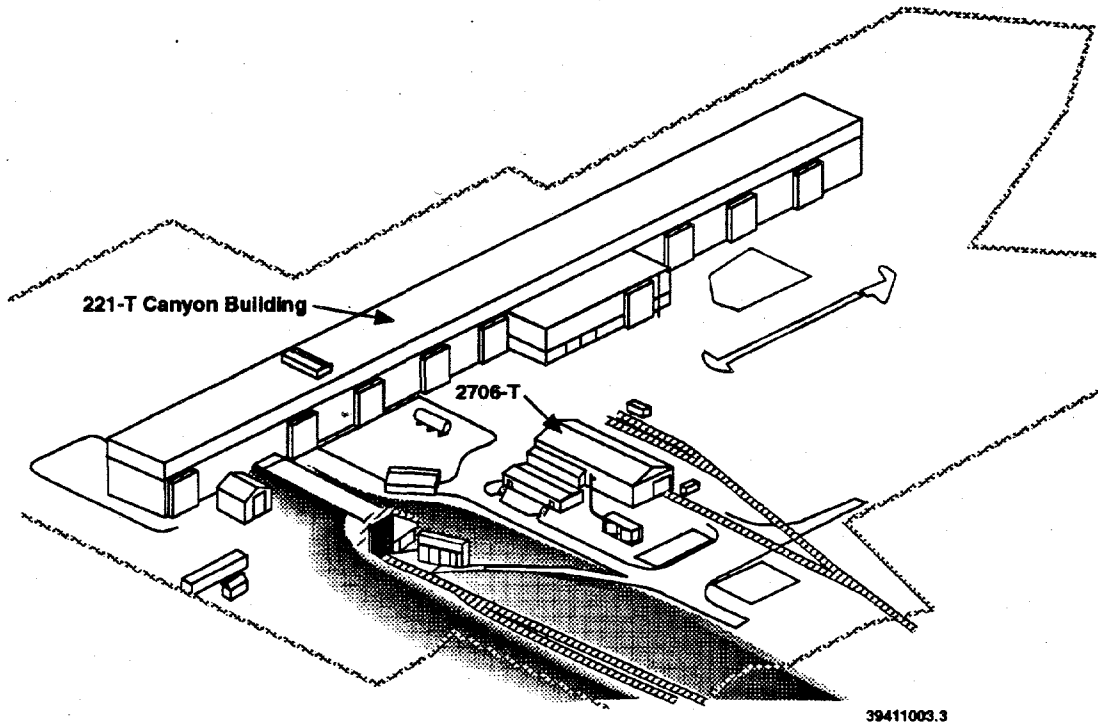
to serve as the interim central treatment/decontamination facility in support of the Hanford Site's environmental restoration mission.

T Plant consists of two main buildings and several support buildings (Figure 1). The 221-T Canyon Building, the original fuel processing facility, is being retrofitted to treat high-dose-rate contaminated items. Low-dose-rate contaminated items are treated in the 2706-T Building.

In late February 1994, personnel at T Plant formed the T Plant Treatment and Disposal Evaluation (TRADE) team to define and evaluate treatment, handling, and volume reduction technologies and processes for low-level radioactive and mixed waste items at the T Plant facilities. Candidate technologies and processes were evaluated based on their ability to comply with Debris Rule performance standards. This paper illustrates how the intra-organizational, multi-disciplinary group applied an up-front systems engineering approach to meet the challenge of implementing that mission in a 50-year-old facility.

The TRADE team's task evolved to include designing the process, procuring equipment, and implementing the treatment systems. Furthermore, the group was tasked with accomplishing these goals within a 2-year time frame, while considering future needs and potential customers. The underlying goal of the TRADE team is to identify and initiate treatment/process methods and technologies to promote the safest and most efficient means to accomplish the T Plant mission in a manner that supports the identified need dates. The team is used as a venue for troubleshooting operational issues,

Figure 1. T Plant.



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sharing vendor information, developing long-range strategies, and addressing integration issues within T Plant's organizational structure.

