41 Regulatory Compliance

41.01

Commentors state that DOE did not provide enough advance public outreach and notice for the public hearings. Several commentors believe many groups were underrepresented at the hearings including: minority, downstream, and rural communities; Georgia government officials; and SRS employees. The commentors suggest that DOE should make a special effort to involve these groups in public involvement and should also train the minority communities in order for them to contribute substantial comments. Commentors recommend that DOE include visiting schools and universities, and produce better advertisements to notify the public about the program. Another commentor suggests that DOE should automatically notify those who have participated in the past and national offices of groups that would be interested in the topics at stake. One commentor suggests that notices should be at least one month in advance. Other commentors state that there was plenty of notice for meetings and commended DOE for the effort in writing the document, holding the public hearings, and answering questions from the public. One commentor asks how to receive copies of the Stockpile Stewardship and Management PEIS.

- Response: The CEQ's minimum comment period requirement on draft EISs is 45 days (40 CFR 1506.10[c]). The public comment period on the Stockpile Stewardship and Management Draft PEIS was 60 days and was considered appropriate for review and comment on the document since preferred alternatives were identified in the Draft PEIS. DOE has had an extensive and ongoing public outreach program on the Complex since the Reconfiguration Program was proposed in 1990. DOE has utilized several different methods for publicizing public meetings and providing Program information to the public. In addition to advertising in the traditional media, notices and meeting information have been made available electronically and various program documents can be requested or accessed using the toll-free information line, the electronic bulletin board (Internet), and the World Wide Web DOE Home Page. A speaker's bureau has also been established with DOE officials available on a limited basis as requested to speak with interested groups concerning DP activities and issues. This can be requested through the toll-free line or the electronic bulletin board services. DOE has continued to keep the public informed during the public comment period and will continue to do so through the publication of the ROD.

41.02

The commentor does not understand the recent decision on DAHRT, where the judge claims that it is only required that an environmental study be completed, not that it would be found to not have negative effects. Commentor believes that NEPA just delays actions; it does not change them. The commentor notes that NEPA only requires EISs and public hearings; it does not mandate that anyone choose the least destructive course of action.

- Response: The regulations for implementing NEPA state, "The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment" (40 CFR 1500.1[c]). Preparation of NEPA documents as the commentor points out are part of the process. "The primary purpose of an environmental impact statement is to serve as an action-forcing device to ensure that the policies and goals defined in the act are infused into the ongoing programs and actions of the Federal Government" (40 CFR 1502.1). The scheduling of proposed actions which require NEPA review includes the necessary time for complying with NEPA and in most cases does not delay the action. NEPA does not mandate that an agency select the least destructive course of action but does require that the agency "... identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment" (40 CFR 1500.2[e]). DOE must demonstrate compliance with the procedural requirements of NEPA before making final decisions on its major Federal actions.

41.03

Commentors state that decisions to be made in the Stockpile Stewardship and Management Program were predetermined and that input from the public and local officials has little impact on the PEIS or decision process. Commentors express disappointment that DOE did not consider comments and suggestions from the scoping meetings and wonder to what extent public support at various candidate sites was considered in the PEIS process. One commentor points out that the preferred alternative is not always the final choice, while another commentor asks if there was a mechanism for citizens to get the ROD changed. A commentor states that if this is a democracy and majority rules, then the public should be allowed to vote on the PEIS. A commentor warns DOE that they must not underestimate the comments the public makes and that the public will not go away. The commentors also state that Congress and the President control DOE funding and they feel shut out of the defense spending authorization process. Specifically, one commentor notes that money has already been allocated for NIF in DOE's budget for fiscal year 1997. Commentors feel that DOE is withholding important information from the public. Another commentor states that DOE should provide the public with information that would allow them to participate in policy development, and that the "classified for national security" blanket should be removed. Another commentor perceives DOE's position on national security policy as being a policy of so much complexity that it is well beyond the grasp of the public.

