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7. Abstract

This document provides an update for FY94 to the B Plant Cleanout and Stabilization Program plan prepared in FY92. Accomplishments made toward the program objectives are discussed as well as planned activities for FY95 and beyond.

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B PLANT CLEANOUT AND STABILIZATION PROGRAM UPDATE FY1994

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B PLANT CLEANOUT AND STABILIZATION PROGRAM UPDATE FY1994

1.0 PURPOSE

The B Plant Cleanout and Stabilization Program Update FY1993 committed to an annual update document. The Cleanout and Stabilization Program (CSP) plan, Reference 1, remains as the best source of detailed discussion of CSP work and continues to be valid. This report is the second update of the original CSP plan. Last year's update, Reference 2, discussed the CSP progress for FY1993 and the goals, objectives, and decision logic for the following year as well as outyears (2 years and beyond). This report will follow the same format to provide an update of FY1994 progress, current status of the program, and plans for the future.

The CSP presented a five year plan that left a number of plant systems operational to support WESF capsule storage. It is now apparent that the transition of B Plant to a long-term surveillance and maintenance mode (LTS&M) will be necessary to complete B Plant deactivation. To accomplish the LTS&M mode for B Plant, WESF will need to be physically isolated to allow stand alone operation for many years beyond the anticipated B Plant deactivation.

The original CSP plan was effectively delayed for 2 years due to budget constraints for FY1994 and FY1995, although some progress has been made in FY1993 and FY1994 to achieve the program objectives. Deactivation work activities are now expected to be initiated in FY1997. This document will describe activities required to meet this target schedule for initiating deactivation of B Plant.

The PUREX (Plutonium-Uranium Reduction Extraction) plant deactivation progress will continue to be monitored for applicability to B Plant. With this in mind, a major B Plant planning activity for the near term will include the preparation of a Project Management Plan (PMP) document. The B Plant program will require the WESF isolation activities (Reference 3) to be integrated into the overall deactivation.

This document will describe work that is needed to meet current goals and objectives and work that has changed, been completed, or redirected. A systems engineering approach to defining this mission was initiated in FY1994 that will also be addressed in this document.

2.0 GOALS AND OBJECTIVES

The goals and objectives of the current program, as described in this document, remain nearly the same as last year's update (Reference 2). A near term, future task will be to develop deactivation end point criteria for B Plant. End point criteria will directly drive future program plans and are discussed in Section 7.2. Current goals and objectives are described below.

2.1 Minimize Radiological Hazards and Risks

B Plant has processed large quantities (> 100 megacuries) of cesium-137 and strontium-90. Residual radioactive contamination from this processing is in many forms and locations in B Plant. The plant design incorporates many features for radiological containment and confinement and systems to prevent the exposure of plant personnel and the public to excessive radiation.

To minimize or reduce the radiological hazard wherever possible this program includes activities in four areas:

- Prevent Migration of Contamination
- Stabilize Major Radioactive Source Terms
- Characterize Radioactive Source Terms
- Reduce Radiation Dose Rates
  [As Low as Reasonably Achievable (ALARA)]

2.2 Prevent Migration of Contamination

Radiological control zones shall be controlled. Controlled is defined as preventing growth in terms of both size and increasing hazard level (ALARA). Source terms (curies) are not normally expected to increase, except by way of migration, from one zone to another. The CSP activities must prevent migration such as contaminated soil, especially from a higher contamination area to a lower contamination area.

Management of radiation control zones or areas should include work to support ALARA, which includes necessary housekeeping, decontamination activities, and proper handling of solid wastes. Minor improvements in radiation zone procedures, instruments, equipment, and radiation monitoring equipment may be included in the CSP.

2.3 Stabilize Major Radioactive Source Terms

Stabilization is in some cases identical to preventing migration. In the case of major radioactive source terms (such as residual process equipment contamination, the contaminated concrete structure, and the retired canyon high-efficiency particulate air (HEPA) filters), the CSP may evaluate and implement methods to fix the inventory in place for long term surveillance.

Inaccessible portions of the plant are expected to contain a source term similar to the contaminated process equipment. The concrete structure of B Plant is estimated to contain from 10^5 to 10^6 curies of contamination on the surface and embedded or bonded to the concrete. The characterization effort will determine whether any actions are required to assure the stability of the embedded contamination.

