DOE/EIS-0236

Stockpile Management Preferred Alternatives Report

July 1996

In support of the
Stockpile Stewardship and Management
Programmatic Environmental Impact Statement

United States Department of Energy

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- Achieve significant cost reductions to make the cost of operations consistent with a smaller stockpile

- Maintain compliance with all applicable environmental requirements while operating in a safe and environmentally conscious manner

The solution which simultaneously achieved these objectives was not obvious. For a large diverse nuclear weapons stockpile of greater than 20 thousand weapons, as existed during the Cold War, it was necessary to have a large dedicated manufacturing complex. At the other extreme, if the U. S. were to support a stockpile of only a few hundred weapons, a small capability colocated with its weapons research and development capability would probably be sufficient. With the reduced stockpile levels planned, it was not clear which operating model applied.

In 1994, in the Nuclear Posture Review, the DOE was asked to support a future U. S. stockpile of 3500 accountable weapons, i.e. the START II (Strategic Arms Reduction Treaty) protocol, with the capability to continue to support a larger stockpile of 6000 accountable weapons (START I) or to reduce stockpile levels further. (The term "accountable weapons" and its relationship to total stockpile size are discussed in Section II.) DOE began moving selected production operations back to the weapon laboratories with the closure of plants in 1994, in recognition of the need to colocate some research, development, and production operations for support of a smaller stockpile. Whether these reduced stockpile levels necessitated additional plant closures and consolidation of work into the weapons laboratories, or supported downsizing of operations at the existing plants was not clear. Studies were begun late in 1994 to address this question.

The DOE decided to address production facility downsizing or relocation as part of the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SSM PEIS). The SSM PEIS process was formally begun with publication of a Notice of Intent in June 1995. A Record of Decision on the SSM PEIS is scheduled for the fall of 1996.

The purpose of this report is to present in a summary form the Stockpile Management alternatives considered in the SSM PEIS, and the technical and cost rationale for the selection and identification of a preferred alternative. A draft version of this report was released in February 1996 to support the March 1996 draft SSM PEIS. The environment, safety, and health impacts of the PEIS alternatives have been documented in the final SSM PEIS. Those impacts were considered in the development of the preferred alternative to assure the recommended preferred alternative did not represent a significant new environmental impact. None was found. A final decision regarding the alternative to be implemented by DOE will be documented in the Record of Decision of the SSM PEIS. That decision will be made based on the technical, programmatic, and cost information summarized in this report, the environmental, safety, and health analyses presented in the SSM PEIS, and other relevant policy and programmatic information.

I. INTRODUCTION

The Stockpile Management program maintains, evaluates, repairs, and dismantles the nuclear weapons stockpile, and provides the capability to manufacture replacement nuclear weapons, if required. The program is conducted at facilities owned by the United States government and operated by government contractors. Throughout the 1970's and 1980's, there were seven production facilities located throughout the U. S. Prior to the 1970's, while the large U. S. stockpile was being initially built, there were several additional production facilities, at one time a total of 14, which provided redundant or backup capability should the primary facility be lost. By about 1970 most U. S. nuclear weapons production was focused on manufacturing replacement weapons and dismantling an equivalent number of retired weapons. With the exception of those manufacturing operations which utilized tritium, all redundant or backup capabilities were eliminated at that time. Because tritium has a relatively short radioactive half-life, and therefore a loss of tritium processing capability would rapidly affect stockpile integrity, backup capabilities for tritium operations were retained until the end of the Cold War.

With the end of the Cold War, actions were begun to reduce the size of the nuclear weapons production complex to size it appropriately for the reduced nuclear weapon stockpile and the reduced national security threat. Plutonium operations for pit production were discontinued at the Rocky Flats Plant in 1992, without reestablishing the capability elsewhere. In 1994, other production operations were ended at three of the seven nuclear weapons production facilities (Mound in Ohio, Pinellas in Florida, and the nonnuclear remainder of Rocky Flats in Colorado). Their production responsibilities were transferred to two of the remaining four plants and to two of the weapon laboratories. Subsequently, studies continued to determine the optimum size and configuration of the nuclear weapons complex. It was recognized that the remaining four production facilities were too large for the expected production work, and that further closure and consolidation or significant downsizing of operations was necessary.

The Department of Energy sought a solution to the size and configuration of its nuclear weapons production capabilities that would accomplish the following objectives:

- Fully support the dismantlement of nuclear weapons to the new reduced stockpile levels

- Fully support the surveillance, evaluation, maintenance, and repair of the reduced stockpile

- Provide flexibility to respond to new requirements or to achieve further reductions in the stockpile size

- Maintain, and improve where necessary, the manufacturing technology necessary to fully support the reduced stockpile

Nuclear weapon secondaries consist of highly enriched uranium, lithium compounds, and other materials. Historically, most of these materials have been fabricated and assembled at the Oak Ridge, Y-12 Plant. Limited fabrication and processing capabilities for these materials have existed at both LANL and LLNL. The expansion of each of these laboratory capabilities to meet future production requirements was considered as an alternative in addition to the downsizing of Y-12 operations.

For nonnuclear component manufacturing, a large capability exists at the Kansas City Plant, and smaller capabilities exist at each weapon laboratory for the nonnuclear components for which the laboratory has design responsibility. Because most of the products manufactured at the Kansas City Plant are designed by Sandia National Laboratories, most nonnuclear manufacturing would be considered for relocation to Sandia for the laboratory production alternative.

For weapon assembly and disassembly operations, a large modern capability exists at the Pantex Plant near Amarillo, Texas. A new device assembly capability was built to support the nuclear test program at the Nevada Test Site. Options for future weapon assembly and disassembly operations were limited to these sites.

The SSM PEIS is also assessing alternative sites for the storage of the strategic reserves of plutonium (in the form of pits) and highly enriched uranium (in the form of secondaries). Plutonium pits and secondaries are considered for potential storage at either of the weapon assembly/disassembly alternative sites. Secondaries are also considered for storage at the Y-12 Plant, should it be the chosen site for secondary and case fabrication. Strategic reserve storage at other candidate sites is also being considered in the DOE Storage and Disposition of Weapons-Usable Fissile Materials PEIS. Decisions on strategic reserve storage are not expected to be made until both PEISs are completed.

The detailed operating data and facility information from the analysis of these siting alternatives are presented in a July 1996 DOE, Albuquerque Operations Office report entitled, *Analysis of Stockpile Management Alternatives.* A draft version of that report was released in February 1996 to support the March 1996 draft SSM PEIS. This Preferred Alternatives Report derives data for its conclusions and recommendations from that analysis. The cost and technical justification for the Stockpile Management preferred alternatives along with an overview of the schedule for implementation are presented in subsequent sections of this report.

B. A New Operating Environment

Before describing specific site-by-site plans for the conduct of the Stockpile Management program, it is necessary to first describe the new operating environment which will govern future production activities. In the past, DOE was able to sustain critical capabilities in both Stockpile Stewardship and Stockpile Management with an ongoing program of new weapon development and production and with the ability to

A. Alternatives Considered

Two general types of alternatives were considered by DOE: downsizing of existing plants or relocation of the plant functions to a laboratory. The DOE has always retained a relatively small fabrication and assembly capability for unique nuclear weapons production technologies at its design laboratories to support research, development, and test activities. Alternative future configurations for Stockpile Management considered the expansion of these small fabrication and assembly capabilities sufficient to support future production needs. An obvious second alternative for each major mission was to downsize existing production facilities to a size appropriate to the future workload. Alternatives were sought which minimized construction of new facilities. Alternatives which required the establishment of facilities and capabilities where none historically existed were, therefore, considered unreasonable.

The alternatives considered are shown below.

Stockpile Management Alternatives

	Site Alternatives							
Technology	PX	Y-12	KCP	SRS	LANL	SNL	LLNL	NTS
Pit Fabrication				*	*			
Pit Requalification and Reuse	*							*
HE Fabrication	*				*		*	
Secondary and Case Fabrication		*			*		*	
Nonnuclear Component Fabrication			*		*	*	*	
Weapon Assembly and Disassembly	*							*

The DOE closed its plutonium component (pit) manufacturing capability at the Rocky Flats Plant in 1992 without establishing a replacement capability. It is expected that, for the next ten or more years, most, but not all, plutonium pit requirements can be satisfied through the requalification and reuse of existing pits. Therefore, alternatives which provided a full capability, but limited capacity, for pit manufacturing were considered. A capable plutonium research and development facility exists at Los Alamos National Laboratory which has produced pits for the nuclear test program and currently is used to perform pit surveillance. It was considered to be an obvious alternative. In addition, the Savannah River Site in South Carolina has a capable infrastructure for plutonium processing, and was considered a reasonable alternative.

High explosive components for nuclear weapon assemblies have been fabricated at the Pantex Plant, though large capable facilities exist at LANL and LLNL for the fabrication of high explosive components for their development activities. All three of these capabilities were considered reasonable for future production needs.

intent of this initiative is to establish an integrated surveillance program between the laboratory and production organizations.

(2) Today, competence in production technology resides primarily at the production facilities, though the weapon laboratories have unique expertise for the fabrication of limited quantities of most weapon components. DOE has determined that it is essential in the future to have an integrated technology program between the production facilities and specific weapon laboratories to ensure that critical technologies are maintained, that necessary new technologies can be introduced without adversely affecting weapon safety and performance, and that work is pooled to ensure efficiency. This partnership will insure that a strong production knowledge base is maintained. It is not expected that the amount of production technology work to be performed at the weapon production facilities will change significantly as a result of this initiative, though it is expected that a robust integrated technology program will exist at the weapon laboratories to complement the work at the individual production plants. The DOE expects that the laboratories, with laboratory employees, may conduct technology work at the production facility, and conversely that production employees may be assigned to work at the laboratories. The objective is to ensure a forward-thinking team program which is jointly conducted under laboratory leadership.

The following sections describe the DOE Stockpile Management preferred alternatives and provide summary descriptions of the proposed actions at each laboratory and production facility. Data and other supporting rationale are provided to justify DOE recommendations relative to each facility.

In addition, although tritium recycle operations are covered in the recently completed PEIS associated with tritium production and recycle, the tritium recycle operations are an integral part of the weapons production complex. Therefore, for completeness, DOE plans for downsizing tritium recycle capabilities at the Savannah River Site, in line with future workload requirements, are also included in this integrated program description.

II. CAPACITY REQUIREMENTS

The production complex capacity requirements for the smaller nuclear weapons stockpile are based on the need to support the reliability and safety of weapons in the enduring stockpile of 2004 and beyond. The deterrent role of nuclear weapons has been a key element of U. S. national security policy for decades. In July 1994, President Clinton reemphasized this national security strategy by saying, perform underground nuclear tests as a confirmation tool. These conditions do not exist today; therefore it is essential that positive measures be taken to increase program confidence in the new operating environment. To provide increased confidence that critical technical capabilities are maintained for both Stockpile Stewardship and Stockpile Management, positive measures will be implemented which seek to integrate production and laboratory technical capabilities and interject greater teaming to accomplish program needs.

The DOE is also developing an enhanced surveillance program to improve the ability to predict material and component defects. The present surveillance program has been successful in finding problems through testing, but has not always been successful in anticipating problems. In the past when problems were found, the DOE always had people and facilities which could be redirected from other weapon development or production activities to address the problem. Therefore, maximum warning time of problems was not a program priority. In the future, DOE will not always have ongoing weapons development and production activities from which to redeploy resources for stockpile concerns. Therefore, an enhanced surveillance program focused on providing increased warning time is being developed. Additional teaming and integration of plant and laboratory capabilities are judged to be essential to provide maximum benefit from current surveillance testing and from the new enhanced surveillance program.

Finally, decisions made today relative to the future of dedicated production facilities would need to be revisited should future arms reduction initiatives result in a significantly smaller nuclear weapon stockpile. Therefore, positive measures are necessary today to reduce the technical risk should future stockpile reductions make additional work consolidation necessary.

The following two specific positive measures are planned which will address these concerns and affect the future operating environment of the weapons production facilities.

