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Accelerated Decontamination and Decommissioning at the Hanford Site

Prepared for the U.S. Department of Energy
Office of Environmental Restoration and
Waste Management



Westinghouse
Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

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ACCELERATED DECONTAMINATION AND DECOMMISSIONING
AT THE HANFORD SITE

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ABSTRACT

The Hanford Site has over 100 facilities that have been declared surplus and are scheduled to be decommissioned. In addition to these surplus facilities, there is a significant number of facilities that are currently being shut down, deactivated, and transferred to the Decontamination and Decommissioning (D&D) program. In the last year, Westinghouse Hanford Company and the U.S. Department of Energy, Richland Operations Office, have developed and implemented an initiative to accelerate the D&D work at the Hanford Site.

The strategy associated with accelerated D&D is to reduce the number of surplus facilities, eliminate potential safety hazards, demonstrate meaningful cleanup progress, and recycle materials for other uses. This initiative has been extremely successful and has resulted in the safe demolition of 13 facilities in fiscal year (FY) 1993. In addition, four facilities have been completed in FY 1994 and demolition of several other facilities is currently underway.

INTRODUCTION

Accelerating D&D work at the Hanford Site involves more than decontaminating a building for reuse and/or demolition. It includes the preliminary planning, engineering, characterization, budgeting, scheduling, regulatory compliance, and all other aspects of project management. This paper provides information on the success of accelerating D&D work at the Hanford Site by (1) highlighting the positive aspects of advanced planning, (2) establishing goals and objectives, and (3) following through with the actual demolition of the facilities.

BACKGROUND

D&D is a major subproject of the Environmental Restoration (ER) Major System Acquisition (MSA) at the Hanford Site and, therefore, is a significant part of the cleanup mission. Although the Hanford ER MSA was not established until FY 1991, the D&D of Hanford Site surplus facilities has been ongoing for the past 20 years and, in total, over 200 structures have been decommissioned. There are currently 100 ER facilities scheduled for D&D and over 200 additional facilities are identified for immediate deactivation and eventual D&D. This includes facilities such as the 100 N Reactor and its support structures. The total number of facilities requiring D&D actions will increase as other operating facilities are shut down, deactivated, and transferred to the D&D program for maintenance and eventual decommissioning. This includes production facilities such as the Plutonium Uranium Extraction Plant, the Plutonium Finishing Plant, and the B Plant. Accelerating the D&D of surplus facilities supports the cleanup work, reduces the backlog of

facilities, and helps to eliminate safety hazards that may result from age and deterioration of facilities.

DEVELOPING THE INITIATIVES

D&D of the surplus production reactors and associated fuels processing plants represent the most significant decommissioning cost, schedule, and technical challenges at the Hanford Site. However, in addition to these large, complex facilities, there are many other support facilities that also need to be decommissioned. All of these have been declared excess, are in deteriorated condition, and represent potential safety hazards to workers. The level of detail for engineering, characterization, safety, procedures, and other project management requirements varies, depending on the size and complexity of the facility to be decommissioned. For example, the engineering for decommissioning a reactor could take five years to complete, whereas engineering required for a filter building that supported the reactor could be completed in six months.

The challenge at the Hanford Site, like that at other large U.S. Department of Energy (DOE) sites, is to balance the long-term requirements for the larger projects with actual demolition work that can be completed now. The Hanford Site met this challenge by developing an initiative sponsored by the DOE and Hanford Site contractors. The initiative is to D&D a minimum of 80 facilities over five years. The majority of these facilities are classified as ancillary facilities that supported the reactors, processing plants, and Hanford Site infrastructure.

Figure 1 shows the projections and actuals associated with accelerating the demolition of surplus facilities.