The TRADE team is a self-directed work group comprised of personnel from all of T Plant's organizations. The team meets weekly to address the wide range of topics and issues related to treatment and decontamination of hazardous and radiologically contaminated equipment and wastes. Although the team has the full support of T Plant's management, the team itself operates independently from any specific organization. This structure allows the TRADE team to interact directly with T Plant and Hanford personnel as well as with outside vendors and consultants to obtain required information. The authority and support granted by T Plant management permit an unbiased, independent evaluation and selection of treatment technologies and processes. Periodic presentations to T Plant management and publication of summary reports assure continued support and input from all concerned parties.

The considerable accomplishments of the TRADE team indicate the value of teamwork and the empowerment of individuals within this team structure to accomplish specific goals. This paper describes in detail the structure and methods of the team. These methods

can be applied by other groups throughout the DOE and commercial complexes for successful and economically sound use of existing facilities when shifting from nuclear production activities to environmental restoration.

II. TIMELINE

Two *Westinghouse Technology to Improve Processes* (WesTIP[®]) workshops held in fiscal years 1993 and 1994 examined options for retrieval, treatment, and disposal of long-length contaminated equipment (LLCE) from the 177 storage tanks at the Hanford Site. These workshops identified T Plant as the primary treatment facility. Previous value engineering studies had identified the need for installation of an oversized entry port and other minor facility modifications in the 221-T Canyon.

Facility resources were limited; therefore, the ability to focus on process and mission development called for efforts and actions beyond the usual methods. The TRADE team was formed, and its charter approved by

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T Plant management in February 1994. At that time, Plant faced two primary challenges:

- Immediate needs
 - Support 221-T Canyon cleanup evolutions
 - Initial acceptance and treatment of tank farm LLCE
 - Initial 2706-T operations.
- Long term needs
 - Support of continued tank farm's LLCE functions
 - Additional site treatment functions for the 221-T Canyon and 2706-T facilities.

To support the immediate needs, focus groups were formed in March 1994 to review and develop individual technologies and processes.

Following a third WestTIP workshop in April 1994, the team shifted the focus of their efforts to address immediate needs. The TRADE team was tasked with developing, procuring, and installing a process to treat LLCE by January 1995. This included addressing all relevant safety, regulatory, and permitting issues. The TRADE team continued to evaluate long-term technologies, as time permitted.

In May 1994, the TRADE team chairs and focus group leaders met with the cognizant manager in an all-day session to develop the basic LLCE treatment process. Management approved the team's process and approach, and teams were established to complete the process design.

In July 1994, systems integration issues forced another change in the focus of the TRADE team's efforts. It was determined that the oversized entry port, planned facility modifications, and process treatment systems should be considered as a single project. This new approach changed the project design parameters, and consequently, the team's approach to the T Plant mission.

In response to this new direction, the team finished the original process design, continued to gather information on treatment technologies, and provided support to T Plant operations on clean up of the 221-T Canyon and identification of near-term processes to treat non-LLCE. Members of the TRADE team participated on The T Plant Systems Engineering Team (TPSET) to evaluate the systems integration issues. This represents the current scope of the TRADE team.

III. TEAM OPERATIONS

A. Methodology

The TRADE team followed the general methodology outlined below:

- Review existing plant capabilities to determine what is usable, acceptable, and viable or could be made so through retrofit, operational improvements, etc.
- Contact industry experts, manufacturers, and suppliers to obtain information on existing and new technology developments and processes.
- Evaluate data as a team to determine the most viable treatment/process options and best methods for incorporation into plant functions that will be consistent with debris rule performance standards and accepted by cognizant regulatory authorities.
- Exchange information with interested members in team members' respective organizations and to obtain information or ideas from outside personnel for consideration by the team.
- Recommend selected options to management and develop conceptual engineering information for implementation of the selected options.

B. Conduct of Business

All team members are allowed to provide input on any matter. All ideas, comments, or opinions are given respectful consideration by the team. The team chair(s) ensure that regular meetings are conducted, coordinate team activities, and ensure that adequate information and documentation are maintained at all times to support team conclusions and recommendations.