(1) Extended weapon lifetime requirements and the associated potential effects on weapon safety, performance, and reliability will increasingly challenge the Stockpile Stewardship program. For this reason, it is judged by DOE to be imperative that a closer linkage between the weapon laboratories and the associated weapon surveillance activities at the production plants be established. Assignment of responsibility to the laboratories for oversight of the surveillance testing activities at the production plants is judged to be an effective means to assure this linkage. The important traditional surveillance role of the production facilities in surveillance testing will continue at about the same level. With the development and implementation of enhanced surveillance testing, overall surveillance activities are expected to increase with some of this increase performed at the responsible weapon laboratory. The

In addition, the NPR had specific recommendations for DOE in terms of Stockpile Stewardship and Management requirements. These requirements are summarized below:

- Maintain nuclear weapon capability (without underground nuclear testing or fissile material production)
- Develop stockpile surveillance engineering base
- Demonstrate capability to refabricate and certify weapon types in the enduring stockpile
- Maintain capability to design, fabricate, and certify new warheads
- Maintain science and technology base
- Ensure tritium availability
- No new-design nuclear warhead production

The NPR specifically left open future options for decreasing or increasing the size of the weapons stockpile in response to changing international environments.

Production Workload Assumptions

For purposes of assessing alternative configurations for the Stockpile Management program, the strategy of the NPR was used, i.e. a START II-sized stockpile while retaining both a lead and a hedge capability. The stockpile composition for 2004 and beyond was based on the 1995 Draft Nuclear Weapons Stockpile Memorandum (A review of the 1996 NWSM indicates no significant changes which would affect the conclusions of this analysis). The considerations for developing a production workload based on the assumed stockpile level include national security policy, historical stockpile defect and change data, and the quantities and types of weapons in the future stockpile. The assumed Stockpile Management workload was developed by representatives of DOE, the three weapons laboratories, and the four production plants. Assistance was provided by a representative from the Office of the Assistant to the Secretary of Defense for Atomic Energy (ATSD (AE)).

The DOE approach for supporting the stockpile consists of three essential parts:

- Repair defects as required to maintain safety and reliability requirements. Defects are identified through surveillance testing activities and the inspection of weapons during routine maintenance.

- Requalify components for use in the stockpile beyond their originally certified design life. Traditionally, weapon systems were replaced with new systems for reasons other than age before they reached their certified lifetime.

- Replace components, or complete weapons, on a scheduled replacement interval to prevent component failure from adversely affecting the availability, reliability, safety or security of weapons in the future stockpile. Weapon surveillance programs are relied upon to provide adequate warning time for a timely response.

> "We will retain strategic nuclear forces sufficient to deter any future hostile foreign leadership with access to strategic nuclear forces from acting against our vital interests and to convince it that seeking a nuclear advantage would be futile. Therefore, we will continue to maintain nuclear forces of sufficient size and capability to hold at risk a broad range of assets valued by such political and military leaders."

Due to their strategic importance, the numbers and types of nuclear weapons in the United States inventory are carefully established and reviewed annually by the Secretaries of Defense and Energy, and approved by the President.

Nuclear Posture Review

The Nuclear Posture Review (NPR) was a ten month, comprehensive review of nuclear forces and policies led by the Department of Defense (DOD) Joint Chiefs of Staff that looked at doctrine, force structure, operations, safety and security, and arms control. A major conclusion was that while reductions in Russian nuclear forces have allowed great strides to be made in reducing U. S. nuclear forces, the U. S. must continue to be prepared for a potential reversal of trends within Russia. In light of this uncertain future, the NPR recommended that the U. S. maintain its flexibility, a hedge, to reconstitute nuclear forces if required.

The NPR recommended a realignment of nuclear forces. Strategic forces were to be aligned as follows:

- Possess no more than 20 B-2 bombers
- Reduce the B-52 bomber force from 94 to 66 aircraft
- Reduce the Trident submarine force from 18 to 14 submarines and equip all submarines with D-5 missiles
- Maintain up to 500 single warhead Minuteman III ICBMs
- Maintain flexibility to reduce forces further or reconstitute

Nonstrategic forces were to be aligned as follows:

- Maintain European commitment at current level
- Eliminate nuclear weapons capability from U. S. Navy surface ships
- Retain nuclear cruise missile capability on submarines
- Retain land-based dual-capable nuclear aircraft capability

In addition, the NPR recommended downward flexibility in the size of nuclear forces should faster and deeper arms reductions be negotiated--the "lead" option. Positive measures were to be established to allow a flexible response to achieve a smaller U. S. stockpile.

The President endorsed the recommendations of the NPR in September 1994, and indicated that nuclear weapons would remain a part of the post Cold War U. S. national security environment.

required level of sprint or surge capacity to allow short term higher production rates to fix a stockpile problem.

A more detailed discussion of capacity issues and contingency options associated with each major production mission is given in Section III. Facility and transition costs assume facilities sized for the NPR hedge option. Consistent with the NPR, facility operating costs are estimated for an operational level which would support the START II stockpile. However, actual operating costs will depend on the actual refurbishment and maintenance workload in future years.

III. RATIONALE FOR PREFERRED ALTERNATIVES

This section presents a description of the preferred alternative for each of the major Stockpile Management production missions. In addition, information that supported the selection of the preferred alternative is presented. For each alternative the following are presented: the Net Present Value of costs for a 25 year period, a numerical measure of the technical risks, and other programmatic considerations. Throughout this report, cost information is presented in fiscal year 1995 constant dollars.

The reader is referred to a companion report entitled *Analysis of Stockpile Management Alternatives*, dated July 1996, for further details regarding the methods used for determining the cost and technical risks. That report also provides a detailed technical description of each alternative, associated costs, comparative technical risks, and other programmatic issues.

A. Pit Mission

1.0 Preferred Alternative for Pit Fabrication

Two sites were considered as alternatives for the pit fabrication mission: (1) Los Alamos National Laboratory (LANL) which has an active program involving both fabrication and recovery of plutonium and has fabricated pits for nuclear explosive testing, and (2) Savannah River Site (SRS) which has separated and produced plutonium metal from reactor targets and has recovered plutonium from scrap materials. For reasons of cost and technical risk,

The preferred alternative is to assign the pit production mission to Los Alamos National Laboratory.

1.1 Net Present Value Costs

Net Present Value (NPV) costs for each alternative are shown below. The costs consist of (1) capital investment, (2) the cost of steady-state operations, and (3) the cost of the ongoing pit evaluation and research and development program at LANL.

The above workload strategy was used for evaluating site alternatives for the Stockpile Management activities to support the SSM PEIS. In addition to this "base case" workload, workloads associated with alternative stockpile sizes were analyzed. These alternative workloads (a low case lead option and a high case hedge option) were used for determining the sensitivity of the analysis to a lower or higher stockpile size, and to assist in making decisions for future production capacity. The high case corresponds to the START I accountable warhead stockpile. No specific DOD force structure projection corresponds to the low case hypothetical stockpile. However, stockpile sizes in the assumed range have been proposed by others (See for example *Foreign Affairs*, Spring 1993). The assumed production capacities associated with each stockpile level are summarized in the following table.

Alternative Stockpile Size Production Capacity Assumptions

	Low Case	Base Case	High Case
Stockpile Size Criteria	< START II	START II	START I
Strategic Stockpile Size (Accountable Warheads)	1,000	3,500	6,000
Weapon Disassembly Capacity			
Weapon refurbishment	50	150	300
Surveillance testing	120	120	140
Disassembly Total	170	270	440
Weapon Assembly Capacity			
Weapon refurbishment rebuilds	50	150	300
Surveillance testing rebuilds	110	110	140
Assembly Total	160	260	440
High Explosive Components	50	150	300
Nonnuclear Components			
Factory and Field Retrofits	up to 100	up to 300	up to 600
Replacement Nuclear Components			
Pits	50*	50*	50*
Secondaries	50*	50*	100(200)**

* The facilities and equipment required to manufacture one component for any stockpile system provides an inherent capacity of up to 50 units per year. This capacity is sometime called Capability-based Capacity.

** Operational facilities and equipment sized for 100 units per year with capacity for an additional 200 units in cold standby.

Required production capacity for alternative stockpile sizes and assumed reconstitution options is a complex subject. First of all, different production capacities are required for different weapon components due to unique aging characteristics and resulting replacement schedules. In addition, assumptions must be made about the ability to optimize future workload to allow optimal production sizing. Finally, assumptions must be made about the referred to the report *Analysis of Stockpile Management Alternatives* (July 1996) for a full description of the criteria and rating system. That report also provides a detailed analysis of each alternative with sufficient technical and cost information to justify the rating.

Ranking Criteria	Score	
	LANL	SRS
Basic Production Capability	90	70
Capability of Production Infrastructure	92	50
Minimize Cost	100	86

1.3 Capacity Assumptions and Contingency Options

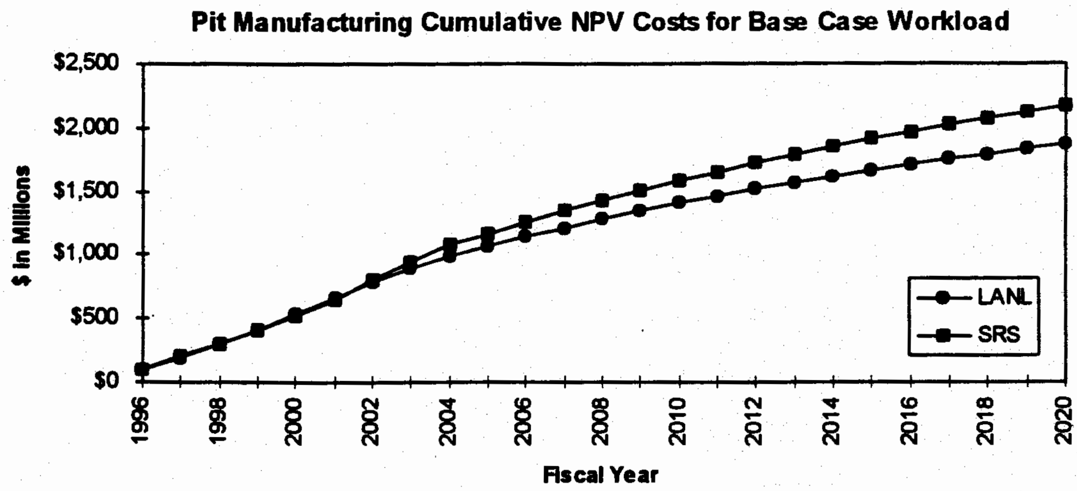
The planned workload for the fabrication of new replacement pits is small for the low, base, and high case stockpiles. Only replacement of pits destroyed in routine surveillance testing is expected until a near term life limiting phenomenon is observed in stockpile pits. Most pit requirements during weapon refurbishment are expected to be satisfied by requalification and reuse of existing pits since historical pit surveillance data and pit life studies do not predict a near term problem. However, data is limited for weapons older than 25 years and for the youngest weapons in the enduring stockpile. Therefore, the technological capability to fabricate replacement pits for enduring stockpile weapons must be reestablished, albeit with a small capacity.

The technological capability to manufacture all plutonium pits in the weapons stockpile provides an inherent capacity to manufacture about 50 pits per year in single shift operations. A larger single shift production capacity of 100 pits per year was also studied as part of the stockpile sensitivity analysis. This larger capacity could be established at a relatively modest additional cost ($44 million at LANL or $20 million at SRS). However, during weapon refurbishment to replace other components, most pits are expected to be requalified and reused. About 20 pits per year are expected to be required to replace pits destroyed in routine surveillance testing. A capacity of about 50 pits per year is, therefore, judged to be sufficient for the next 10 or more years for any of the assumed stockpile levels.

In sizing the plutonium fabrication capability for the future nuclear weapons program, consideration was given to establishing a larger fabrication capacity in line with the capacity planned for other portions of the nuclear weapon complex. Larger capacity was rejected, however, because of the small demand for the fabrication of replacement pits, and the significant, but currently undefined, time period before significant additional pit production capacity would be needed.