- Response: DOE has not made any decisions on the Stockpile Stewardship and Management PEIS proposed actions. DOE has identified in section 3.8 of the Final PEIS the preferred alternatives for both stockpile stewardship and stockpile management. The ROD on the Stockpile Stewardship and Management Program will be issued no earlier than 30 days following the issuance of the Final PEIS. The decisions on the Stockpile Stewardship and Management Program will be identified in the ROD. The ROD, which will be published in the Federal Register and is a publicly available document, will also include the rationale and various factors used by DOE in making the decisions on the Stockpile Stewardship and Management Program.

  Chapter 2 of the PEIS discusses the national security policy considerations and the role they play in defining the purpose and need of the Stockpile Stewardship and Management Program. The Stockpile Stewardship and Management Program was developed in response to changing world conditions, an end to the Cold War, and the reaffirmation of the proposed CTBT. DOE participates regularly in Congressional hearings on defense issues in which the stockpile stewardship and management issues are discussed. Congress determines how funds are allocated and DOE spends monies consistent with Congressional direction. Therefore, Congress ultimately determines whether the decisions resulting from the Stockpile Stewardship and Management PEIS will be implemented.

41.04

Commentors state that DOE cannot expect the public to make decisions on DOE programs in bits and pieces.

- Response: Since the time when the original commitment was made to prepare a PEIS on reconfiguration of the Complex and a PEIS on environmental restoration and waste management, the world has changed significantly. Most importantly, the Cold War has ended, the Nation's nuclear arsenal is being reduced significantly, and a significant amount of special nuclear materials have become surplus to national security needs. These changed circumstances have had a significant effect on DOE's strategic planning, and the PEISs being prepared are responsive to these new circumstances. Because of the large scope of these programs there is no way to avoid some overlap of issues. However, the purpose and need for DOE's proposed programs and relationships between these programs are clearly described in each of the PEISs and site-wide NEPA documents. Section 1.7, Other National Environmental Policy Act Reviews, of the PEIS discusses other DOE programs and their relationship to the Stockpile Stewardship and Management Program.

41.05

The commentors express widely differing views on the PEIS public hearing scheduling, formats, and content. Commentors state that DOE did not tell the truth to the public in the PEIS and the meetings were nothing more than public relations efforts and not worth the cost and effort to hold them; that transcripts be taken at meetings and incorporated into the PEIS so that comments could be accurately tracked and responses verified; that the modified format was better than before because some people may hesitate to approach a microphone during public hearings; that the format should be adhered to and not changed mid-meeting, and that the meetings should focus on environmental impacts, not impacts to peace. Other commentors express the view that the public meetings are a valuable forum for the public and hope that DOE will continue their use. Many commentors favor the formal hearing format rather than the workshop format. One commentor also points out that 1) public meetings are attended by and large by the same people grinding out their own agendas and obviously not interested in facts; 2) too many participants suggest they are representing the public; often this amounts to a public of 1 or 2; and 3) meetings provide a forum for many negative anti-establishment and emotional, vitriolic attacks on any good faith efforts. Commentors ask many questions including: why didn't DOE have a meeting in Oakland, in addition to LLNL, for similar reasons Santa Fe hosted a public meeting; does NEPA allow DOE to lie in the PEIS; is DOE required to respond to comments from the public; why the comments collected do not go through an impartial agency rather than to the reading rooms; and why aren't there more means available for the public to express their opinions to DOE, rather than just NEPA. Another commentor states that the charts handed out at the meetings should be clearly labeled.

- Response: The public hearings on the Draft PEIS were conducted using a modified traditional hearing format. The change in format was in response to past public comments on the interactive public hearing format used for the Tritium Supply and Recycling PEIS and more recent requests by interested parties near several DOE sites. The modified format included a formal statement period in addition to the interactive session, and the recording of a verbatim transcript of the hearing in addition to the notation of comments by designated notetakers. Efforts were made by DOE to accommodate the public to as large an extent as was feasible.

For this reason, modifications were also made between sites as necessary to fulfill special needs or requests from the public, elected officials, and site representatives. The additional public hearing was held in Santa Fe because of substantial public requests and because the city is located in proximity to two of the proposed alternative sites (LANL and SNL) which could potentially receive both stockpile stewardship and stockpile management missions. The principal area affected and public interest area for LLNL potential stewardship missions was the city of Livermore; therefore, only one meeting was held at Livermore.