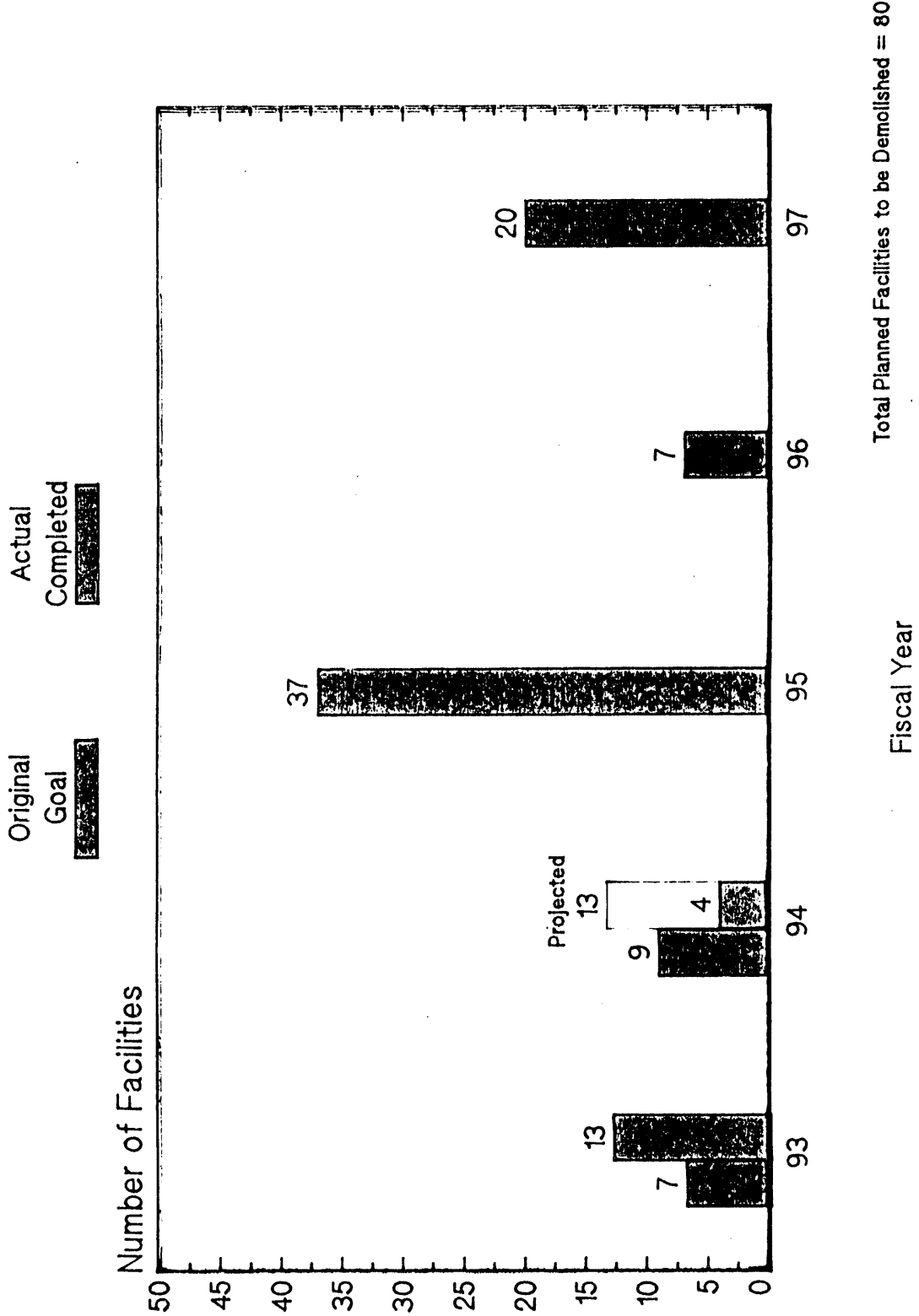
In FY 1993, the first main objective of decommissioning seven facilities was exceeded by six for a total of thirteen. This was attributed to work efficiency, better equipment, and application of "lessons learned" from demolishing similar facilities.

The second main objective of the initiative is to recycle materials generated by the demolition process (e.g., concrete, steel, and wood products). Some special demolition equipment that has been obtained to support this part of the initiative includes a concrete crusher, hydraulic shears/pulverizer, and wood shredder. Currently, this equipment is being used on FY 1994 demolition projects, and is being factored into the planning for new projects in the outyears.