In less accessible places, such as the wind tunnel, the stabilization effort will be limited because the contamination is both non-accessible and isolated from the environment by the canyon filter system. Process cell floors as well as the cell drain system are suspected of containing some loose material. To pursue the objective of stabilization, these areas will be flushed with water and the rinsate sampled to determine the effectiveness of water flushing to remove radioactive material.

2.4 Characterize Radioactive Source Terms

Twenty-five of the 40 cells are configured with Hanford style nuclear process equipment including; tanks, solvent extraction and ion exchange columns, centrifuges, piping, and pumps. All of this equipment can be removed remotely.

This process equipment is estimated to contain from 10^5 to 10^6 curies of contamination, but is not well characterized with respect to isotopic composition. Characterization is required for CSP if the equipment is left in place for eventual turnover to decontamination and decommissioning (D and D) or for burial.

Physical removal and possible burial of some process cell equipment is necessary to gain access to other equipment and to the cell walls and floors in order to characterize and quantify the cell contamination.

An objective of the program will also be to characterize the retired HEPA filter inventory. The A, B, and C filters are retired. The D filter has been active for 15 years. The estimated total ^{137}Cs inventory for these 4 filters is approximately 100,000 curies. There is a major uncertainty concerning the ^{90}Sr to ^{137}Cs ratio, and therefore the ^{90}Sr inventory is uncertain. Internal remote inspection and radiation measurements are needed, along with a radiological computer model to characterize the HEPA filter inventory.

2.5 Reduce Radiation Dose Rates (ALARA)

The mission will focus on achieving a balance of characterizing, stabilizing, and immobilizing contamination. A net effect to onsite personnel will be to reduce radiation dose rates. The final configuration or plant condition for long term surveillance after CSP should reflect the principles of ALARA.

2.6 Reduce Costs

Because of contamination, the facility is expensive to operate and maintain compared to similar, but less contaminated, canyon facilities. A program goal is to reduce costs for routine tasks as rapidly as possible while assuring safety and radiological control.

Deactivation or shutdown of unnecessary systems will reduce the need for manpower to perform routine tasks and, instead will assist with the plant cleanup. In some cases, tangible cost savings should be realized while the new work scope of the mission is evolving.

2.7 Equipment Inventory and Characterization

Deactivated or unused equipment, process or non-process, may be defined as waste at some future date. An inventory of stored equipment will be required, in addition to configuration documentation, for turnover to D and D.

2.8 Reduction of Hazard Classification

With the current methodology of hazard class determination, it is considered impossible to achieve a lower rating for B Plant without full scale D and D work which is not considered part of the CSP. Therefore, reduction of the Hazard Classification to low is no longer a valid objective for the CSP. Achievement of a low hazard classification is not considered an end point criteria, (see section 7.0).

2.9 Radioactive Organic Inventory

Although not a major radiological source term, an objective of CSP is to consolidate, characterize, and eventually dispose of the liquid organic solvent stored in B Plant.

The base plan for disposition of the organic includes consolidation to two tanks using existing equipment. The consolidation plan will then permit full characterization and development of disposal alternatives.

3.0 TASKS

Although the CSP is not funded for FY1994 and FY1995, the tasks listed below also support the current B Plant mission which shares many of the objectives listed above.

3.1 Completed Tasks

3.1.1 Decontamination of Canyon Deck

Contamination levels in the canyon complicate the mission to clean up the plant. At the start of cleanup activities in 1992, a significant quantity of obsolete equipment, parts, tools, laundry, and general debris had accumulated on the canyon deck. All the debris accumulated in the canyon was considered either radioactive waste, hazardous waste, or mixed waste and is being removed.

The progress made in 1992 and 1993 included washing of the canyon deck and removal of 600 cubic feet of solid waste for burial. Smearable surface contamination has been reduced by a factor of ten in some areas. To reduce background dose rates, some major contaminated equipment items have been placed in the shielded process cells for interim storage.

In FY1994 the crane upgrades were completed and significant quantities of laundry and crane parts were removed from the canyon.

3.1.2 Removal of Radioactive Liquid Inventory

Radioactive liquid inventories stored in B Plant at the start of CSP included: cesium solutions in two tanks, strontium in one tank, mixed strontium and transuranic containing solids with cesium solution in six tanks, and liquid organic solvent contaminated with strontium in six tanks. The mixed material consisting of strontium/cesium/transuranics was called NCAW.

The strontium liquid inventory (1 tank) was transferred from B Plant in 1987. This eliminated 5000 curies of strontium-90 from B Plant.