41.06

Commentors state that the PEIS process was procedurally defective. One commentor states that there are perceived advantages which go to the locations where the PEIS authorship (Albuquerque Area Office) takes place. Another commentor believes that the PEIS pitted LANL and ORR against each other. In addition, the commentor suggests that DOE obtain competent independent evaluations, not location centered, but more broadly centered, using the expertise of people attending the meeting and elsewhere in the Nation to add more credibility to the entire PEIS process.

- Response: The analysis for the PEIS is conducted in accordance with CEQ regulations (40 CFR 1500-1508), and DOE's NEPA regulations (10 CFR 1021) and procedures. The DOE Albuquerque Operations Office's lead in preparing the support stockpile management alternatives reports with oversight of DOE Headquarters represented the best coordination point between stewardship and management elements of the Program. All proposed management alternatives were developed in cooperation with all DOE weapons complex sites. In addition, all supporting data and peer review were provided by each affected site and underwent a substantial comment and revision process. Technical experts at each site with relevant experience in each of the proposed mission areas at both the management and working level provided input and review. The process used in developing the management alternatives and the screening process for determining the preferred alternatives can be found in the Analysis of Stockpile Management Alternatives report and the Stockpile Management Preferred Alternatives Report which are available in the DOE Public Reading Rooms near each site.

41.07

A commentor suggests that a civilian review board be set up to oversight DOE. Other commentors point out that the Defense Facility Safety Review Board performs that responsibility now and that it has been recommended that EPA and OSHA be added to DOE facility oversight. One commentor states that citizen advisory boards are not accountable to the local citizens and do not speak for the citizens with respect to safety concerns.

- Response: Section 4.14 describes the regulations and requirements under which all DOE sites conduct their operations during the normal course of their work activities. This section also describes the applicable DOE orders requiring the reviews performed by the sites of all planned and existing construction and operation for potential accidents and the assessment of the associated human health and environmental consequences of an accident. The sites associated with the Stockpile Stewardship and Management Program would comply with these DOE orders and update the appropriate safety documentation before authorization of construction or start of operations.

On January 25, 1995, DOE created the Advisory Committee on External Regulation of Department of Energy Nuclear Safety and charged it with providing advice, information, and recommendations on whether and how new and existing DOE facilities and operations, except those covered under Executive Order 12344, might be externally regulated to ensure nuclear safety. The Advisory Committee has made the following recommendations concerning the structure of the external regulation: (1) an existing agency-either the NRC or a restructured Defense Nuclear Facilities Safety Board-regulate facility safety at all DOE nuclear facilities under the Atomic Energy Act; (2) OSHA regulate all protection of workers at DOE nuclear facilities under the Occupational Safety and Health Act, unless regulation of worker risks at a given facility could significantly interfere with maintaining facility safety in which case all worker protection would be regulated under the Atomic Energy Act of 1954; (3) EPA continue to regulate environmental protection matters for all DOE nuclear facilities and sites under the environmental statutes; and (4) states with programs authorized by the EPA, OSHA, or the regulator of facility safety acquire or continue to have roles in regulation of environmental protection, facility safety, and worker protection comparable to those they now exercise in the private sector. The committee believes these recommendations will strengthen, streamline, and simplify the regulation of safety at DOE nuclear facilities. The Secretary of Energy has convened a DOE working group to review the recommendations and determine how to implement them. A report is due to the Secretary by the Fall of 1996. DOE, the Administration, and Congress will be involved in determining external regulations for DOE facilities.

Advisory boards act as liaisons between the public and Federal, state, and local governments and agencies. The boards provide an important forum for stakeholders and agencies to explore complex problems and generally provide independent policy and technical advice to affected parties.