Construction and operation of a larger pit production capacity at this time would be expensive, and would not have sufficient workload for the foreseeable future to justify its maintenance and operation. In addition, a new larger plutonium fabrication facility would by necessity be based on manufacturing facilities at Rocky Flats. Advances

With the cessation of plutonium production operations at Rocky Flats in 1992, the DOE did not immediately reestablish its capability to produce significant quantities of pits. Consequently, the costs associated with the pit production alternatives relate to reestablishing this capability, rather than consolidating or downsizing an existing capability, as is the case with the other production missions. As the following figure indicates, LANL is the lower cost alternative. In addition, the LANL capability could be in place and operational by 2004, two years earlier than the SRS option.



1.2 Technical Risks

Technical risk associated with each alternative was assessed by comparing the relative experience of each site in the pertinent areas of basic production and production support infrastructure. No pits are currently being produced for the nuclear weapon stockpile, and neither site has done so in the recent past. As noted above, LANL has recently provided pits for nuclear explosive testing, and is currently producing plutonium-238 heat sources for NASA programs. Also, LANL continues to perform pit surveillance and technology development activities directly related to the required capabilities for pit fabrication.

SRS is currently processing and shipping plutonium-238 to LANL to support fabrication of heat sources. Although SRS has an excellent plutonium health, safety, and safeguards infrastructure, the historical mission for the site has been separation and production of plutonium metal for shipment to other sites for weapon programs use. Consequently, SRS has no experience with the kind of capabilities required for precision nuclear component manufacturing and the ancillary supporting functions such as tool and product engineering; precision machining, and nondestructive evaluation.

The following table provides the numeric ranking for the two measures of technical risk and the numeric measure of relative cost. These ranking criteria and associated rating system are used for each major production mission in this report. The reader is

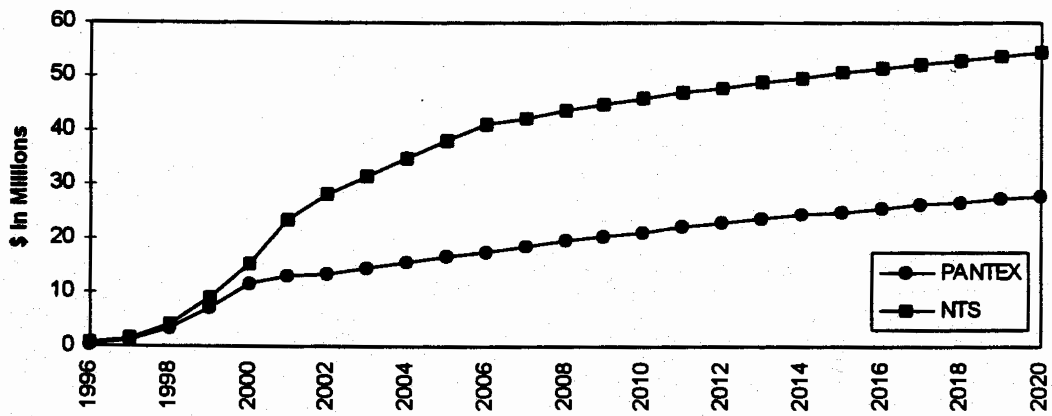
Because these operations would not involve work with uncased plutonium, they could be performed in specially equipped bays at Pantex or at the Device Assembly Facility (DAF) at the NTS. Capability to perform requalification and reuse of pits would inherently also provide capability for requalification of secondaries, should that capability be needed. A qualified Class I plutonium facility would not be needed. For reasons of cost and technical risk,

The preferred alternative is to assign the pit requalification and reuse production mission to the Pantex Plant.

2.1 Net Present Value Costs

A net present value (NPV) cost analysis was performed to assess the merits of the two siting options. The costs consisted of (1) capital investment to install a capability for pit reuse and (2) cost of steady-state operations. In addition, an analysis was performed of the cost to install and operate a capacity for both higher and lower levels of workload to judge the relative sensitivity of the two site alternatives to workload changes. As the following figure indicates, assigning this mission to Pantex is the lower cost alternative.

Pit ReuseCumulative NPV Costs for Base Case Workload



have been made in process technology since the construction of Rocky Flats, however significant technological advances have not been made in facility design, layout, and operation.

DOE believes that improvements are possible in these areas which would significantly affect new plutonium facility size, cost, and environmental impact. DOE further believes that development and demonstration work should be performed on alternative facility concepts prior to making large financial and programmatic commitments, particularly in light of the small near term requirement for pit production. Significant time exists before a larger plutonium fabrication facility could be required. This time should be used to develop and demonstrate alternative concepts to help guide future decision makers regarding plutonium facility design and construction.

For these reasons, this programmatic analysis limits plutonium fabrication facility analysis to a facility sized to meet expected programmatic requirements over the next ten or more years. Should a life-limiting problem be found for plutonium pits in the future stockpile, a larger facility would be required. DOE will perform development and demonstration work at its operating plutonium facilities over the next five years to study alternative facility concepts which could be utilized in the future in the construction of a larger fabrication capacity. Environmental analysis of this larger capacity is not planned at this time because of the uncertainty in the need for such a capacity and the uncertainty in the facility technology that would be utilized. Should a larger pit production capacity be required in the future, appropriate environmental and siting analysis would be performed at that time. Existing DOE nuclear facilities, such as those at SRS, would be the expected candidates for siting of this larger capacity.

1.4 Other Considerations

The SRS alternative proposes to utilize facilities that currently are free of plutonium contamination, whereas the proposed option for LANL is currently in full operation as a qualified Class I plutonium facility. Assignment of the pit fabrication mission to SRS would increase the future cost of decontamination and decommissioning of plutonium facilities. This cost was neither analyzed nor included in the estimates.

The SRS alternative is less constrained by space limitations than the LANL alternative, and consequently has a larger ultimate capacity.

2.0 Requalification of Intact Pits and Nonintrusive Pit Modification Reuse

Two sites were considered as reasonable alternatives for requalification of intact pits and nonintrusive pit modification reuse: (1) the Nevada Test Site (NTS) which historically has provided the support for nuclear explosive testing by the weapons laboratories, and (2) the Pantex Plant which currently performs all assembly/disassembly functions including pit recertification. Either site would only be assigned this mission if they were assigned the weapon assembly/disassembly mission.

B. Secondary Factory Mission

1. Preferred Alternative for Secondary Fabrication

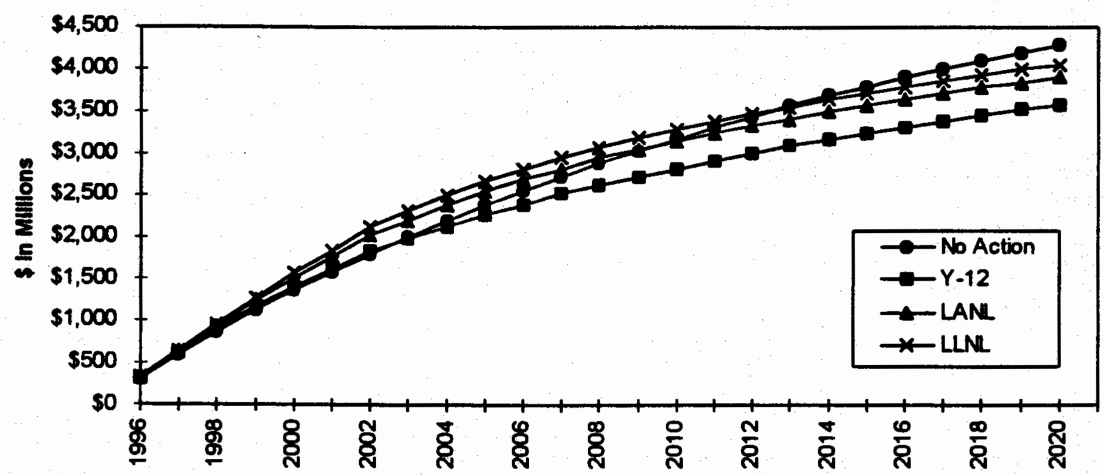
Three alternative sites were considered for the future secondary factory: the Y-12 Plant, LANL, and LLNL. In addition, a no action alternative (at Y-12) was considered for comparative purposes. For reasons of cost, technical risk, and capacity flexibility,

The preferred alternative is to retain the secondary production mission in a downsized Oak Ridge Y-12 Plant.

2. Net Present Value Costs

The cost analysis determined the net present value (NPV) for investment and operating costs for a 25 year period. The results of this analysis are shown below.

Secondary Factory Cumulative NPV Costs for Base Case Workload



The highest net present value of costs is associated with the status quo of not downsizing the Y-12 Plant, i.e., the no action alternative. The alternatives which would transfer production responsibility to either of the two weapon laboratories are lower cost than no action, but are more expensive than downsizing the Y-12 Plant due to their large investment and other transition costs.

3. Technical Risks

Technical risks associated with each alternative site were assessed by rating each alternative in the areas of basic production capabilities and the production infrastructure capability. The results of the technical risk assessment are shown below.

2.2 Technical Risks

Technical risk associated with each alternative was assessed by comparing the relative experience of each site in the pertinent areas of basic production and production support infrastructure. The pit reuse and pit requalification requirements are being developed, consequently neither site has experience in all operations. However, Pantex has supported LLNL in developing one type of pit reuse workstation and is familiar with its design and function. In addition, Pantex has routinely performed gas analysis and limited pit diagnostics as part of its weapons surveillance mission. Although the NTS has supported work involving assembly of pits into nuclear explosive devices, these operations were performed by weapon laboratory personnel, consequently there is no experience at the NTS associated with pit modification and inspection operations.

The following table provides the numeric ranking for the two measures of technical risk and the numeric measure of relative cost.

Ranking Criteria	Score	
	NTS	Pantex Plant
Basic Production Capability	50	85
Capability of Production Infrastructure	50	100
Minimize Cost	51	100

2.3 Capacity Assumptions and Contingency Options

A basic capability for pit requalification and reuse provides sufficient operating capacity to support the low case or the base case stockpile levels (up to about 150 units per year). This capacity could be doubled for the high case stockpile by operation of a fourth weapon assembly bay at an additional cost of about $6 million per year.

2.4 Other Considerations

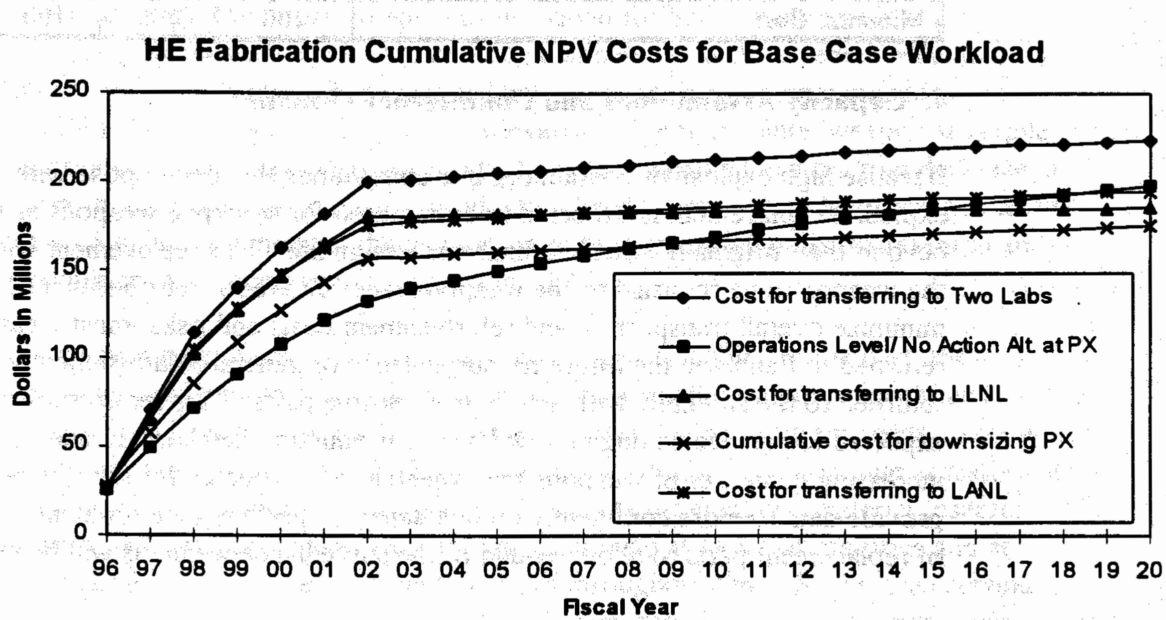
As described in Section III. E., the Pantex Plant is the recommended preferred alternative for the weapons assembly/disassembly mission. The DOE desire to colocate pit reuse/requalification with weapons assembly contributes to the selection of Pantex for this mission.