For final disposition, the cesium solutions and NCAW were considered one waste stream. Nine process tanks stored about 10,000 gallons. The waste from these 9 tanks contained about 150 kCi (kilocuries) cesium-137 and smaller quantities of other isotopes including strontium-90. This material was transferred to Tank Farms in 1993.

The only remaining liquid "inventory" stored in B Plant is organic solvents. These solvents were used until 1979 for the solvent extraction strontium recovery process during the last process mission and are currently stored in 5 cells. The organic liquid is contaminated with strontium-90 (about 500 Ci) and is flammable, which requires operation of fire protection systems for continued storage. At the end of FY1994, the consolidation of organic solvent to two tanks is being completed. This will permit full characterization and development of disposal alternatives.

It should be recognized that new radioactive liquid "inventory" could be created if flushing of process equipment or cells is performed and subsequent sample analyses show significant curie quantities of strontium or cesium.

3.1.3 Systematic Deactivation of Equipment

The liquid inventory removal will help the systematic deactivation of unneeded systems, equipment, instruments, and tanks. Deactivation is needed to simplify maintenance and surveillance of the facility, as well as reduce the potential for contamination spread. A potential benefit of deactivation is to reduce the need for manpower to perform routine tasks and will free manpower to assist with the plant cleanup.

3.1.4. Remove/Stabilize HEPA Filter Inventory

The 291-B HEPA filters were constructed in such a way to permit modular expansions. Three filter modules are retired and a fourth module is active. As part of the new mission, the retired HEPA filter inventory must be removed/stabilized to eliminate credible mechanisms to disperse the inventory to the environment. In 1973 radiation readings were taken from the retired filters. The exposure measurements were extrapolated to the present time and indicates that one of the filter modules exceeds $1x10^9$ Rads total dose. At this level of exposure, a loss of mechanical properties of the HEPA filters can be expected. This means a potential for an unstable condition.

In FY1993, the concern about the high total exposure to radiation and the potential risk of storing the high curie inventory prompted declaration of an Unreviewed Safety Question (USQ). A safety analysis study was performed to resolve the USQ, by defining the potential accidents related to radiation damaged HEPA filters. This study did not identify any accident which could exceed the safety envelope of B Plant. Since the accidents postulated in the safety analysis are within the safety envelope, the USQ has been declared resolved.

However, even though the accidents postulated fell within the safety envelope of B Plant, an engineering study (Reference 4) was completed to evaluate stabilization of HEPA Filters in the retired modules. The "B Plant Retired HEPA Filters Study" evaluated 12 alternatives that ranged from interim solutions to full remediation of the exhaust system. The recommended alternative consists of installing a new Air Cleanup Train (ACT) in parallel with the existing sand filter and isolating the existing HEPA filter chambers from the exhaust stream. This option allows for full stabilization of the retired/isolated filter systems at a later date. At the close of FY1994, a Facility Design Criteria is being completed for the "B Plant Retired HEPA Filter Study".

In FY1994 a remote inspection plan was developed for the retired 'A' Filter. The inspection will include radiation readings to be used in a radiological model that was developed to estimate inventories more accurately. The inspection will take place in early FY1995.

3.1.5. Characterize Contaminated Process Equipment and Cells

Twenty-five of the 40 cells are configured with Hanford style nuclear process equipment; tanks, solvent extraction and ion exchange columns, centrifuges, piping, and pumps. Physical removal and burial of some process cell equipment is necessary to gain access to other equipment and to the cell walls and floors to characterize and quantify the cell contamination.

Upgrades to the canyon crane were initiated in FY1992-1993 and completed in FY1994. These include a new video system to permit improved remote in-cell inspection and documentation. The video records are also expected to aid in providing useful cell as-builts.

3.1.6. Cold Side Cleanup

Cold side facilities at B Plant are defined as any area outside of the 221-B canyon. The cold side areas vary with regard to level of radiological contamination, general condition, and future use. The 221-B galleries are the key cold side areas needing attention. Active operating equipment is located with inactive equipment. Permanent isolation of the cold side from the radioactive contamination of the canyon has not been achieved.

Typical abandoned equipment to be removed from the pipe and operating galleries includes; piping and valving, insulation, conduit and wiring, instrumentation and controls, pumps, tankage, centrifuge controls, and panel boards.

A major refurbishment of the pipe gallery was completed in FY1993. General decontamination was performed along with removal of 10,000 feet of piping and associated valves and fittings from inactive systems. Only one radiation zone remains of the approximately seven that existed when the cleanup was started. The walls and ceiling were painted and the floor was repaired and resurfaced.