41.08

The commentors believe that the threat of using nuclear weapons and the environmental impacts that result from using the weapons are impacts that should be analyzed in the PEIS. According to a commentor, the nuclear arsenal is a temptation to those in power. Another commentor adds that stockpile stewardship and management does not cover the global consequences an accident like Chernobyl could cause. One commentor notes that the PEIS should state that the stockpile sizes discussed could obliterate the planet. The commentor believes that LANL is a bomb designer's dream come true and that the United States will use these weapons if it wants to. The commentor believes this because of a quote from DOD attorney John McNeil stating, "Nuclear weapons can be targeted in ways that either increase or decrease resulting incidental civilian injury and collateral damage, and their use may be lawful or not depending upon the enemy's conduct." The commentor does not agree with these views, especially the idea of incidental civilian injuries, considering the fact that there were 210,000 dead within months of the bombing of Hiroshima and Nagasaki, and 300,000 survivors suffering slow deaths and painful lives over the next 50 years. Commentors state that the American people cannot trust that our nuclear weapons, if they exist, will not be used on civilians again. The commentors cite the dropping of the atomic bomb on Japanese cities, stating that it could have been demonstrated in a nonpopulated area to show U.S. capability. Commentors feel that there is no way to be aware of all the possible effects of nuclear weapons at this time. According to commentors technically there is too much that is unknown, and the world needs to obtain a better understanding of the impacts of nuclear materials. A commentor asks where in the PEIS the impacts to the present agricultural economy which has built and sustained the Texas Panhandle were; why were the risks to this economic stronghold not assessed; what will happen when we no longer produce food for people, where is our priority; are bombs more important than food. The commentor states that those in agriculture strive to produce quality, wholesome food for the world population--one farmer feeds in excess of 131 people, yet the industry across the road from us builds bombs to annihilate people. The commentor asks where is our sense of morality and respect for life. Food is the most important commodity we produce--it must be protected.

- Response: The use of nuclear weapons and the resulting environmental impacts are beyond the scope of this PEIS.

41.09

Commentors are concerned with the cost of the PEIS and would like DOE to spend taxpayer money more frugally. Another commentor asks how much money has been spent on the PEIS.

- Response: NEPA requires DOE to assure that major Federal actions are taken only after due consideration of their environmental impacts. Preparing a PEIS in compliance with NEPA is a complex and costly task for a program as complex as Stockpile Stewardship and Management. The cost to complete the PEIS was approximately $10 million, which is commensurate with the complexity of the issues analyzed.

41.10

Commentors feel that issuing the Stockpile Stewardship and Management Draft PEIS, and the Storage and Disposition Draft PEIS, the Pantex Site-Wide Draft EIS and NTS Site-Wide EISs at the same time prohibited them from thoroughly and responsibly reviewing and commenting on the proposed programs and actions. The commentors state that DOE has placed an unnecessary and unreasonable burden on the affected communities and the public, and request DOE provide assistance to have an independent evaluation performed. Commentors state that by releasing all these documents, DOE was restricting public comment and placing more emphasis on proposal preparation than proposal analysis and review. Another commentor sees the combined meetings as a step forward and feels that DOE is recognizing that there are some overlaps among programs.

- Response: The CEQ's minimum comment period requirement on draft EISs is 45 days (40 CFR 1506.10[c]). The public comment period on the Stockpile Stewardship and Management Draft PEIS was 60 days and was considered appropriate for review and comment on the document. The public comment period on the Storage and Disposition Draft PEIS, which did not identify any preferred alternatives for storage and disposition, was extended from 60 to 90 days to allow the public to fully review and comment on the proposed alternatives. Each of the other documents, as with all DOE NEPA documents, has a public comment period of at least 45 days. Although DOE coordinates all programs and the preparation of NEPA documents, the sheer number of documents being prepared by DOE sometimes results in the release of several documents at the same time. Every effort is made to provide adequate public review of the documents in these cases, balanced with DOE's needs and mission.

  The PEIS and site-wide EISs prepared by DOE comply with the letter and spirit of NEPA. Each document has a concise summary of the most important information found in the entire document. Moreover, the PEISs are organized so that a focused review of any individual site can be readily accomplished. For example, if a member of the public (or a local community) is most interested in just one site (e.g., ORR), each PEIS covers the potential environmental impacts at that site in about 100 pages. Lastly, the main body of each environmental document is written to be understood by the general public, with more detailed, supporting information in appendixes. As a final point, DOE provides a significant amount of funding to states to oversee DOE's operations at the DOE sites as they relate to the health and safety of the public in surrounding communities. We do not believe it is appropriate to provide separate funding to local governments and organizations for document reviews of this kind when we are providing large block funding to the state for such reviews and oversight.

41.11

The commentor feels the Stockpile Stewardship and Management PEIS represents a sequence of site-specific reviews which is not an adequate EIS.