Figures 2 and 3 show the estimated amounts of material that will be generated and the differences in volume when the material is processed using the concrete crusher and wood shredder. Significant savings will be realized by processing the materials with the equipment. A major part of this savings is from size reduction, compaction, transportation, salvage, and reuse versus disposal. The savings will allow for more demolition work to be completed in the outyears, and thus will support the cost-effective cleanup efforts for the entire Hanford Site.

The third objective of the initiative is to work within the existing budget guidance and continue to plan for the major projects (e.g., reactor D&D) while the accelerated demolition work is being completed on the support

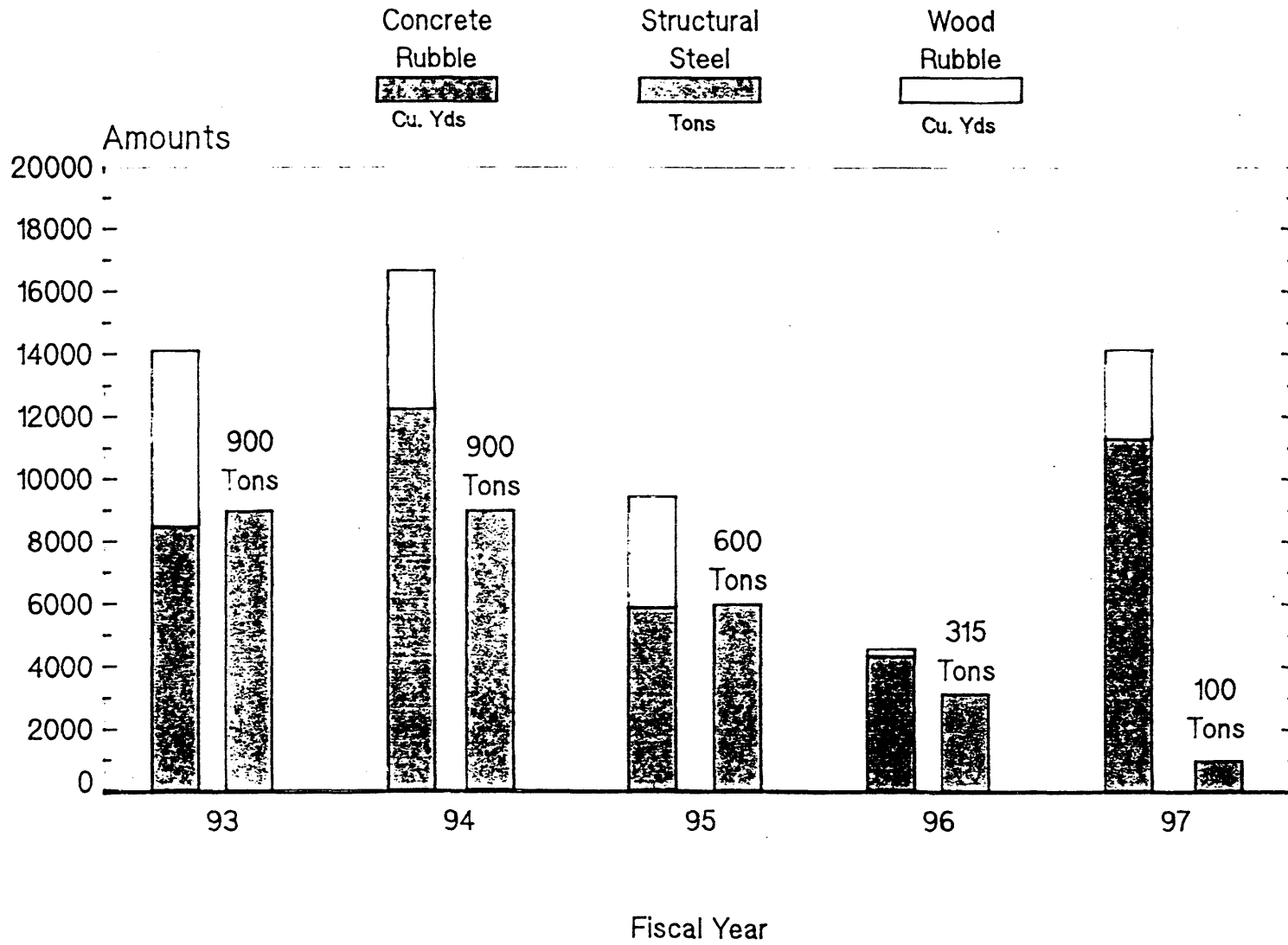
Figure 1
HANFORD ACCELERATED BUILDING DECOMMISSIONING
FIVE YEAR PROJECTION AND ACTUALS