The NTS does not have existing facilities in which to house the pit modification and inspection operations. Consequently, a construction project would be required to build an addition to the DAF for these operations. This project cost was included in the analysis.

The costs for HE production are relatively small for all alternatives, though the assignment to multiple sites is more expensive than assignment to a single site. Assigning a portion of the production mission to the two laboratories would help preserve DOE core competency in high explosives, a critical Stockpile Stewardship capability. At the same time, assignment of the production mission to Pantex is a lower cost alternative and helps assure preservation of DOE core competency for production to support stockpile refurbishment. Section VIII describes the technical, cost, and schedule implications assuming the production mission has been assigned to a downsized Pantex.

2. Net Present Value Costs

Net Present Value (NPV) costs comprised of one-time transition costs and additional annual operating costs are shown below. Pantex costs assume a base mission to perform weapon assembly and disassembly with the high explosives costs incremental to this base mission. Likewise the LANL and LLNL annual operating costs assume a base program to accomplish weapons research and development. Because of the important contribution that HE fabrication capability provides to Stockpile Stewardship competence at the nuclear weapon laboratories, alternatives were also considered which would assign total or partial production responsibility to each laboratory. After relocation or downsizing of the HE capability, the incremental annual operating costs for all alternatives are about the same. The cost difference between alternatives is predominantly due to transition costs, i.e. facility shutdown, workforce restructuring, and production requalification. These costs range from a low of about $10 million for the Pantex alternative to about $40 million for the alternative which assigns total responsibility jointly to the laboratories.



Ranking Criteria	Score		
	Y-12	LANL	LLNL
Basic Production Capability	98	87	88
Capability of Production Infrastructure	100	80	78
Minimize Cost	100	94	88

4. Capacity Assumptions and Contingency Options

As with plutonium pit production workload, the projected workload for secondary fabrication, after near term planned work is accomplished, is projected to be mainly that associated with the replacement of secondaries destroyed during routine surveillance testing. However, unlike pits, secondaries contain organic compounds which can deteriorate with age. The capability to fabricate all secondary and case parts provides an inherent capacity to produce up to 50 sets of weapon components per year. This capacity is sufficient for either the low case or the base case stockpile levels. For the high case stockpile, a factory with a single shift capacity of 100 units per year was assessed. The added investment cost for the higher capacity ranged from $5 million at LANL or Y-12 to $70 million at LLNL. Because of this relatively small investment required for a relatively large contingency capacity, an operational single shift capacity of 100 secondaries per year is assumed to be maintained. At Y-12, an added single shift capacity of 200 secondaries per year can be maintained in a standby mode at minimal cost. This option adds to the attractiveness of the Y-12 alternative. Multiple shift operations would add to these capacity levels.

C. High Explosives Mission

1. Preferred Alternative for High Explosive Production

The High Explosives (HE) production mission includes HE procurement, formulation, synthesis, component fabrication, characterization, surveillance, disposal, and storage. Three DOE sites (LANL, LLNL, and Pantex) have fully capable existing HE capabilities. Alternatives involving these three sites were considered, i.e. to transfer all or a portion of the work to LANL and/or LLNL, or to retain the mission at a downsized Pantex. For reasons of cost and technical risk,

The preferred alternative is to retain the high explosives production mission in a downsized Pantex Plant.

DOE believes it is essential to assure core competency maintenance for HE research, development, and production while achieving cost efficiencies. Assigning the HE production mission to Pantex provides assurance that competency for production will be maintained, but does not yield assurance that competency for stockpile stewardship is retained. DOE will continue to seek solutions to this concern.

The assumed production capacities for HE components for the alternative stockpile sizes were:

Low Case	50 sets per year
Base Case	150 sets per year
High Case	300 sets per year

These production capacities are in addition to the required capacity to fabricate replacement components for those lost in surveillance testing (up to 50 sets per year)

The transition costs as well as the annual operating costs were found to be relatively insensitive to these alternative capacities. Therefore, to assure adequate contingency capacity, single shift production capacity of about 300 component sets per year is planned. LANL and LLNL would each have sufficient capacity within existing facilities to support this production rate. Pantex facilities would be downsized to this lower operating capacity. In addition, as a contingency, DOE could retain some existing high explosive buildings at Pantex in a safe shutdown mode at minimal costs under any alternative. These facilities could be reactivated should future requirements exceed established capacities.

5. Other Considerations

For all portions of the Stockpile Management program, DOE has sought to address the level of expected future production requirements, and whether this level of work is sufficient to maintain competence. This issue is particularly appropriate to high explosive production since DOE has three large existing capabilities (at LLNL, LANL, and Pantex), and the future component workload for both development and production is relatively small. Maintaining competence at three separate facilities with a small combined workload challenges DOE in maintaining competence for both Stockpile Management and Stockpile Stewardship. For example, weapon stockpile reductions (with no new weapons production) have resulted in a ten fold decrease at Pantex in expected high explosive production levels compared to historical production levels. Similar reductions in the fabrication of high explosive parts for research and development have occurred at LANL and LLNL.

This maintenance of competency issue is not unique to DOE. In the past, the Department of Defense (DOD) and other federal agencies bought products and services from DOE high explosive facilities to meet unique program needs. This work could contribute to DOE competency maintenance if it were to continue at historical levels. However, major reductions in requirements for energetic material research, development, test, and production are also occurring at DOD laboratories and at industrial research and development facilities throughout the U.S. This decreasing workload presents a severe challenge to the maintenance of essential capabilities and the retention of critical core competencies in energetic materials research, development, and production.

3. Technical Risks

All technologies required for the HE mission have been previously demonstrated at LANL and LLNL. Both have in the recent past produced HE components in numbers greater than and at specifications comparable to those required for future production. No deviations from the current baseline technologies used at Pantex would be required. Approved procedures are in place for transporting HE from the laboratory to the assembly site. Therefore, the technical risk is low for either laboratory.

However, both laboratories require significant effort to establish the production support infrastructure needed to sustain production. This is a limitation that DOE has successfully addressed in the past at the weapon laboratories, however. In addition, LANL is currently establishing a production infrastructure for the manufacture of detonators and other assigned weapon components, and LLNL has had a limited production infrastructure in place in the recent past.

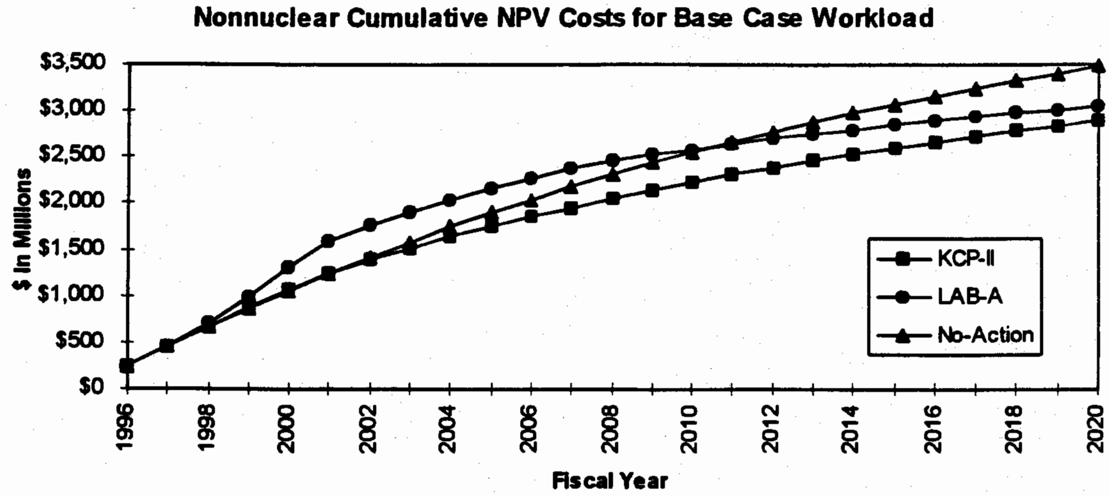
The technical risk of downsizing and remaining at Pantex would be low. Facilities and equipment are modern, well maintained, and capable.

The following table provides the technical risks and relative cost ranking for each alternative.

Ranking Criteria	Score			
	Pantex	**LANL**	**LLNL**	**Two-Lab**
Capability of Process Technologies	100	96	92	94
Capability of Production Support Infrastructure	100	70	65	68
Minimize Cost	100	100	100	77

4. Capacity Assumptions and Contingency Options

Because high explosives contain organic compounds that decompose with age, high explosive replacement is expected to be required for stockpile weapons as they age beyond their originally intended minimum design life. This replacement will require the weapon to be returned to the weapon assembly site for refurbishment. To minimize overall transportion and refurbishment costs and risks, most weapons returned to Pantex in the future for surveillance or general refurbishment may be returned to the stockpile with new high explosive parts. This refurbishment activity is expected to provide an onging low level of production demand. In addition, increasing quantities of weapons are expected to be selected for surveillance testing to provide data to more confidently predict safety or performance problems. Fabrication of replacement parts to allow rebuild of the surveillance weapons will be required.



3. Technical Risks

The following table provides the ranking of the technical risks and relative costs for each alternative.

Ranking Criteria	Score				
	KCP	Lab A	Lab B	Lab C	Lab D
Basic Production Capability	100	85	84	85	84
Capability of Production Infrastructure	100	74	73	74	73
Minimize Cost	100	95	94	93	92

4. Capacity Assumptions and Contingency Options

The assumed levels for nonnuclear component production were 100 weapon sets per year for the low case stockpile size, 300 sets per year for the base case stockpile, and 600 sets per year for the high case stockpile. These assumed production levels are greater than for most other portions of the weapon because nonnuclear components historically have needed replacement at higher rates. For the Kansas City Plant alternative, the cost to downsize the plant is relatively insensitive to the range of potential stockpile sizes because no new construction was required. The Kansas City Plant downsizing costs ranged from $97 million for the low case to $108 million for the high case. In contrast, costs for the laboratory alternatives for nonnuclear production were large and very sensitive to assumed stockpile size. Laboratory construction costs ranged from $200 million for the low case to $290 million for the high case.

The Kansas City Plant would be downsized consistent with the assumed workload for the high case stockpile.

The DOE sought future weapon complex configurations that simultaneously maintained technical competence, minimized technical risk, and minimized costs. It was recognized that in some cases these would be competing objectives where the minimum risk alternative might not be the minimum cost alternative. Due to all of these considerations, DOE proposes to maintain its predominant HE production mission at the Pantex Plant.

D. Nonnuclear Mission

1. Preferred Alternative for Nonnuclear Component Fabrication

There were two alternatives considered for the nonnuclear manufacturing mission of the Kansas City Plant (KCP). One involves downsizing the KCP and the other involves transferring the production responsibility to the three weapons laboratories which have design responsibility for the products manufactured at KCP. The laboratory alternative had four options (listed in the analysis as Lab A, Lab B, Lab C, and Lab D) to be evaluated. These four options involved various combinations of production assignment to the three laboratories. The reader is referred to the previously referenced *Analysis of Stockpile Management Alternatives* for a detailed description of each laboratory alternative. For reasons of cost and technical risk,

The preferred alternative is to retain the nonnuclear production mission in a downsized Kansas City Plant.

2. Net Present Value Costs

The following chart shows the cumulative cost net present value (NPV) for the downsized KCP and the Lab A (the most cost competitive of the four laboratory options) alternatives. The chart also includes the NPV for the no-action alternative at KCP. Downsizing the KCP has the lowest cost NPV.

new processes; however, there would be minor risk because personnel and processes would need to be relocated and requalified.

The assembly of nuclear test devices was accomplished in the past by personnel from the weapon laboratories, not by personnel from the NTS. Therefore, additional risk is added to this option due to: the support that would be required from the laboratories to assist in the qualification of the production operations, the uncertainty associated with the availability of laboratory personnel to provide this support, the significant amount of construction required on a very aggressive schedule, and the one year gap in operations. A summary of the relative rankings is shown below.