The pipe gallery cleanup will contribute to good ALARA practices, reduce surveillance costs in the future, and reduce maintenance costs.

In FY1994, nine vertical tanks in the 211B chemical tank farm were emptied of residual liquids, cleaned, and physically removed for reuse on the Hanford site. All remaining piping associated with these nine vertical tanks was also removed.

The cleanout of the 271B 3rd Floor AMU area was completed in FY1994 as well as tank removal in the 276B Building. The AMU cleanout included 20 tanks, inspection of the floor for integrity, and removal of chemical piping. The 276B work is about 50% complete with 2 tanks and associated chemical piping removed.

3.2 Planned Tasks for FY1995

In early FY1995, consolidation of the organic to two tanks will be complete. The consolidation plan will then permit full characterization and development of final disposal alternatives. Organic disposal alternatives considered thus far include incineration, consolidation outside of B Plant with organic from other facilities, and separation processes to remove the strontium.

Process cell and equipment deactivation will continue until a minimum of systems necessary remain to support Waste Encapsulation and Storage Facility (WESF) or as the WESF isolation project is implemented (See section 5.0). These shutdown activities can increase dramatically as the need for support systems such as process and instrument air, steam, electric power, and heating, ventilation, and air conditioning (HVAC) decreases to the point where consolidation, shutdowns, or isolation of the systems is possible.

The development of a deactivation Project Management Plan (PMP) and/or deactivation end point criteria will be initiated in FY1995 if funding is available.

To support ongoing canyon deck cleanup activiites, a remote handled burial will be performed in FY1995.

3.3 Summary of Tasks

Table 1 summarizes the multi-year tasks discussed above in this section.

COMPLETED CSP TASKS THROUGH FY1994	PLANNED TASKS BUDGET YEAR FY1995	OUT YEARS FY1996 & BEYOND
RAD LIQUID INVENTORY REMOVAL NCAW/Cs transferred Organic Sampled Initiated Organic Consolidation	Full Organic Characterization	Organic Disposition Initiated
CANYON CLEANUP LL solid waste removed Smearable reduced Deck washed Equipment consolidated	Continue LL solid waste removal Continue washing Continue equipment consolidation	Zone reduction/reclassification Complete isolation & blanking Clear canyon deck
SYSTEM SHUTDOWNS Process cell deactivation OSR Air Dilution	Continue deactivation, initiate B Plant systems isolation Shutdown Vessel Vent System	Complete isolation & blanking Shutdown additional systems
SYSTEM STARTUPS None	Test/modify jumper cutter	Cell and Equipment Decon Solid Waste Volume Reduction
COLD SIDE FACILITY CLEANUP Pipe gallery 211B general Aqueous Make-up 211B vertical tanks	217B Cleanup Complete 276B cleanup 211B horizontal tanks	Operating Gallery 212B
OUTSIDE CLEANUP	Initiate soil cleanup	
PROCESS CELL CHARACTERIZATION	Initiate in-cell video Initiate rad characterization	Implement document for turnover

COMPLETED CSP TASKS THROUGH FY1994	PLANNED TASKS BUDGET YEAR FY1995	OUT YEARS FY1996 & BEYOND
SOLID WASTE DISPOSAL 4 X 4 X 8s K-3 Filters	Initiate remote handled burials	Continue drag-off burials Design and procure new burial boxes
CANYON VENTILATION/HEPA FILTERS Retired filter safety analysis (USQ) E filter startup initiated Retired filter engineering study (W-059) and FDC	Continue Retired Filter Isolation project (W-059)	Install W-059 Retired Filter Isolation Project
COMPLIANCE TPA change request for Modified Part B Permit (submittal date TBD)		Negotiate Transition milestones under TPA Section 3.1 requirements.
SAFETY ANALYSIS REPORT Hazard Analysis Completed Facility Description comp. Draft B Plant ISB document complete including Safety Equipment List, Technical Safety Requirements, and Accident Analysis.	Issue B Plant ISB document Prepare Safety Equipment List Revise OSRs	Add addendums for specific activities as necessary
TANK INTEGRITY ASSESSMENT Completed assessment plan Initiated assessment inspections	Complete inspections Prepare Tank Integrity Assessment Report	Submit Tank Integrity Report and Negotiate Compliance Strategy

4.0 CSP DECISION POINTS AND LOGIC

Major decisions are required to determine the scope of characterization, disposal of equipment by burial, decontamination activities, and isolation or remediation of significant source terms. Support of WESF with its capsule inventory must be continued until an alternative storage facility is available.