- Response: The format of the PEIS (i.e., discussion of the environmental impacts of the proposed Stockpile Stewardship and Management Program alternatives by site) was selected as the most efficient and user friendly way to communicate the complex issues covered in the document. It allows members of the public who may only be concerned about potential impacts at the DOE site nearest them to focus their review. The use of the format was for the convenience of the public and does not make the PEIS inadequate.

41.12

The commentor feels the NEPA process requires by law a range of reasonable alternatives so the public may evaluate an evenhanded analysis which includes many analyzed alternatives and their ramifications on the environment and international policy. Several commentors feel that DOE has unreasonably constrained the alternatives it analyzes in order to support the one alternative that is preferred. Another commentor states that there is no discussion of the current proposed alternatives' relationship to the anticipated next generation stockpile stewardship facilities.

- Response: Chapter 2 of the PEIS discusses the purpose, need, proposed action, and the reasonable alternatives for the Stockpile Stewardship and Management Program. The range of reasonable alternatives was developed based on two different perspectives discussed in detail in this chapter. The discussion of the purpose and need describes the constraints placed upon DOE in meeting the Program objectives and the formulation of reasonable alternatives addressed in the PEIS. One perspective (section 2.2) is from the top level of national security policies for nuclear deterrence, arms control, and nonproliferation. The other perspective (section 2.3) focuses on the relevant technical efforts to maintain a safe and reliable U.S. nuclear weapons stockpile. The alternatives considered and the reasons they were eliminated from detailed study are discussed in section 3.1.2. Also see the response to comment summary 40.85 for additional discussion of the range of reasonable alternatives considered.

41.13

The commentor feels statements such as "none," "minimal," "within regulatory statutes and guidelines," "manageable," and "amenable" are not credible when describing environmental impacts.

- Response: The terms that the commentor refers to were used by DOE at the public hearings to summarize information presented in the PEIS. Their use was prefaced with the statement that these were DOE's subjective opinions of the impacts described in the PEIS. They were used in an effort to simplify complex information. Others may disagree with these subjective terms. The potential impacts identified in the PEIS are described using some of the terms identified by the commentor as appropriate based on the detail of the analysis. Where data was sufficient to quantify the potential effects of the proposed action they are provided. When regulations, guidelines, or standards were available for comparison purposes they are shown in tables or text with appropriate discussion. In some cases the data and level of analysis was insufficient to quantify effects and the description of impacts are described qualitatively. When qualitative analysis is presented, the discussion necessarily uses terms similar to those noted by the commentor. The discussion supporting both quantitative and qualitative analysis is appropriate to aid the reader in interpreting the potential impacts of the proposed action.

41.14

The commentors request an extension of the public comment period on the Draft PEIS and ask if there will be another public comment period after the Final PEIS.

- Response: DOE did not extend the comment period beyond May 7, 1996, although late comments were considered to the extent possible. Members of the public may submit comments on the Final PEIS, including the preferred alternatives. A decision on the Stockpile Stewardship and Management Program will not be made until at least 30 days after the EPA Notice of Availability of the Final PEIS appears in the Federal Register.

41.15

The commentor believes that NEPA mandates an analysis of economic and impacts on future generations. The commentor also believes that costs, timing, and consumption of nonrenewable resources should together drive the PEIS. The commentor wants a complete environmental impact assessment which includes the impact on future generations. The commentor points out that the words "future generations" are not stated in the document. The commentor questions why these items are missing.

- Response: Chapter 4 of the PEIS describes the affected environment and the potential environmental impacts, including the socioeconomic impacts, expected from the proposed Stockpile Stewardship and Management Program. Nonenvironmental issues concerning cost, schedule, and technical risk are presented and analyzed in the Analysis of Stockpile Management Alternatives report and the Stockpile Management Preferred Alternatives Report which are available in the DOE Public Reading Rooms near each site. The consumption of nonrenewable resources for each of the alternatives is discussed in section 4.17. By completing this PEIS, DOE is meeting the requirements of section 101(b)(1) of NEPA (i.e., "it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may fulfill the responsibilities of each generation as trustee of the environment for succeeding generations...").