Ranking Criteria	Score	
	Pantex Plant	NTS
Basic Production Capability	100	80
Capability of Production Infrastructure	100	60
Minimize Cost	100	73

4. Capacity Assumptions and Contingency Options

Annual weapon operations workload was assumed to range from 280 weapons per year for the low case stockpile to 580 weapons per year for the high case stockpile. These weapon operations would include a mix of weapon refurbishments and weapons disassembled and reassembled for surveillance testing. The costs to downsize Pantex would be relatively insensitive to the level of assumed weapon operations (about $15 million for each case). Because of the large construction activity required, the NTS costs were sensitive to the assumed stockpile level. NTS construction costs would range from $215 million for the low case to $313 million for the high case.

The Pantex Plant would be downsized consistent with the assumed workload for the high case stockpile. This alternative provides maximum flexibility to respond to future larger or smaller stockpile levels at a reasonable cost. Depending on the weapon type, additional capacity could be added through multi-shift operations to meet unforeseen program demands. A feature that adds to the attractiveness of Pantex is that for minimal additional cost, some existing facilities at Pantex could be maintained in a safe shutdown mode. Should future requirements dictate a larger assembly or disassembly capacity (such as might occur in subsequent arms reduction treaties) some of these facilities could be reactivated. This provides the DOE programmatic flexibility that cannot be reasonably attained with the NTS option.

E. Weapons Assembly/Disassembly Mission

1. Preferred Alternative for Weapons Assembly and Disassembly

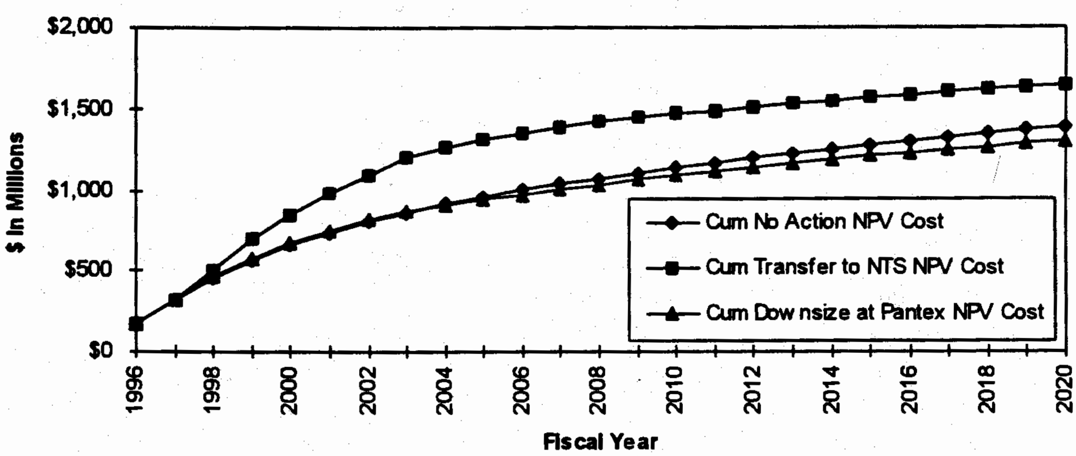
Two sites were considered as reasonable alternatives for the assembly/disassembly mission: (1) the Nevada Test Site (NTS) which has been the site for assembly and testing of nuclear test devices and (2) the Pantex Plant which currently performs assembly, disassembly, and surveillance of nuclear weapons. For reasons of cost, technical risk, and program flexibility,

The preferred alternative is to retain the weapons assembly/disassembly mission in a downsized Pantex Plant.

2. Net Present Value Costs

For all workloads, the downsizing of Pantex requires very little investment for construction and transition costs. Alternatively, the relocation of the mission to NTS requires substantial funding in these areas. Coupled with similar annual operating costs for both sites, the NPV analysis illustrated in the figure below ndicates that over the twenty-five year period considered, the option to downsize Pantex results in the better cost alternative. It is also more cost effective than taking no action.

Cumulative NPV Costs for Base Case Workload



3. Technical Risks

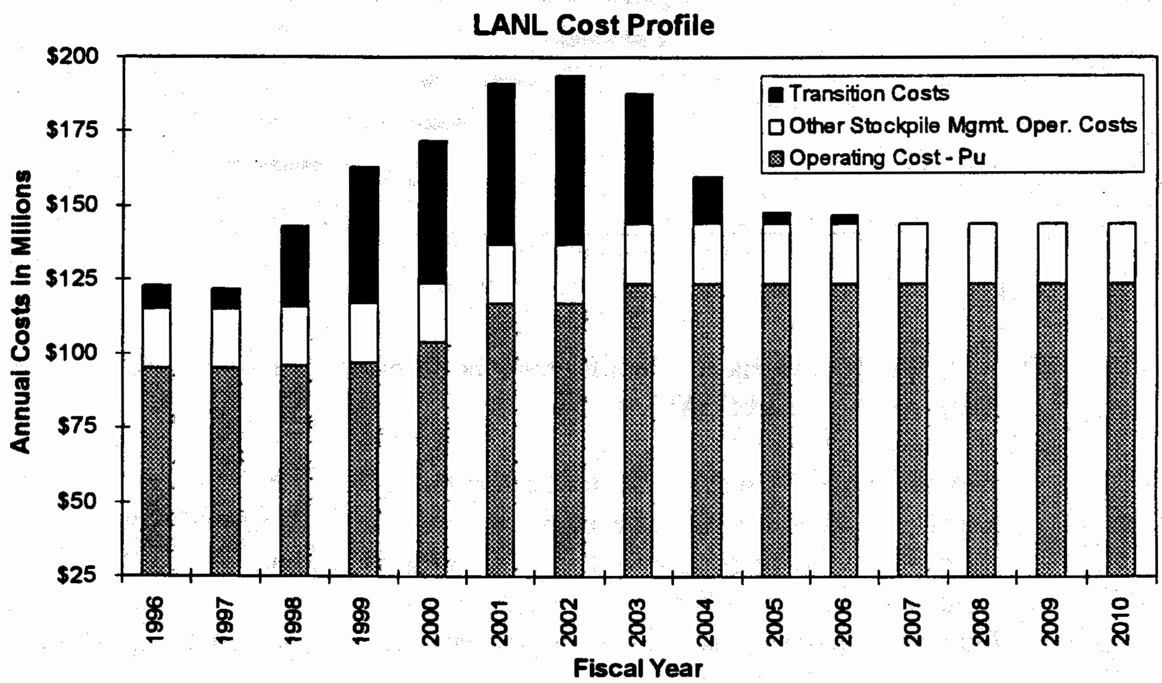
Technical risk was assessed by comparing the relative capabilities of each alternative in the areas of basic production capability and production infrastructure. Since Pantex is currently performing the A/D mission, downsizing can be accomplished without interruption to operations.

The technologies that would be transferred and established at NTS are identical to those currently at Pantex. Therefore, there would be no technical risk associated with developing

Existing facilities and staff would be utilized in concert with technology and surveillance programs at Savannah River, Pantex, and Y-12 plants to support these missions. Appropriate LANL staff may be located at these sites to work with the plant staff for accomplishment of these joint missions.

2. Costs and Schedules

The annual budgets necessary to establish the new missions and to continue existing missions are depicted below. The transition costs include the costs to relocate missions and to make facility modifications at LANL. Annual operating costs are shown for the plutonium mission and the other Stockpile Management missions that have been assigned to LANL.



A transition cost of $312 Million supports a combined project to extend the useful life of the electrical and mechanical systems of the TA-55 plutonium facility and to reconfigure one wing for pit manufacturing. Most of the existing pit fabrication equipment has a useful life of an additional 15 years and does not need replacement at this time. In FY 1996 and FY 1997 transition costs are shown for conceptual design to secure project funding in FY 1998. The annual operating cost for the LANL plutonium mission after taking on the pit manufacturing mission will grow from about $95 million to about $125 million.

As part of the Nonnuclear Reconfiguration Program, LANL is currently establishing the capabilities to support high power detonators, calorimeters, neutron tube target loading, beryllium technologies, pit support components, etched bridges, and cables. These costs are shown as Other Stockpile Management Operating Costs.

IV. DESCRIPTION OF PLANNED STOCKPILE MANAGEMENT ACTIVITIES AT LOS ALAMOS NATIONAL LABORATORY (LANL)

1. Description of Planned Actions

Activities

The following Stockpile Management activities would be assigned to LANL:

- Manufacture of pits and intrusive reuse of plutonium components
- Plutonium fabrication and processing technology development with support from LLNL
- Oversight of secondary surveillance testing for LANL-designed weapons
- Oversight of tritium reservoir surveillance, testing, and tritium recycle technology
- Support of high explosive safety and assembly/disassembly operations at the Pantex Plant, and
- Continuation of previous Stockpile Management assignments (pit surveillance, calorimetry, and detonator, beryllium, neutron tube target loading, and pit support component production and surveillance)

Operations and Workload

Plutonium component fabrication capacity of 50 pits per year would be established based on single-shift operations. Technology and capability for all stockpiled weapon systems and alloy types would be supported.

The preferred alternative is consistent with the DOE's investment over the last decade in plutonium fabrication and processing facilities and technology at TA-55. Technological capabilities for the remaining missions currently exist at LANL.

Facilities

The plutonium missions would be performed at TA-55 and at the CMR facility. These missions would require facility modifications and installation of new equipment in the 300 Wing of TA-55. Concurrently, LANL would complete maintenance upgrades to extend the useful life of the mechanical and electrical systems of the TA-55 plutonium facility. TA-55 has been operational without major refurbishment since 1978, and though it has been maintained in an excellent condition, there are significant maintenance upgrades that should be made in the next decade irrespective of the pit production mission.

Support of the integrated manufacturing technology and component surveillance mission would require no significant facility upgrades or expansions at LANL.

V. DESCRIPTION OF PLANNED STOCKPILE MANAGEMENT ACTIVITIES AT LAWRENCE LIVERMORE NATIONAL LABORATORY (LLNL)

1. Description of Planned Actions

Activities

The following Stockpile Management activities would be assigned to LLNL:

- Oversight of secondary surveillance testing for LLNL-designed weapons
- Support of high explosive safety and assembly/disassembly operations at the Pantex Plant
- Oversight of uranium and case fabrication and processing technology with support from the Y-12 Plant and LANL, and
- Continuation of previous Stockpile Management assignments

Operations and Workload

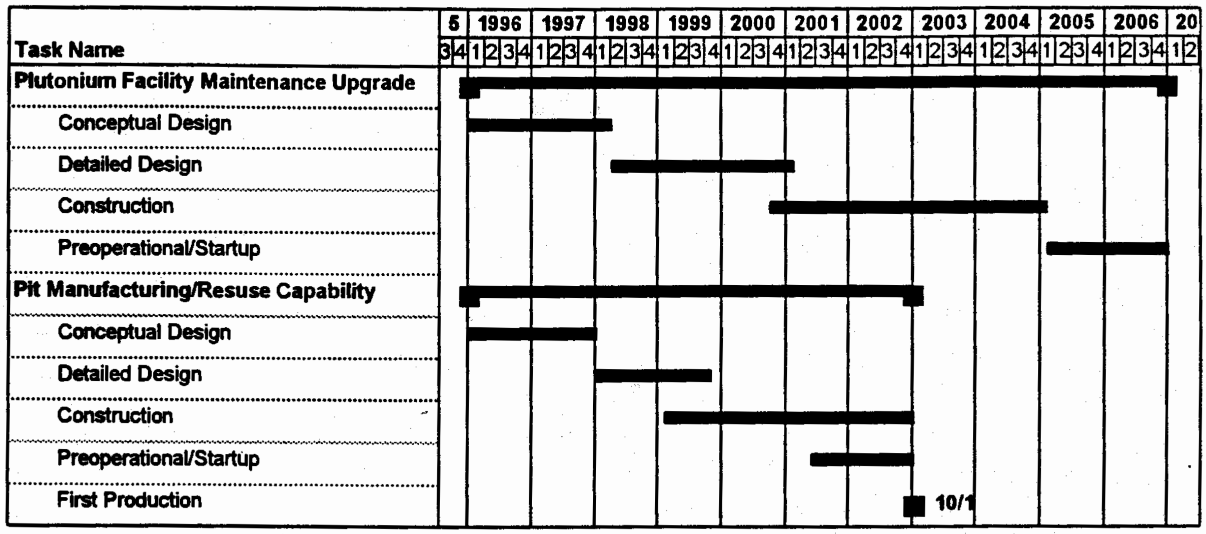
LLNL would participate with LANL in the support of HE safety and the assembly/disassembly operations at Pantex.