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Figure 2

TOTAL GROSS VOLUME WITHOUT PROCESSING MATERIAL GENERATED BY ACCELERATED DEMOLITION PROJECTS



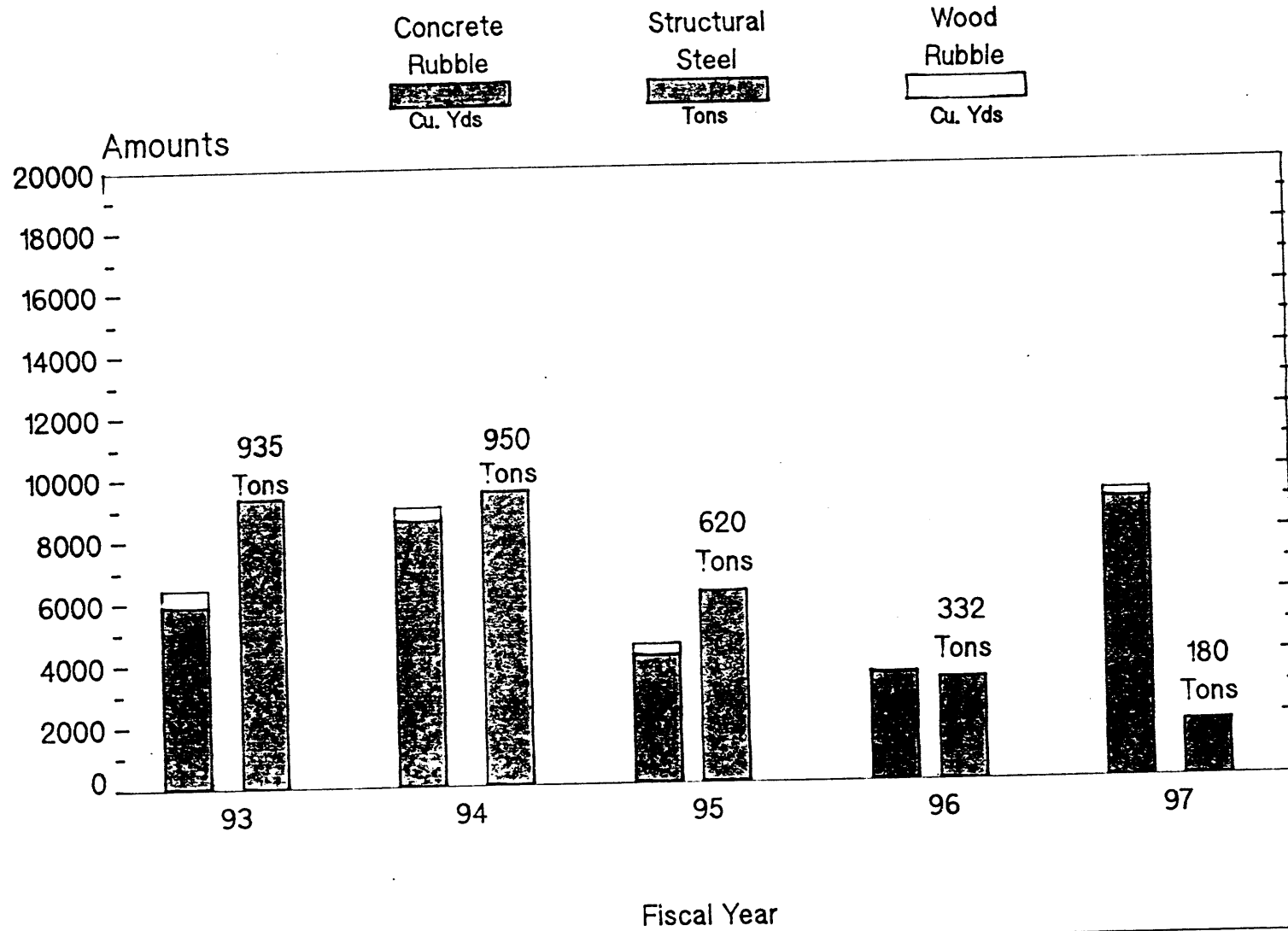
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Figure 3

