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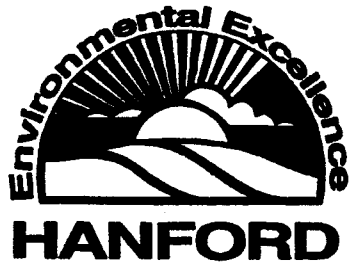
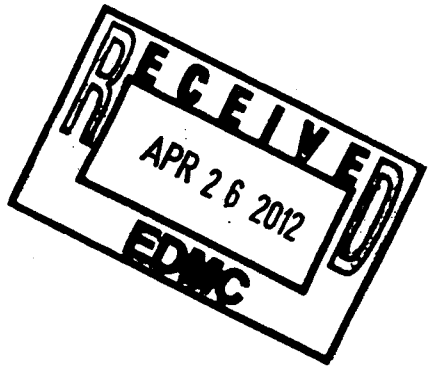
Rev. 01

105-B Reactor Facility Museum Phase I Feasibility Study Report





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

Bechtel Hanford, Inc.
Richland, Washington

Approved for Public Release

B Reactor

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PHASE I FEASIBILITY STUDY REPORT

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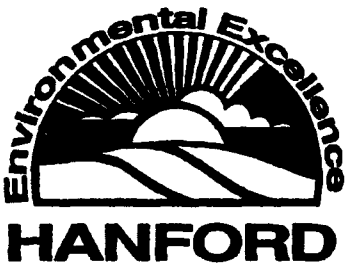

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EXECUTIVE SUMMARY

This report contains the results of the 105-B Reactor (B Reactor) Phase I Feasibility Study. The purpose of this feasibility study is to evaluate options for the dismantlement or reutilization of the B Reactor and determine the feasibility of each of these options.

The B Reactor complex was constructed in 1943 to provide nuclear materials for the war effort. The engineering and construction achievements of B Reactor are recognized as monumental as it was the world's first full-scale nuclear reactor. The operation of this reactor generated the plutonium used in the first atomic weapons test and in the bombing of Nagasaki, Japan. It is widely believed that this bombing was directly responsible for the end of World War II without a full-scale invasion of Japan. The technological and political impacts of the advent of nuclear reactors is immense and are still developing over 50 years later.

In 1985, an environmental impact statement was prepared (DOE 1989 and DOE 1992), and in 1993, a record of decision (ROD) (DOE 1993) was published for the dismantlement of Hanford's surplus reactors, including the B Reactor. Progress towards this dismantlement, including the decontamination of the reactors, has continued over time to accomplish the requirements of this ROD. Since the ROD was issued, B Reactor has been placed on the National Historic Register, and there is strong and growing support throughout the nuclear community to preserve the reactor as a museum. Preliminary steps have begun towards preservation through the installation of visitor displays and conducting controlled tours throughout portions of the reactor working areas. Some areas of the facility contain residual radioactive contamination and are not available for tours to the general public.

This study was conducted to define the activities necessary to continue using the B Reactor as a museum; evaluate the technical feasibility of those activities; examine the cost effectiveness of these actions versus dismantlement; and evaluate options which would improve the B Reactor as a museum attraction. To accomplish these goals, an extensive assessment of the physical site conditions was performed. In addition, an examination of the cultural value of the reactor was done, noting especially its relationship to the Hanford Site and place in national/international nuclear history.

Six alternatives were evaluated in this Feasibility Study. The first five alternatives (Alternatives A through E) each address the use of B Reactor as a museum, while the sixth alternative (Alternative F) addresses issues associated with dismantling the reactor. Table ES-1 summarizes the key aspects of each Alternative, which are further described in the following paragraphs.

Table ES-1. Summary of Alternatives' Key Elements.