LLNL would be responsible to coordinate an integrated secondary and case technology development program with Y-12 and LANL to assure capable production processes remain available at Y-12. The secondary and case technology program would be integrated with production technology work at Y-12. This integration of work would seek to provide added assurance that critical manufacturing technology will be retained and that new production technologies can be introduced without adversely affecting weapon safety or performance. The amount of production technology work at Y-12 is not expected to change significantly from current levels; however, the nature of the work will be more aligned with LLNL and LANL Stockpile Stewardship needs. LLNL and LANL employees may conduct some technology work at Y-12 and conversely Y-12 employees may conduct some technology work at the laboratories.

LANL and LLNL responsibilities in determining aging effects on secondaries would also become more integrated with surveillance activities at Y-12. Each organization possesses unique knowledge and skills that would be pooled for greatest efficiency of surveillance operations and greater confidence in predicting aging effects. This could result in laboratory employees actively participating in the surveillance testing and evaluation at Y-12, and Y-12 employees performing surveillance and aging work at the laboratories.

The schedules for establishing the pit component production capabilities are shown below.

LANL Schedule of Activities



3. Risks

The technical risk associated with assigning the pit manufacturing mission to Los Alamos is low because of LANL's:

- Previous history of making pits for nuclear testing
- Experience with technology development for the W88 pit rebuild program
- Experience with the conduct of the pit surveillance program
- Production experience for the Cassini Program
- Plutonium processing support to Rocky Flats Plant production during the 1980's

4. Issues and Uncertainties

There is moderate schedule and cost risk because of the high annual capital funding profile and the aggressive project schedule. An additional risk is the complexity of managing a number of concurrent LANL construction projects in a relatively short time period. The DOE will investigate improved management approaches to ensure project success.

VI. DESCRIPTION OF PLANNED STOCKPILE MANAGEMENT ACTIVITIES AT SANDIA NATIONAL LABORATORIES (SNL)

1. Description of Planned Actions

Activities

Sandia National Laboratories will retain currently assigned Stockpile Management activities including:

- System and stockpile engineering support for non-nuclear components and subsystems
- Continuation of previous Stockpile Management production assignments (principally neutron generators)
- Integration of the stockpile surveillance and reliability assessment programs
- Support of assembly/disassembly operations at the Pantex Plant
- Non-nuclear manufacturing technologies, with support from the Kansas City Plant, LANL, and LLNL
- Independent assessment of nuclear explosive safety
- Quality assessment and maintenance of Primary Standards for the nuclear weapons program
- Military liaison activities including training, technical manuals, and field engineering support

Operations and Workload

Operations will remain essentially constant with nearly the same level and type of support provided to the mission areas as in the past. Facilities and processes will be developed to support emerging nonnuclear manufacturing technologies with support from sites which have nonnuclear manufacturing missions. The total work load at Sandia will remain essentially constant.

2. Costs

Funding is expected to increase slightly from the FY 96 level of $164 million as shown below. This increase is due to the phase in of operations for production missions (primarily neutron generator production) assigned to Sandia in previous decisions. Manpower levels remain relatively constant during this time period.

FY 96	FY 97	FY 98	FY 99	FY 00
$164 M	$177 M	$180 M	$180 M	$180 M

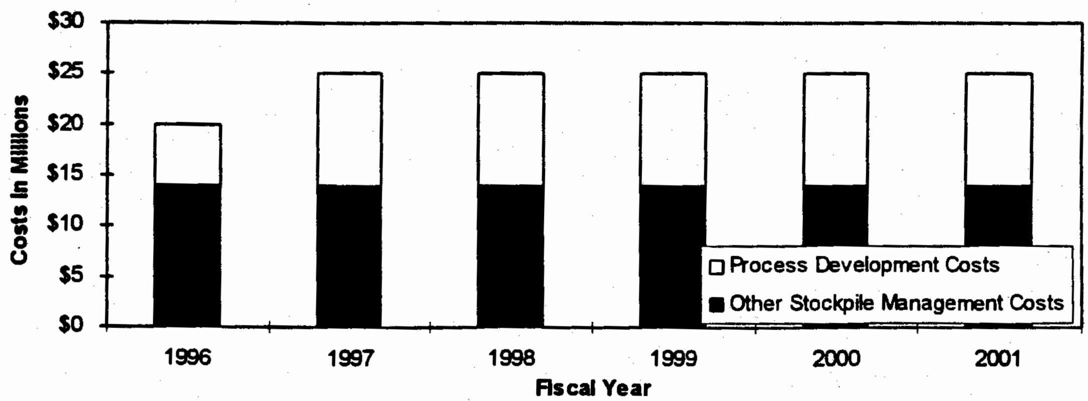
Facilities

No new facilities are expected to be added at LLNL to accommodate the technology development activities for nuclear weapon secondaries.

2. Costs and Schedules

Stockpile Management costs for LLNL are shown in the following chart.

Annual Stockpile Management Costs at LLNL



Process Development costs are an estimate of the costs for LLNL to assume a leadership role in manufacturing technology associated with weapon secondaries and cases. The expanded role of LLNL in secondary and case process technology is expected to begin in FY 1997. Other Stockpile Management costs represent an estimate of ongoing costs for specific Stockpile Management projects (currently about $15 million per year). Additional costs, not shown though not expected to be large, will be required for support of Pantex assembly/disassembly operations and to support plutonium technology work at LANL.

3. Risks

Technical risks associated with the LLNL Stockpile Management activities are very low.

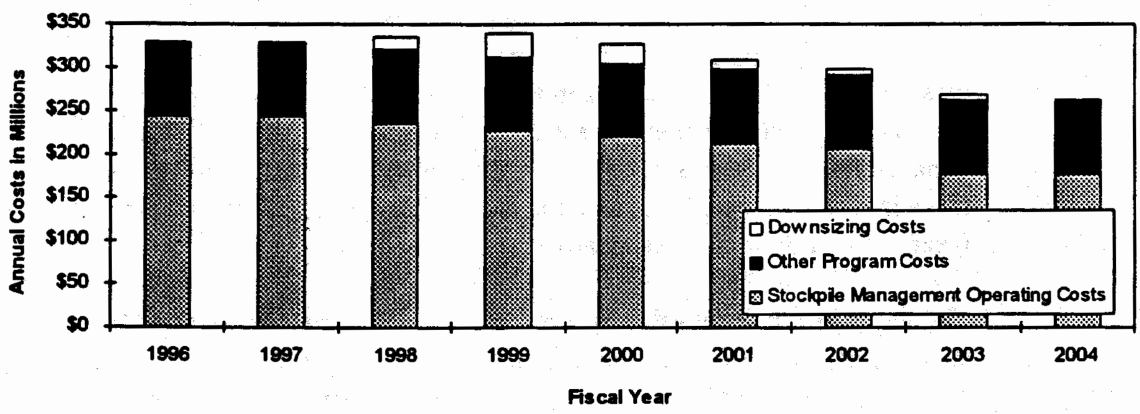
4. Issues and Uncertainties

There are no outstanding issues or uncertainties at LLNL associated with the technology development activities for nuclear weapon secondaries, or other assignments.

2. Costs and Schedules

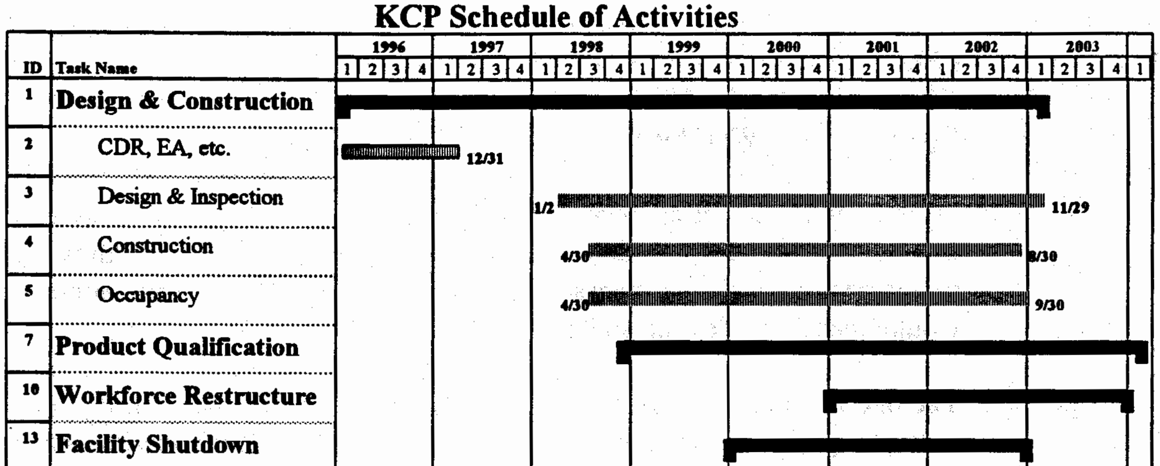
The projected annual budget to downsize and operate the KCP is given below. The cost to transition to the downsized plant is about $90 million. Depending on future actual workload requirements, the annual Stockpile Management operating budget would decrease from the current level of $244 million to as low as $177 million after transition is complete.

Projected Annual Costs for KCP



The schedule for transitioning to the downsized KCP is given below.

KCP Schedule of Activities



3. Risks, Issues, and Uncertainties

The risk associated with downsizing the KCP is extremely low. This is because (1) there is no production program interruption, (2) an experienced work force is retained, (3) a fully capable production infrastructure is already in place, and (4) the existing process and manufacturing engineering expertise are retained.

VII. DESCRIPTION OF PLANNED STOCKPILE MANAGEMENT ACTIVITIES AT THE KANSAS CITY PLANT (KCP)

1. Description of Planned Actions

Activities

It is DOE's preferred alternative to retain existing nonnuclear production missions at the Kansas City Plant (KCP) and to downsize it appropriately to satisfy future production needs. This optimization of the plant size would result in the least technical risk and greatest cost savings for nonnuclear manufacturing. At the same time, it is DOE's intent that SNL take a greater role and responsibility at the KCP for both nonnuclear manufacturing technology and the conduct of the weapon surveillance testing program.

Operations and Workload

The production mission of the KCP would remain unchanged. The proposed actions to downsize the KCP are driven by the lower production workload for support of the planned stockpile. Manufacturing processes and capabilities will be maintained consistent with production requirements and expected industry capabilities. KCP will continue to procure from industrial sources rather than to maintain in-house capabilities where feasible.

The preferred alternative is also consistent with the initiative started in 1993 to make KCP the Logistics and Manufacturing Center (LMC) for the DOE Weapons Complex. The LMC initiative gave the KCP a greater responsibility for nuclear weapons logistic activities.

The responsibilities assigned to SNL at the KCP will require the establishment of an integrated surveillance testing and assessment program between SNL and the KCP which takes maximum advantage of the expertise of both locations. The assignment of a nonnuclear manufacturing technology role to SNL should help assure continued competence in nonnuclear production technology at both KCP and SNL.

Facilities

Currently, the Kansas City Plant is approximately 3.2 million square feet contained primarily in three connected buildings (main manufacturing, manufacturing support and technology transfer). The manufacturing support building and technology transfer center as well as portions of the main manufacturing building would be vacated. The Kansas City Plant would be downsized to approximately 1.8 million square feet.

Work would be performed on a single shift. Sprint or surge capacities would come from multiple shift operations.

The Pantex missions would be consolidated primarily into Zone 12, with some support activities in Zones 13, 15, and 16. If the storage of excess plutonium were to remain at Pantex, it could continue to be stored in Zone 4. The high explosive production mission would continue some operations in Zone 11.