An engineering report is prepared on a regular basis to document team findings and activities to management. This report is the responsibility of the team chairs, and the team approves each report before it is published.

Meeting minutes are recorded and distributed to the team to document events and decisions and maintain the continuity of TRADE team activities.

A central file is maintained by the team chair(s). This file is readily accessible to all team members. Team members are responsible for ensuring information

removed is noted in the file checkout sheet and is returned in a timely manner to allow for use by other team members.

Team members file written reports on all investigated technologies or processes to the team chair(s). These reports document how the technology or process works and may include member observations, opinions, or ideas on the viability of the investigated items.

C. Membership

The team represents the widest possible range of interested parties and technical disciplines. Participating T Plant organizations include Operations, Engineering, Projects, Maintenance, Environmental Engineering and Compliance, and Health Physics. Selected oversight organizations include Environmental Permitting and Compliance, Quality Assurance, Industrial Safety, and Nuclear Safety. A champion manager supports the TRADE team and provides an interface to T Plant management. Team members participate actively in the development process and coordinate with members of the groups they represent. Over time, a number of the individual team members have changed, but the organizations represented have remained constant. The TRADE team chair(s) have also changed, and the cognizant manager has been shifted from Environmental Engineering and Compliance to T Plant Projects.

IV. SIGNIFICANT ACCOMPLISHMENTS

The TRADE team's successes are indicative of the value of teamwork and the empowerment of individuals within a team structure to accomplish specific goals. The achievements of this dedicated, multi-disciplinary group are described below, as are recommendations for future team activities.

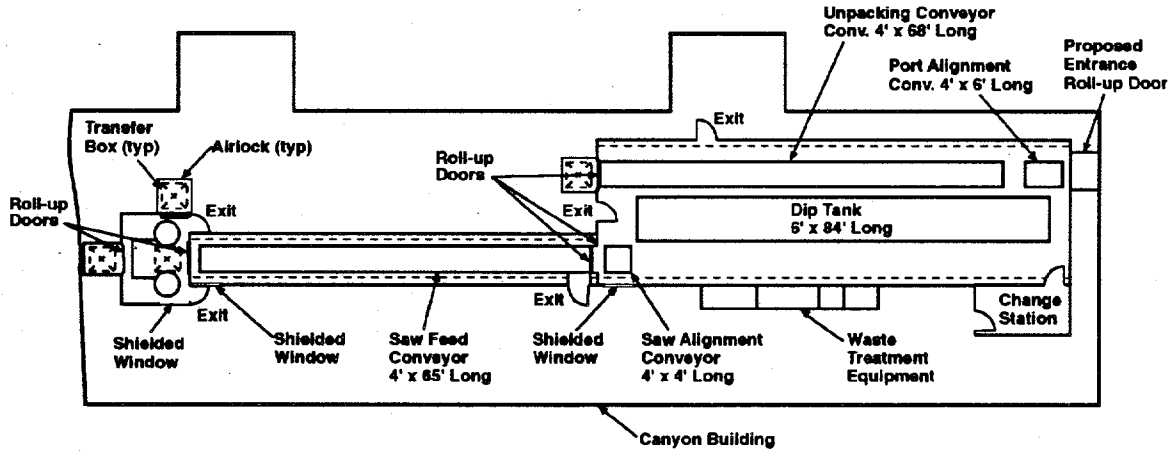
- Identified the need for an integrated team to evaluate and recommend processes and requirements to support T Plant's mission. Defined a focused mission effort and established near-term (0-2 years) and long-term (2 years and beyond) goals.