ESTIMATED VOLUMES AFTER PROCESSING DEMOLITION MATERIALS THROUGH CRUSHER/SHREDDER



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facilities. Both of these criteria are currently being met as part of this initiative. The following sections describe implementation of the initiative and the lessons learned.

IMPLEMENTATION OF THE INITIATIVE

The accelerated D&D initiative has been extremely successful to date, and in FY 1994, demolition projects are on or ahead of schedule. Since conception of this initiative, seventeen facilities have been demolished, nine facilities are currently being demolished, and project planing is underway for the D&D of eight additional facilities. Demolition of these facilities has eliminated industrial safety hazards, generated large quantities of recyclable materials, provided extensive training for workers, reduced surveillance and maintenance requirements, and contributed to real cleanup progress.

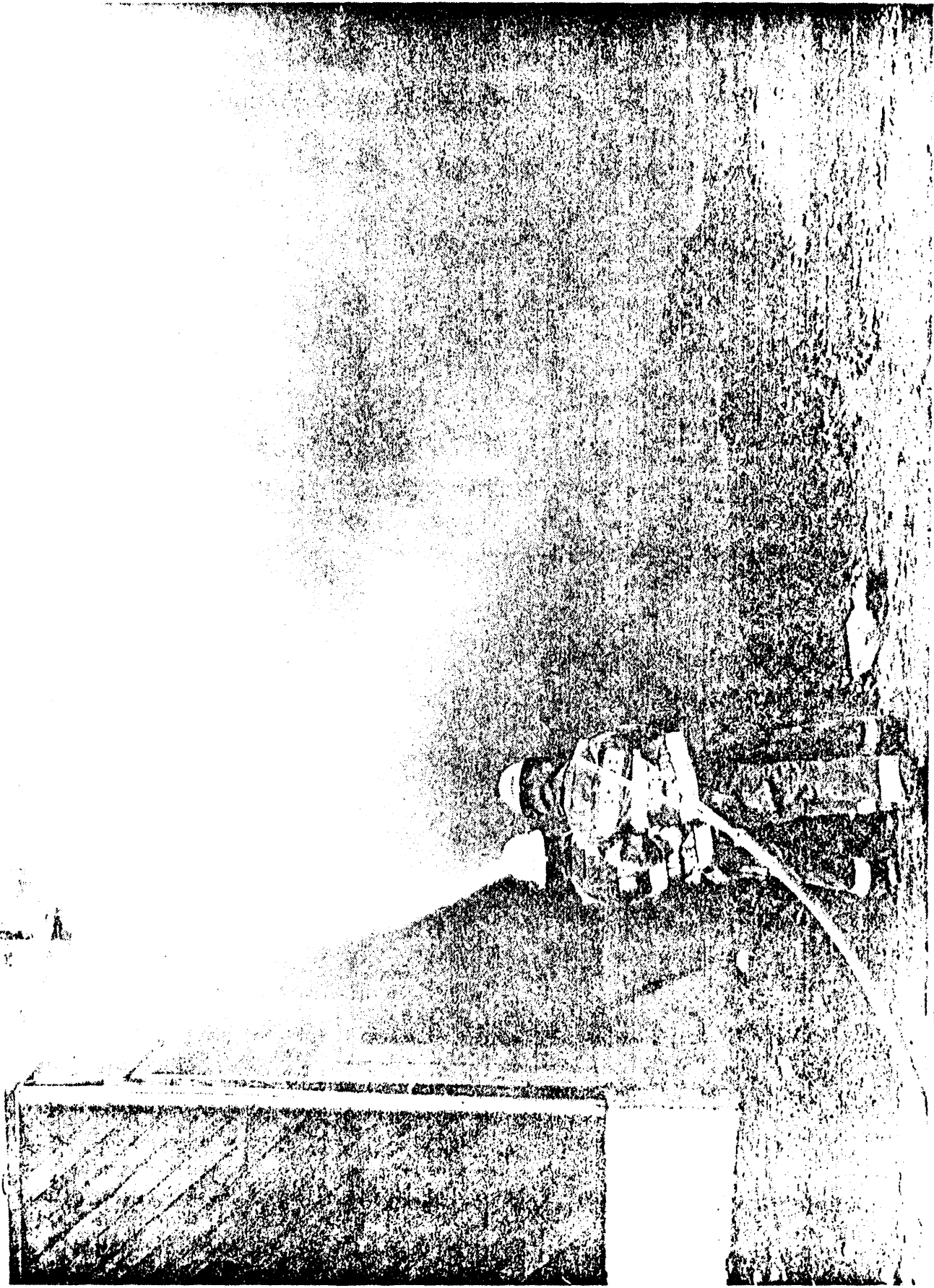
Various methods have been used to carry out the D&D of these facilities. Three of the facilities were demolished via a controlled burn after the hazardous materials and waste (e.g., asbestos) had been removed. This process significantly reduced waste volume and trained approximately 100 fire fighters and paramedics in a live training exercise. Participants included Hanford Site fire fighters and some new recruits from the local communities. Figure 4 is a typical demolition via controlled burn completed in FY 1993.