Active facilities would consist of about 1.4 million gross square feet. As part of downsizing, there would be modifications and upgrades to some facilities. Facilities not utilized would be put into a standby condition, undergo decontamination and decommissioning, or be made available for alternate uses. If necessary, the facilities that are in standby condition could be quickly reactivated to provide additional operational capacity of up to several hundred additional weapons per year.

2. Costs and Schedules

All weapon production facilities except Pantex experienced significant personnel reductions in the past five years due to the end of new weapons production. In contrast, employment at Pantex increased during that time period due to its unique role in weapons dismantlement. That job is expected to be completed in the next few years, however, and commensurate staffing reductions are expected. Most of the reductions in staff and operating costs are due to the decrease in workload, not the consolidation of the site. Of the total staffing reduction over the next ten years, over 80% will be due to the projected decrease in workload.

Not considered here are operating costs associated with the storage of excess nuclear material. Programmatic and siting alternatives for the storage of this material are continuing to be assessed as part of the Storage and Disposition of Weapons-Usable Fissile Materials PEIS.

The costs and schedules for achieving a downsized Pantex are shown below.

VIII. DESCRIPTION OF PLANNED STOCKPILE MANAGEMENT ACTIVITIES AT THE PANTEX PLANT

1. Description of Planned Actions

Activities

It is DOE's preferred alternative to retain the existing weapon assembly and disassembly missions at the Pantex Plant and to downsize it appropriately to satisfy future production needs. This optimization of the plant size would result in the least technical risk and greatest cost savings. At the same time, it is DOE's intent that LANL, LLNL, and SNL take a greater role and responsibility at Pantex for both weapon assembly technology and the conduct of the weapon surveillance testing program. The responsibilities assigned to LANL, LLNL, and SNL would require the expansion of the laboratories' role at Pantex. A laboratory office jointly staffed by the three laboratories, which is an expansion of the existing Tri-Lab office and the weapons evaluation test laboratory, is expected.

The long-term missions that would be assigned to the Pantex Plant are: (1) assembly/ disassembly, surveillance, and dismantlement of nuclear weapons, (2) pit requalification and nonintrusive reuse, (3) high explosive component production and (4) potentially, storage of the nation's strategic reserves of plutonium (as pits).

Pantex could also be the site for the storage of the DOE inventories of excess nuclear materials. These storage missions are currently being assessed in the ongoing Pantex site-wide EIS and the Storage and Disposition of Weapons-Usable Fissile Materials PEIS.

Operations and Workload

Production processes associated with pit recertification and weapon assembly, disassembly, surveillance, and dismantlement would be identical to those being performed today. The processes needed for pit requalification and nonintrusive reuse would need to be defined and established.

The operational roles of LANL, LLNL, and SNL would change at Pantex. For example, personnel from the laboratories might perform assembly/disassembly for some weapon surveillance operations to improve the programmatic tie between Stockpile Stewardship and Stockpile Management.

Facilities

Facilities at Pantex would be sized to support 300 weapon assemblies and disassemblies per year plus the disassembly and reassembly of surveillance weapons.

An additional uncertainty is associated with the elimination of projected inventories of high explosives from weapon dismantlement. There is currently no approved schedule for this activity. A completion date of FY 2000 is assumed in this report, and is considered conservative, as it allows for two additional years to complete the disposition of high explosives that would be generated at Pantex through 1998.

IX. DESCRIPTION OF PLANNED STOCKPILE MANAGEMENT ACTIVITIES AT THE Y-12 PLANT

1. Description of Planned Actions

Activities

It is DOE's preferred alternative to retain existing weapon secondary and case fabrication missions at the Y-12 plant and to downsize it appropriately to satisfy future production needs. This optimization of the plant size would result in the least technical risk and greatest cost savings. At the same time, it is DOE's intent that LLNL and LANL take a greater role and responsibility at Y-12 for both weapon secondary and case technology and the conduct of the weapon surveillance testing program.

The responsibilities assigned to LLNL and LANL would require the expansion of their role at Y-12. A laboratory office at Y-12, jointly staffed by the laboratories, is expected.

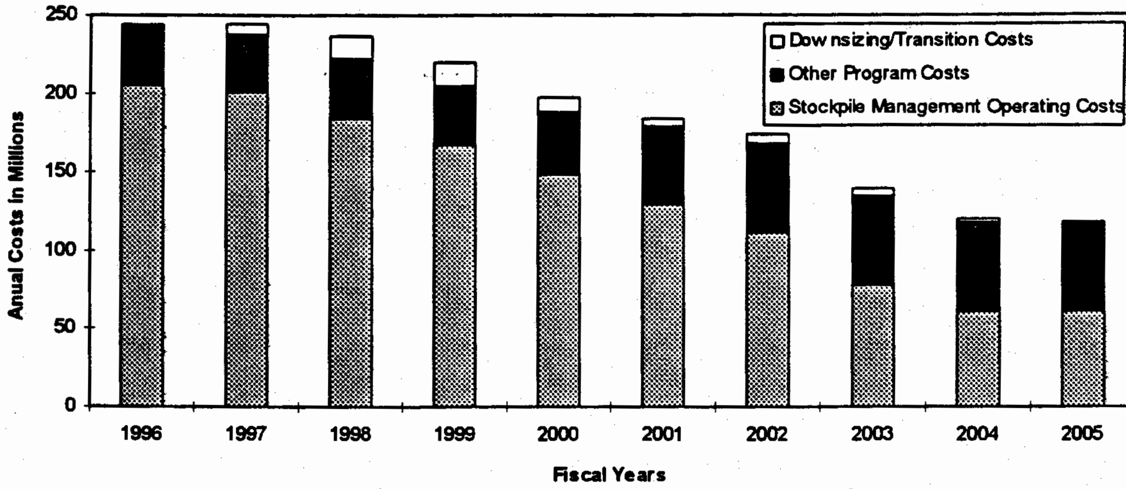
The long-term missions that would remain at the Y-12 plant are: (1) fabrication of components for weapon secondaries; (2) assembly/disassembly and surveillance of weapon secondaries and cases; and (3) potentially, storage of the nation's strategic reserves of highly enriched uranium. The Y-12 plant could also be the site for the storage and processing of excess nuclear materials.

Operations and Workloads

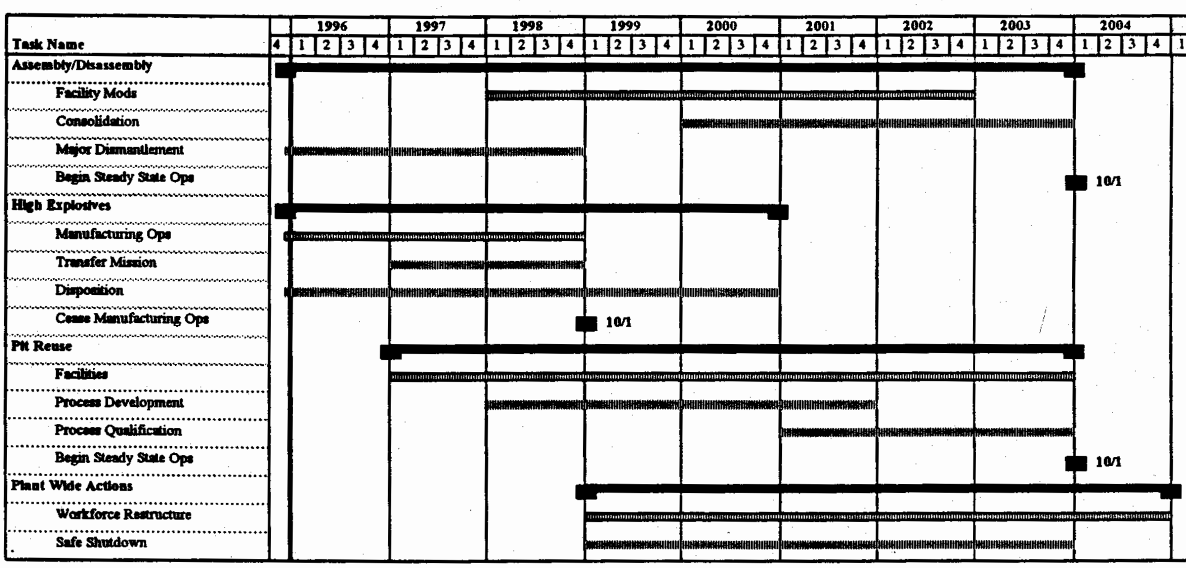
Operations at Y-12 would be sized consistent with projected workload requirements. Operations would normally be performed on a single shift basis. This level of activity would support the manufacture of about 20 secondaries and cases per year. The secondaries and cases manufactured each year would be used to replace secondaries and cases destroyed by surveillance testing.

Requirements for greater production quantities would require increased production operations staff, multi-shift operations, and/or reactivation of standby facilities. Increasing the production staffing could result in a capacity of about 100 units per year on a sustained basis. Annual workload requirements greater than 100 units could be accommodated by either multi-shift operations, or by reactivation of standby capacity.

Projected Annual Costs for Pantex - HE Colocated with A/D



Estimated Implementation Schedules

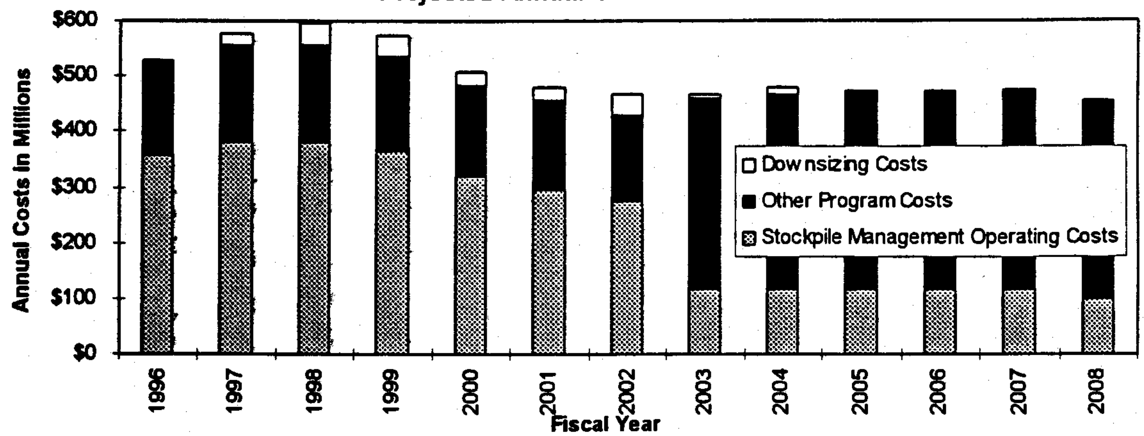


3. Risks, Issues, and Uncertainties

There is very little risk associated with implementing the downsizing of Pantex. The facility modifications are minor and there would be no interruption in operations.

There is no operating experience with pit requalification and reuse. However, the operations are not expected to be significantly different from traditional Pantex processes and equipment, and confidence in the requirements and processes will develop with experience.

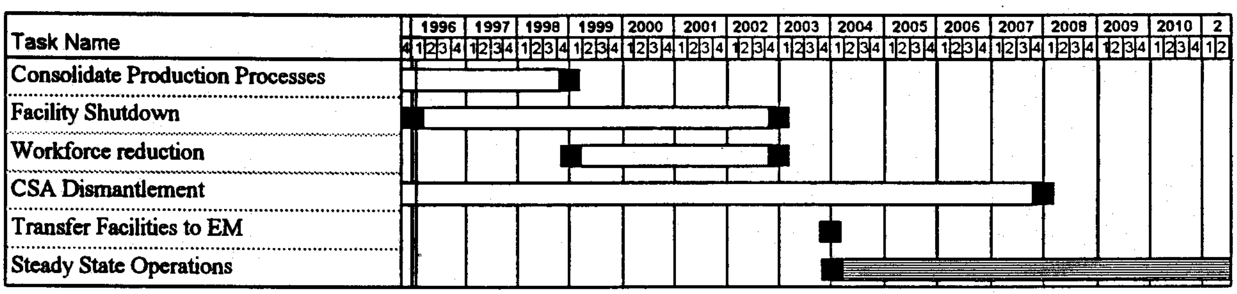
Projected Annual Costs for Y-12



Stockpile Management operating costs are shown to decrease from over $300 million per year to less than $100 million per year by the year 2003. Downsizing costs cover the facility modification, equipment relocation, and other costs to achieve the downsized Y-12. Other program costs include work for other DOE programs and other federal agencies. These costs are assumed to continue at present levels. Not shown are the costs for D&D of facilities determined to be excess to program needs. The landlord costs for excess facilities awaiting D&D are projected to be $131 million annually until the D&D is completed, and are shown as other program costs beginning in year 2003.