- Involved individuals from all organizations within T Plant to accomplish its mission. Recruited necessary support contacts (i.e., safety, procurement, and regulatory) and included these individuals as active members in the process.
- Increased awareness of related projects and activities and the need for their integration to successfully accomplish T Plant's mission. Designed a treatment system consistent with Debris Rule standards to meet near-term goals. Included enough flexibility to adapt the system to long-term goals.
- The TRADE team's original assumptions called for a commercial vendor to design, build, and deliver the Primary Decontamination Module (PDM) and Secondary Decontamination Module (SDM). Team members formed separate focus groups to develop the performance specifications for the two modules. The focus groups worked closely with Westinghouse Hanford Company procurement to develop the specifications. Although systems integration issues ultimately led to a change in approach, and the specifications were never issued for bid, the information contained in these specifications will provide valuable input to future project documentation. Conceptual designs for the PDM and SDM are shown in Figures 2 and 3, respectively.

A. Future Activities

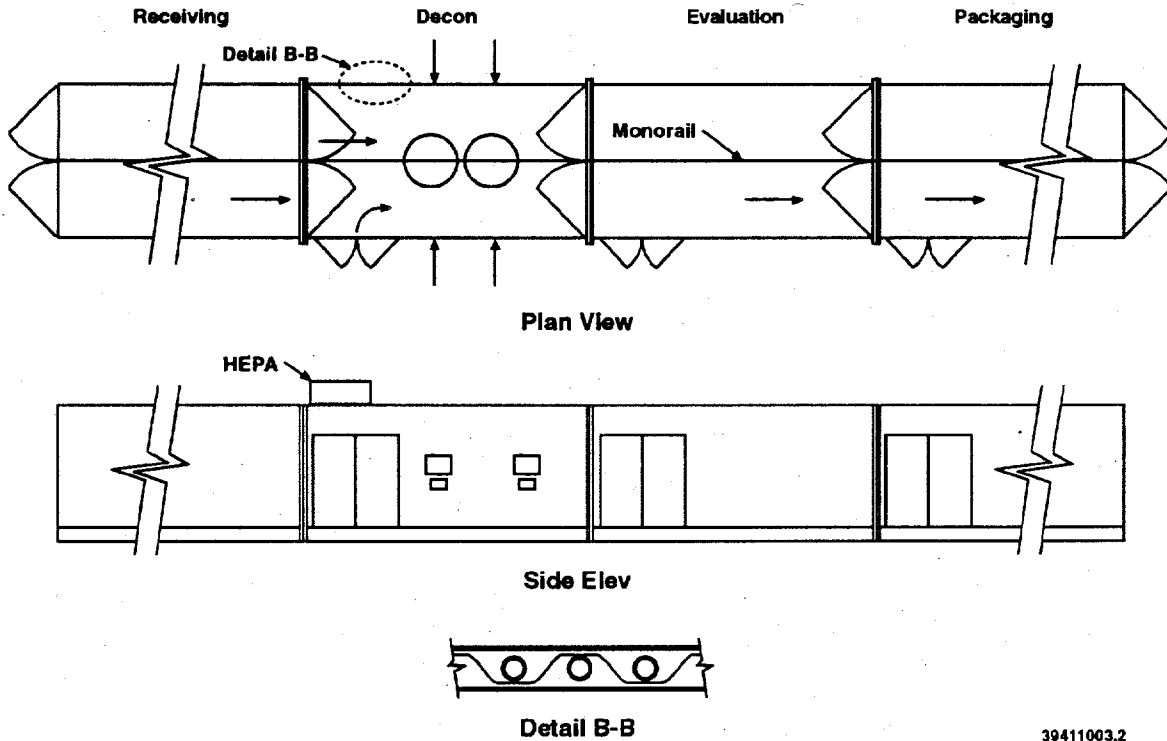
The TRADE team continues to evolve based on the results of the TPSET evaluation and the ongoing T Plant activities. Having marketed and sold the ideas and concepts to the Hanford Site as a whole, the TRADE team will continue to exist as a "think tank," responsible for input to and review of future project plans and documents and evaluating new technologies. The TRADE team will also continue in its role as an integrating group for T Plant operational activities and will be used to troubleshoot emergent operational problems.

Figure 2. Secondary Decontamination Module — Conceptual Layout.



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Figure 3. Primary Decontamination Module — Conceptual Layout.



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