Progress has been made on the new B Plant mission. All radioactive liquid inventories except organic have been removed from the canyon. The canyon deck has been cleaned with smearable contamination substantially reduced and a systematic deactivation of unneeded equipment has been initiated. However, additional work is required:

- The best alternative for disposition of the organic needs to be selected and a program initiated.
- The plant has not reached a decision on dismantling process cells and burials.
- Final disposition of the retired HEPA filter inventory needs to be determined.
- Upgrades needed for the canyon crane (if any) will depend on the extent of cell work required, the time period the crane needs to remain fully operational, and the condition the crane should be left in or maintained after this mission.
- The end point criteria, "how clean is clean" question, needs to be determined to fully define the new mission. This question will also require definition of the characterization needed.

These five decision areas will help focus FY1995 planned activities to implement the CSP.

5.0 PROJECTS

5.1 Completed Projects FY1994

W-163 "Cell Drainage Instrumentation Upgrade

Scope: Provide monitoring of instrumentation and alarms on the FPMCS for Cells 9 and 10 (LLW collection and transfers).

Status: Installation is in final stages; expect completion first quarter FY1995.

Canyon Crane Upgrades

Scope: Expense funded project replacing mechanical components as recommended by the manufacturer as well as installing a video system to supplement optics.

Status: Completed FY1994.

Demineralized Water Supply

Scope: Install IonPure demineralizing unit to meet needs of B Plant/WESF in place of ion exchange columns located in 217B.

Status: Completed FY1994.

5.2 Projects in Progress

W-007 "B Plant Process Condensate Treatment Facility"

Scope: Current scope includes the modifications to B Plant/WESF necessary to implement the best available technology and all known available and reasonable methods of prevention, control, and treatment at B Plant for the three Phase I liquid effluent waste streams: process condensate, steam condensate and the chemical sewer. Installation of additional monitoring and sampling is necessary to ensure that an acceptable liquid effluent waste stream is discharged to the Treated Effluent Disposal Facility.

Status: This project is currently in construction.

The decision to not operate the Cell 23 Concentrator will eliminate the future generation of the process condensate and the steam condensate waste streams. The modifications (BAT/AKART) associated with these streams will not be entirely completed (only partial BAT implementation) and have been removed from the scope of work. The remaining BAT/AKART scope associated with the chemical sewer will include rerouting of piping, installation of second batch tank (TK-900B) with auxiliary equipment and controls, and installation of additional instrumentation and monitoring capabilities, (i.e. pH monitoring, beta/gamma monitoring and control) flow proportional sampling. Installation of backflow dampers on canyon supply fans to provide source controls have been completed, but are not part of BAT/AKART.

W-028 "Aging Waste Transfer Lines"

Scope: Project descoped to add only a single double-encased discharge line which will tie B Plant to a new diversion box. The project provides two diversion boxes and a two new buried pipelines.

Status: Design nearly complete.

W-239 "E Filter Activation Testing

Scope: The scope of this expense funded project is to put E filter into service replacing D Filter as the primary canyon exhaust filter.

Status: Project work completed in FY1994. E Filter to be placed into service in FY1995.

W-252 "Closed Loop Cooling"

Scope: Implement best available technology for Phase II liquid effluent waste streams as required by a Tri-Party Agreement (TPA) milestone. W-252 is providing an alternative cooling system to replace the existing once through method and a route to connect the waste stream from the new system to a state permitted disposal site.

Status: Project currently in the design phase. WESF pool cell cooling is currently the only system to be supplied by this system.

W-059 "B Plant Retired HEPA Filters"

Scope: Provide a new HePA filtration system to support the B Plant canyon through D&D, isolate the existing retired filters from the ventilation system, and mitigate the potential for release of contamination.

Status: The engineering study and Facility Design Criteria were completed at the end of FY1994.

W-463 "F Filter Testing"

Scope: Test the last constructed canyon exhaust filter construction to determine if American National Standards Institute (ANSI) requirements for HEPA filtration can be met.

Status: W-463 was cancelled in FY1994. W-059 will construct a new filter system.

5.3 Future Projects

Organic Destruction - Engineering studies may show that disposal of organic inventories requires the installation of new systems to provide treatment and/or destruction.

221-B "Water Intrusion Control"

Water intrusion into 221B from heavy rainfalls and snowmelt has become a major problem in recent years. Installation of a storm sewer system to provide ground level drainage is being investigated as well as roofing repairs and rain gutter installations. Integrity of the structure must be achieved as a prerequisite for LTS&M.