ALTERNATIVES	DESCRIPTION	IMPROVEMENTS
Alternative A	Controlled Tour Access	Repair roof Improve ventilation and heating Upgrade fire protection Comply with ADA requirements Provide potable water/improve toilet facilities upgrade barriers/signs Abate asbestos hazard
Alternative B	Public Access With Current Displays	Implement Alternative A improvements Open access road from Vernita Bridge Upgrade Route 240 access gate Construct access road fence Improve parking lot Install direction signs Staff during operating hours
Alternative C	Public Access With Enhanced Displays	Implement Alternative A/ Alternative B improvements Upgrade current displays Provide presentation/demonstration area Improve entry lobby exhibits Implement access road/site exhibits
Alternative D	Public Access With Enhanced Displays and Additional Tours	Implement Alternative A/ Alternative B/Alternative C improvements Extend access to valve pit room Extend access to fan room Extend access to fuel storage basin
Alternative E	Public Access With Enhanced Displays, Additional Tours, and River Access/Cultural Center	Implement Alternative A/ Alternative B/Alternative C/ Alternative D improvements Provide open space/park reserve Provide day use/camping facilities Identify cultural/environmental site features USFWS wildlife refuge
Alternative F	Dismantling	Decommission and dismantle per ROD Comply with NHPA requirements

Alternative A, the continued use of B Reactor as a museum, requires some physical upgrades to meet federal standards. The key upgrades include fixation of asbestos throughout the facility, installation of a ventilation system to control natural radon levels, and physical facility enhancements to allow compliance with the Americans with Disabilities Act (ADA). The scheduled tour method currently used would continue to be utilized.

In addition to this option, four additional options are considered to enhance B Reactor as a museum. These options are identified as Alternatives B through E. Each of these options allows the public to visit without a prearranged tour and requires that one staff member be at the reactor at all times it is open. The four options vary in the areas of access and level of exhibits provided to the public.

Alternative B is the first of the enhanced museum options. This alternative allows for public access through the improvement of existing roadways and parking lots. In addition, fences would be constructed to limit public access to other areas of the Hanford Site. New roadway signs and exhibits at the Highway 240 access would also be included in this alternative to increase the public's awareness of the museum. All of the safety and ADA upgrades identified in Alternative A are also included.

Alternative C adds upgraded displays and an air conditioned auditorium, in addition to those upgrades identified in Alternatives A and B.

Alternative D requires upgrades to additional areas within the reactor to allow the public access to those areas. The technical significance of these areas is sufficient to warrant consideration of this action. This alternative would include all of the upgrades identified in Alternatives A, B, and C.

Alternative E provides for all of the previously discussed upgrades and adds a family picnic area and cultural resource center near the site.

Alternative F is the dismantlement of the reactor in compliance with a standing ROD obtained through the National Environmental Policy Act process. This dismantlement would not meet the intent of the listing on the National Historic Register or allow appropriate preservation of this historic accomplishment.

The remainder of the report describes the evaluation process. The alternatives were analyzed using a set of criteria. There are two general types of criteria. The first are physical criteria which must be met to ensure an alternative is technically and physically feasible. These criteria were applied to each of the alternatives as they were developed and are incorporated within the alternatives to address the necessary facility and structural upgrades to ensure feasibility. The second set of criteria are used to evaluate the relative merits of each alternative against the others. These criteria were developed using a cost/benefit rationale for evaluation.

A set of 12 benefits such as historical, public relations, and environmental were evaluated for each alternative. A forced-ranking for each benefit was then assigned. This ranking was developed as part of a prototypical workshop which included a cross-sectional representation of engineers, project managers, scientists, and technicians from the technical project team's organizations. From the rankings, a cost benefit analysis matrix was developed to identify a relative score for each alternative.

From this alternative analysis phase, several key conclusions were identified. The first conclusion is that the continued use of B Reactor as a museum provides a strong benefit to various areas of the public sector. The alternative which showed the greatest cost/benefit ranking was Alternative C. This alternative allows the public access to the reactor and improves the current displays. The second key conclusion from this study is that the five alternatives defined in this report where the reactor facility functions as a museum are technically feasible options and may be implemented separately in a time-phased manner. Finally, it was concluded that given the use of the reactor facility as a museum is technically feasible, key stakeholders from community, state, and federal agencies, the Indian Nations, and groups as appropriate should be involved in the decision-making process.

The next logical step is to perform the activities identified for Phase II. This study should provide sufficient design detail for each of the alternatives to permit the development of refined cost estimates and include stakeholder involvement.