Demolition of the large 190-B Main Pump House facility was accomplished using a combination of heavy equipment and explosives. This provided some new challenges for the engineering staff on readiness reviews and safety requirements associated with the use of explosives, and also helped an offsite contractor, who had never worked on Hanford Site projects, to become familiar with the Hanford Site cleanup mission. Figure 5 shows the series of explosions in December 1993 that was used to bring down the 190-B infrastructure.

Other nondemolition accomplishments critical to long-term D&D success include completion of the *Final Surplus Production Reactor Decommissioning Environmental Impact Statement* and associated Record Of Decision for the eight surplus production reactors at the Hanford Site. This required *National Environmental Policy Act* documentation has allowed the project manager to proceed with the engineering for implementation of the D&D alternative. This accomplishment is important to ensure clear project definitions are established before detailed design and procurement strategies are initiated. Although it is estimated to be approximately five years before the first reactor is decommissioned, the accelerated decommissioning work on other facilities will continue as the engineering for this major effort is being completed.

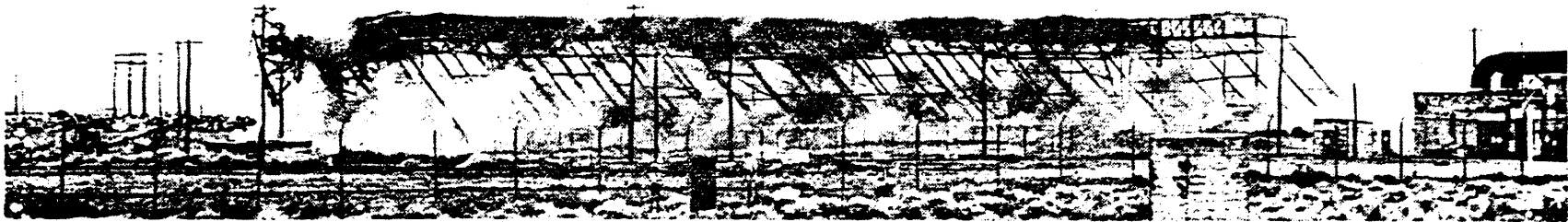
In addition to improvements in the areas of safety, demolition, engineering, and training, there have also been positive changes in work efficiency. Obtaining some state-of-the-art demolition equipment (e.g., track-mounted backhoe with shears and a hydraulic concrete pulverizer with other attachments) has greatly improved the safety and scheduling aspects of this work. The operators have received valuable experience using this equipment on actual demolitions, and are improving work output via increased efficiencies. Demolition work completed 10 years ago using existing equipment (e.g., a wrecking ball and front loader) took three months to complete and was