B Plant/WESF Isolation Project

An engineering study (Reference 3) was completed evaluating the feasibility of isolating WESF from B Plant. A project is proposed that modifies four of the support systems/services now provided by B Plant to WESF. (See Section 7.1 below).

6.0 SCHEDULE AND RESOURCES

A detailed plan will be developed in FY1995 to include schedule and costs of CSP/deactivation activities.

7.0 B PLANT DEACTIVATION MISSION

Transitioning B Plant to the LTS&M state readies the facility for eventual D&D. To achieve this state, the configuration of the combined B Plant/WESF facilities must be revised to decouple B Plant from WESF and D&D Readiness end point criteria must be met. A study was completed in FY1994, Reference 3, to determine the feasibility of isolating WESF from B Plant. This study and the recommended B Plant - WESF Isolation project is discussed in Section 7.1.

Deactivation end point criteria are discussed in Section 7.2.

7.1 B Plant/WESF Isolation

A study was requested by DOE-RL to determine the feasibility of isolating WESF from B Plant. This Engineering Study, initially called the "Decoupling Study," was to consider replacement or elimination of the WESF support services currently provided by B Plant.

WESF Mission Analysis

The definition of the baseline mission for WESF is critical to the overall strategy and recommendations. The decision to isolate WESF is dependent upon future plans, yet to be determined, for capsule storage at WESF. The key WESF program assumptions are listed below:

- The maintenance of existing pool cell operating systems will continue for at least 15 years. The final inventory will include capsules returned as part of the Capsule Return Program.
- The TWRS program will continue to have responsibility for the ultimate disposition of the strontium and cesium capsule inventory along with the single and double shell tank waste.
- Maintenance of the WESF hot cells will continue to generate solid and liquid waste.

Significant Issues

Several issues have been identified that may affect the decision to isolate WESF from B Plant or the selection of the best alternative for each system.

- The surveillance of B Plant after deactivation has been assumed to be independent of WESF surveillance and performed by a different organization/contractor. Therefore, the WESF operations and surveillance organization will not participate in the surveillance of the deactivated B plant, physically enter the facility, or operate and maintain the B Plant canyon ventilation.

- It is unknown whether the current level of maintenance will continue for the WESF hot cells. Several scenarios are possible:

  - Clean up the hot cells before B Plant deactivation and isolation to use available space in Cell 4 and reduce future waste volumes.

  - Reduce the maintenance of hot cells; abandon equipment in place.

  - Modify or upgrade the hot cells for future mission availability. A better definition of the WESF mission may take place following the release of the Isolation Study which may alter the conclusions.

- B Plant deactivation end point criteria have yet to be established/negotiated and the potential exists for the results to change the conclusions of the Isolation Study.

- The permitting strategy of B Plant deactivation and WESF liquid waste handling needs to be established.

- Completion of Project W-252, Closed Loop Cooling System (CLCS) and Project W-028, pipeline to Tank Farms are required for the conclusions of the Isolation Study.

WESF Support Systems Summary

Individual evaluations of the five WESF support systems were completed by a team of B Plant engineers. Alternatives were selected by the study team and a contractor (ICF KH) provided engineering support in the form of system descriptions, sketches, and preliminary cost estimates.

The Isolation Study recommended that the five systems be modified/replaced to allow independent, stand alone operation of WESF. The preferred configuration of each new system is described below, based on the evaluations performed in support of this study.

Cooling Water - Project W-252 has been initiated to provide closed-loop cooling that will eliminate WESF's reliance on B Plant to supply water and receive the cooling water effluent. The implementation of the CLCS project (W-252) should be completed before the separation of B Plant and WESF.

Deionized Water - The recommended alternative for an independent deionized water system is the "Culligan multi-tank system." The system consists of two sets of one cation tank, one anion, tank, and one mixed-bed resin tank. The proposed location is on the second floor of the 225B AMU building following equipment removal and decontamination of storage areas.

Low Level Liquid Waste (LLLW) - Of the five options evaluated, the recommended system is: pipeline inter-tie to Project W-028, using the existing tanks in 221BF for waste collection. This alternative requires that the Project W-028 pipeline to Tank Farms be completed. WESF's LLLW will be piped from the lines feeding TK-100 into new tanks installed inside one of the existing large tanks at 221BF. From 221BF, the LLLW will be pumped to the pipeline in Project W-028. The pipeline for the transfer will be a double encased (pipe-in-pipe) transfer line. The selection of this option assumes that current codes can be met by the modified 221BF facility, including seismic requirements.