The major milestones for downsizing Y-12 are shown below.

Schedule for Downsized Y-12



3. Risks, Issues, and Uncertainties

The planned downsizing of the Y-12 plant involves risk in two areas. The facilities not required for the Stockpile Management program are assumed to be transferred to D&D as the weapons program completes safe shutdown of the facilities. This transfer may not be possible as assumed. Each year of delay in transfer would move $131 million (starting in 2003) from Other Program Costs to the Stockpile Management

The reactivation of standby facilities and equipment and the hiring and training of additional production workers would require about three years. The Y-12 production activities would be performed with a small, flexible workforce.

Production process development work at Y-12 would be integrated with the LLNL and LANL secondary technology program. This integration is expected to result in greater assurance that critical manufacturing technology will be retained and that new production technologies can be introduced without adversely affecting weapon safety or performance. The amount of production technology work at Y-12 is not expected to change significantly from current levels; however, the nature of the work will be more aligned with LLNL and LANL Stockpile Stewardship needs.

Stockpile surveillance activities at Y-12 would also become more integrated with the laboratories. Each organization possesses unique knowledge and skills that will be pooled for greatest efficiency of surveillance operations and for added confidence in the prediction of aging effects. This could result in laboratory employees actively participating in the surveillance testing and evaluation at Y-12, and Y-12 employees doing the same at the laboratories.

Facilities

Y-12 would downsize and consolidate all secondary and case manufacturing processes into significantly fewer existing production buildings. Existing excess equipment that does not have to be removed to accommodate consolidation would be placed in cold standby. In addition, two production buildings would be maintained in a cold standby status as a contingency. The remaining buildings (80%-to-90% of the current floor space) would be made available to other programs, e.g. the fissile materials disposition program, if Y-12 is chosen for the fissile materials disposition mission, or brought to a safe shutdown condition and transferred to Environmental Management for decontamination and decommissioning (D&D).

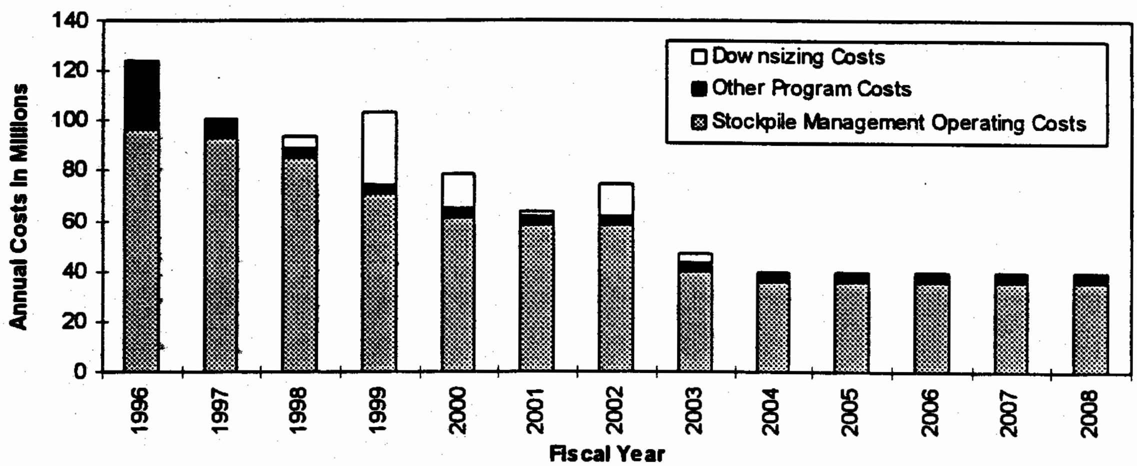
2. Costs and Schedules

Costs of downsizing and subsequently operating Y-12 are shown below.

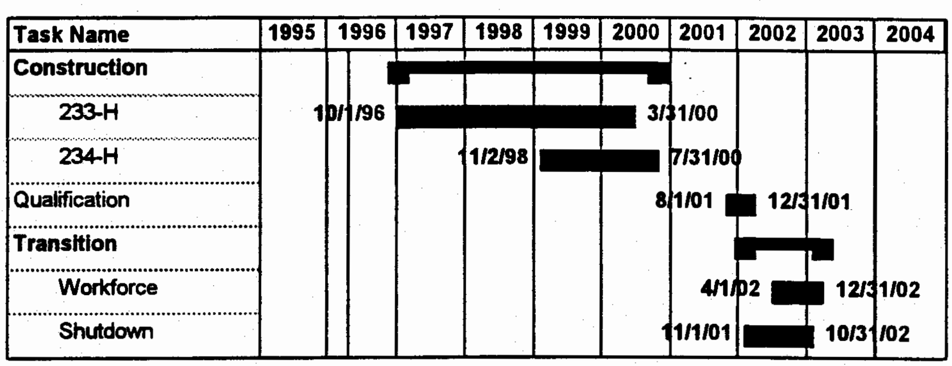
2. Costs and Schedules

Development of preliminary cost estimates to operate and downsize the tritium operations at SRS consistent with the START I or START II stockpile sizes has been completed. However, further analysis is required before a final cost estimate can be established. The preliminary numbers presented below do, however, serve to describe anticipated levels for future operations of the tritium recycle facilities. The total project cost to consolidate tritium operations at SRS is expected to be about $75 million over this period. After consolidation, and as the total stockpile size decreases during the next decade, the annual operating costs will decline from the present level of about $90 million. Annual operating costs after 2002 should range between $40-70 million.

Projected Annual Costs for SRS



The preliminary schedule to implement the downsizing activities is shown below.



operating cost in the above funding chart. This issue must be worked well in advance of the time for transfer of the site landlord responsibilities scheduled for 2003.

The second risk is the implementation of the flexible workforce. The consolidated Y-12, operating at the workload described above, would require a production workforce that is capable of operating various production processes, and is therefore subject to bargaining agreements relative to labor classification.

X. DESCRIPTION OF PLANNED STOCKPILE MANAGEMENT ACTIVITIES AT THE SAVANNAH RIVER SITE (SRS)

1. Description of Planned Actions

Activities

The SRS tritium facilities will continue to support the nuclear weapons stockpile through the recycling of tritium from the weapons stockpile and the loading and surveillance of tritium reservoirs. The SRS would also be the site for tritium production if an accelerator is chosen as the method for tritium production. Tritium production and recycling options have been recently addressed by DOE in a separate PEIS. Tritium recycle plans are presented here for completeness because this activity is an integral portion of the weapons production complex.

A greater role for LANL in tritium recycle technology and tritium reservoir surveillance at SRS is expected. Los Alamos staff could work at SRS in these areas, and conversely it is expected that SRS staff could participate in work at LANL.

Operations and Workloads

Operations at SRS would be sized consistent with projected workload to support tritium reservoirs in the weapons stockpile. The workload level is more directly related to the size of the weapons stockpile than for any other weapon production mission because of the inherent rate of tritium decay and the associated need to replace tritium reservoirs on a scheduled basis.

Facilities

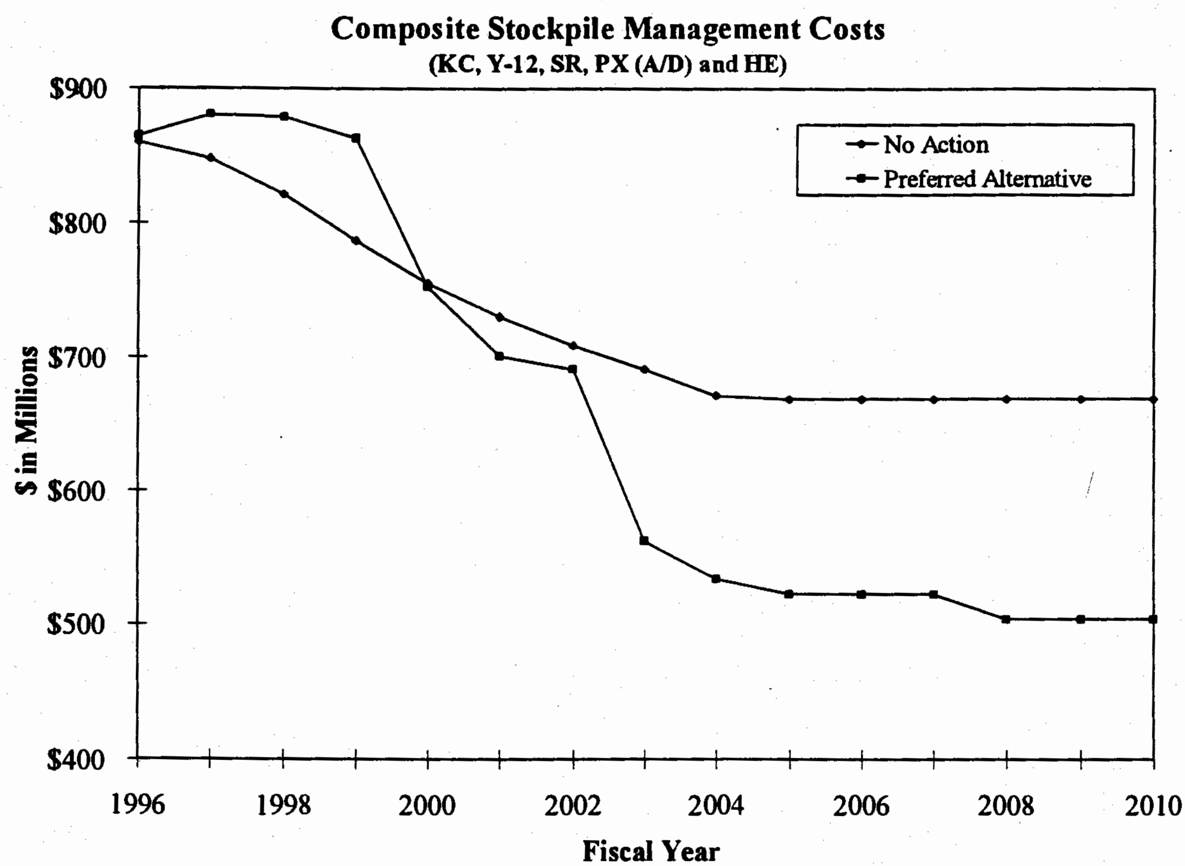
The SRS would downsize and consolidate tritium recycle and surveillance activities into fewer, newer facilities to significantly reduce operating costs. The new Replacement Tritium Facility, building 233-H, would be the principal tritium facility after consolidation.

3. Risks, Issues, and Uncertainties

The risk associated with consolidating tritium activities at SRS is very low. This is because (1) an experienced workforce will be retained, (2) a fully capable infrastructure is already in place, and (3) the existing process expertise is retained.

XI. COMPOSITE COST ANALYSIS

A composite cost comparison which combines the projected cost data for the four production plants is shown in the following chart. It compares the Stockpile Management costs at these plants with no downsizing to the costs if the downsizing described in Sections VII through X is achieved.



As shown above, with no facility downsizing, workload reductions will reduce total operating costs at the four plants from the present level of about $860 million to about $670 million. By investments in facility downsizing, the total facility operating costs would further reduce to about $520 million by FY2005. These annual operating costs include $131 million in site landlord costs at the Y-12 Plant which might be transferred to the DOE Environmental Mangement organization. Stockpile Management total costs at the four plants would be reduced to about $390 million if this transfer were to occur, though DOE total costs would be unchanged.

An investment in facility downsizing of about $170 million over the next four years results in a net savings of approximately $300 million by the end of FY2005, and net savings of nearly $1.1 billion by the end of FY2010. In addition, the initial $170 million investment will be fully recouped by the end of FY2003.