Figure 4



Typical Demolition of a Surplus Facility via Controlled Burn

Figure 5



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190-B Main Pumphouse Demolition via Explosives

recently completed for an identical facility with a smaller crew in 10 days, using new state-of-the-art demolition equipment. In addition, procurement of the recycling equipment has been completed and operations are underway to process the materials for reuse. The equipment, along with the proper training and utilization, will continue to support improved work efficiencies for future demolition projects. Also, the sharing of procedures, plans, initiatives, lessons learned, engineering, etc., with other DOE sites and private contractors has helped improve the efficiency of work at the Hanford Site and other sites. All of these accomplishments have contributed to some valuable lessons learned for this type of work. These are discussed in the next section.

SUMMARY AND LESSONS LEARNED

The accelerated D&D initiative has been successful and is exceeding the original objectives by safely completing more facility demolitions than were originally planned, reducing/eliminating safety hazards, and providing visible cleanup progress that will continue over the next several years. The recycling of materials is a valuable byproduct of this initiative that will generate considerable cost savings, reduce waste volumes, and save natural resources such as land for burial. While the accelerated D&D program is well underway, the engineering for major decommissioning work on the eight surplus production reactors is also progressing at an increased pace to ensure implementation of the *Final Surplus Production Reactor Decommissioning Environmental Impact Statement Record of Decision*.

This initiative is providing some valuable lessons learned for future D&D at the Hanford Site and other sites. Some of the most significant lessons learned to date include the following.

- An accurate inventory of facilities that are declared surplus and scheduled to be shut down is necessary for planning the best D&D strategies.
- Advanced engineering, characterization, cost estimating, etc., are essential elements for planning the work, scheduling the resources, and ensuring on-time within-budget completions.
- Clear project definitions are required "up front" to determine what work should be completed with onsite resources and what work should be subcontracted.
- The use of multiple contractor and labor support can greatly increase the quantity and quality of work that can be completed. Relying solely upon traditional demolition methods can stagnate the project.
- State-of-the-art demolition equipment can greatly improve the safety aspects of the job and the efficiency of the work force.
- By demolishing first those facilities having less complex project requirements (e.g., support facilities) more time is allowed to complete the more demanding requirements (e.g., engineering, *National Environmental Policy Act*, and other project requirements)

that are involved with facilities such as reactors and fuel processing plants.

- Knowing how the D&D initiative fits into the overall cleanup strategies allows for a wider variety of project alternatives and improves stakeholder involvement.
- Recycling of demolition materials is a MUST for this type of work. Opportunities abound to use and adopt state-of-the-art equipment and new technologies.
- Accelerating physical cleanup/demolition work provides unique and real time opportunity for testing new technologies in the field.
- Accelerated D&D reduces and/or eliminates safety hazards for workers.
- Demolition costs increase exponentially as demolition is delayed due to the quantity and severity of safety hazards which must be mitigated before or during demolition.

These lessons learned are already being shared with other DOE and contractor personnel involved in D&D work throughout the complex. Funding for D&D work is still limited because of the many other demanding priorities. However, a well-focused application of the amount of budget received can provide outstanding success in the area of facility D&D, cleanup, and safety.

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2. "National Environmental Policy Act of 1969," 42 U.S.C. 4321 et seq.

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