Liquid Effluents - The recommended system is continued operation of the 211BA facility after WESF isolation from B Plant. The controls of 211BA will be relocated and monitoring may be performed from a control room in WESF. Additional work scope includes an Engineering Work Station and alternative electric power for 211BA.

Solid Waste - The recommended alternative system for remote handled radioactive waste generated in WESF hot cells includes the following features:

- Use of approved containers loaded in A Cell. A major clean up of A Cell will precede the installation of the new system.
- Contamination prevention by bagging the container to control surface contamination. Separate drum inner and outer liners will become part of the waste. The system will innclude a hood and a bag sealer and cutter.
- 222-S laboratory analysis will characterize the ^{90}Sr and ^{137}Cs ratio of each waste item. A high purity Germanium (HPGe) gamma drum counter system will complete the characterization of each container in a drum counter located in the WESF canyon.

- The characterized, externally clean, waste container is moved to an approved shielded cask container. The shielded container is transported directly to the burial ground by current solid waste disposal procedures.

Cost Analysis/Summary

Because WESF will continue to store capsules indefinitely, the isolation of WESF from B Plant is necessary to complete the deactivation of the B Plant facility. The B Plant deactivation is urgent, because of the high annual costs to maintain and operate B Plant.

Based on the CSP, it will first be assumed the B Plant budget can be reduced to $8,300,000 at the end of deactivation with the plant providing minimum services to WESF. If the Isolation Project is completed in FY2002, to coincide with completion of deactivation, the B Plant O&M costs will then be reduced from $8,300,000 to $1,000,000 for an annual savings of $7,300,000.

The proposed Isolation Project is justified at this project cost. The project should be completed on a schedule to coincide with the end of deactivation (projected to be FY2002) with project costs delayed where possible to maximize the economic benefits. Failure to complete the Isolation with the deactivation will delay the potential annual cost savings of $7,300,000.

7.2 Deactivation End Point Criteria

End point criteria are required to establish the end of B Plant deactivation. Deactivation will be a program to transition from the current plant status to a turnover to D&D. D&D will begin with a lengthy period of LTS&M before actual D&D activities take place.

The end point criteria must be defined in B Plant specific terms as an extension of the CSP plan, or as a component of a future PMP. The end point criteria must define a safe, low mortgage, long-term maintenance state. The end point criteria also provides a management test for validating proposed activities.

The following elements need to be considered in the development of the Criteria:

1. Eliminate or stabilize environmental and safety risk as defined by regulations, codes and standards, and industry practice.

2. Leave equipment, systems, and materials in place until an end state has been defined or is available.

3. Complete activities dependent on facility-specific process, operating, and facilities engineering experience.

4. Complete activities dependent on existing, functional facility specific equipment which will be inoperable following a decade deactivation period.

5. Configure the facility for and limit access to quarterly assessment entry.

6. Establish and archive records and drawings for:

   - Reactivating D&D essential systems
   - D&D meaningful characterization

7. Leave the facility in an orderly condition.

PUREX Deactivation End Point Criteria

For comparison the PUREX deactivation project has adopted a specific strategy for developing end point criteria. One element of this strategy is to build a base for other transition facilities. B Plant will monitor the results of this strategy and revise/develop B Plant plans accordingly.

The PUREX strategy starts with a goal statement, guiding principles, and objectives.

Goal

The goal of deactivation is to achieve a safe, stable and environmentally sound condition, suitable for an extended period, as quickly and economically as possible.

Guiding Principles

- End States must be driven by objectives
- We do not know when or how D&D will be done
- Cost effectiveness is important
- We need involvement and agreement of key participants
- End States must be practical.

Objectives

- Protect public and environment
- Facilitate surveillance and maintenance
- Facilitate ultimate decontamination and decommissioning
- Comply with rules, regulations, and requirements
- Meet commitments to stakeholders.

The tasks required to implement the PUREX strategy fall into the following categories:

- Elimination/Reduction of hazards
- Deal with radiation fields
- Reduce contamination and prevent spread
- Waste disposal
- Isolate and contain
- Provide monitoring and control capability
- Additional facility modification or refurbishment
- Documentation and labeling.

The process will start with a preliminary, but comprehensive, characterization of the entire plant.

The process will then classify end point criteria in terms of physical spaces (rather than plant systems) and systems within the spaces. The alternative approach, using plant systems, proved to be too awkward due to the complexity of a canyon type process building. Future D&D personnel are expected to more efficiently deal with spaces, room,s etc. because radiological containment will be a primary factor for D&D.

The end result of the PUREX end point criteria strategy is a functional matrix of tasks/activities and end state objectives that will justify the required activities. This matrix will be developed for each plant space.

7.3 System Engineering

A system engineering approach has been adapted by WHC and DOE-RL to define the content and organization of the Hanford site cleanup effort. The deactivation of transition facilities is a function within the Hanford mission. The deactivation of B Plant was the focus of a system engineering team organized in the fourth quarter of FY1994. Products of this effort will be published in early FY1995.

Excerpts from the B Plant mission analysis report draft are included below to illustrate how the deactivation mission is changing.

Purpose

The B Plant mission analysis will be the basis for a functional analysis which breaks down the B Plant mission statement into the necessary activities to accomplish the mission. These activities are the product of the functional analysis and will then be used in subsequent steps of the systems engineering process, such as identifying requirements and allocating those requirements to B Plant functions. The information in the mission analysis and the functional and requirements analysis are a part of the B Plant technical baseline.

Mission Statement

The B Plant mission is to safely and cost effectively transition the facility to a "shut-down" status (ie. a safe, minimal surveillance configuration awaiting D&D) within five years of project authorization. Currently available technologies will be applied in innovative ways to support the B plant mission. Freed-up intellectual and physical resources will be applied to other Hanford Site mission objectives. Figure 1 is the B Plant Mission Context Diagram and pictorially defines the Deactivate B Plant Mission.

Mission Objectives

The objectives for the Deactivate B Plant Mission are the following:

- to successfully transfer the deactivated B Plant facility to the D&D contractor.
- to provide a sufficient surveillance and maintenance program for B Plant which minimizes total operating costs following the deactivation.
- to provide replacement operating systems and services for WESF that eliminate WESF dependence on B Plant.

Mission Risks

The B Plant mission, as defined, is feasible. Both possible and probable alternative solutions, which can accomplish the B Plant mission, are expected to exist. To the extent the mission is defined here, the technology exists and the operational resources are available to accomplish the mission. As the Functional Requirements Analysis is performed and the mission is further defined, mission feasibility will be explored in more depth. Following the requirements identification and their allocation to system functions; detailed structural, physical, and organizational configurations of alternative solutions will be fully developed, evaluated for feasibility, and the preferred alternative selected. The mission risks have been identified as:

- Public and Worker Health and Safety
  Public concern will remain high until distrust of DOE Hanford Operations is substantially reduced or eliminated. Characterization and mitigation of all ESH issues may eventually result in more public trust of DOE Hanford.
- Programmatic
  Inadequate funding could jeopardize the timely completion of B Plant deactivation activities.

Lack of clear, detailed guidance on acceptable end states for Hanford Site facilities presents a significant risk to the development of a sound technical baseline.

Issues

- B Plant needs to be provided the time duration between deactivation completion and start of D&D. If the rate of deterioration is high and/or the duration to D&D is long, upgrades to maintain the ESH envelop are more complicated and expensive.

- B Plant cannot complete deactivation until the critical WESF support systems are replaced and the systems in the two facilities are physically isolated from each other.

- Minimal decontamination is currently planned for the highly radioactive structure, process equipment, and existing canyon filter system. Therefore, a ventilation system will remain operating to ensure containment. B Plant will be deactivated, but the ventilation system will be active. If the duration between deactivation and D&D is long, some decontamination of the highly radioactive structure may be desirable.

- The acceptance criterion for transfer of B Plant to the D&D contractor have not been completely defined. The determination of responsibilities, the end point criteria and the activities to be performed, and the interfaces are not clear.

8.0 REFERENCES

1. WHC-SD-WM-AP-023, B Plant Cleanout and Stabilization Program Plan, Revision 0, W. W. Bowen, Westinghouse Hanford Operations, Richland, Washington, dated August 31, 1992.

2. WHC-SD-WM-PRS-011, B Plant Cleanout and Stabilization Program Update, FY1993, D. K. Smith, Westinghouse Hanford Operations, Richland, Washington, dated October 1993.

3. WHC-SD-WM-ES-313, B Plant-WESF Isolation Study, J. W. Gehrke, Westinghouse Hanford Operations, Richland, Washington, September 1994.

4. External Engineering Report, "B Plant Retired HEPA Filter Engineering Study (W-059)," BNFL Inc., March 16, 1994.