41.16

One commentor states that a policy document is needed as the "mother" of all of these NEPA processes. The commentor states that such a document would provide the bridge between the PEISs (and other NEPA processes as needed) and explain their relationship.

- Response: DOE is a diverse and highly complex department with many varied activities. At any given time a number of actions are being planned, constructed, and implemented. Accordingly, there are a number of NEPA actions being conducted simultaneously. In order to explain how the actions proposed by the Stockpile Stewardship and Management PEIS fit into the context of actions proposed by other NEPA documents, section 1.7 was constructed. This section provides the reader with a description of the other major NEPA actions presently being conducted by DOE and describes their relationship to the Stockpile Stewardship and Management PEIS.

  DP has an office solely devoted to NEPA coordination. This office reviews all NEPA actions to assure consistency of assumptions, data, and factual information. Besides this internal DP consistency control, all major NEPA actions are reviewed by the Office of Environment, Safety, and Health, the Office of the General Counsel, and other appropriate departmental elements for consistency with DOE NEPA requirements, DOE policy, and other DOE actions. Such a review and concurrence process is dynamic and constantly reflects current policy and other program considerations.

41.17

The commentor states that the Draft PEIS has not considered the full range of proposed and potential stockpile stewardship alternatives that is required by NEPA. The commentor states that DOE has characterized a number of potential stockpile stewardship facilities as not "ripe" for NEPA review because they have not reached the stage of development and definition that is necessary for evaluation and decisionmaking (Draft PEIS, section 1.2). The commentor states that next generation facilities are included in budget planning and, thus, should be proposed actions in the PEIS. The commentor also believes the ability to perform detailed (i.e., site-specific) environmental impact analysis is not the relevant standard for inclusion of a project in a PEIS. Commentor contends that the exclusion of the Advanced Hydrotest Facility (AHF), HEPPF, ARS (X-1), and Jupiter facility from the analysis of proposed actions is not supported by the facts, and is a violation of NEPA.

- Response: In the Notice of Intent for the Stockpile Stewardship and Management PEIS (60 FR 31291, June 14, 1995), DOE expressed its intent to propose six new facilities for stockpile stewardship: (1) CFF; (2) Atlas Facility; (3) NIF; (4) HEPPF; (5) AHF; and (6) Jupiter Facility. While DOE recognized that these six facilities were at different stages of research, development, and definition, the intent was to make the PEIS as forward-looking and complete as possible, with regard to the future stockpile stewardship program.

  Following scoping, when preparation of the PEIS actually began, DOE realized that three of these facilities (HEPPF, AHF, and Jupiter) were so minimally defined that it would have been premature to "propose" them, in the NEPA-sense, for the purpose of decisionmaking, since more R&D was needed. Therefore, in section 3.3.3 of the Implementation Plan for the Stockpile Stewardship and Management PEIS (DOE/EIS-0236IP), DOE explained that these three facilities were "not currently defined well enough to be considered as proposed stockpile stewardship alternatives."

  Events associated with R&D of the Jupiter facility illustrate the point that the next generation facilities are not currently defined well enough to be considered as proposed stockpile stewardship alternatives. The Jupiter Facility would be a significant technological advancement in the pulsed-power x-ray source capability. During the time the Implementation Plan was being prepared, scientists at SNL realized that, although the concept of Jupiter was defined (a 32 MJ pulsed-power x-ray source), how to achieve that concept was unclear. In fact, SNL scientists concluded that Jupiter represented so large a technological advancement that they developed the concept of the Advanced Radiation Source (ARS) (X-1). The ARS (X-1), which is envisioned as an interim step to an eventual Jupiter facility, would be a four-fold increase over current pulsed-power x-ray sources, yet would only be one-fourth the power envisioned for Jupiter. The performance requirements for the ARS (X-1) have not been fully established; the type of technology to provide the basis for the facility has not been determined, nor have concepts for the resultant physical plant. Consequently, impacts from facility construction as well as from facility operation can only be theorized. Thus, not even ARS (X-1) has reached the stage where the concept can be defined well enough for decisionmaking purposes. Jupiter, which is dependent on ARS (X-1) development, is even further from definition.

However, even though the next generation stockpile stewardship facilities are not defined well enough to be "proposals," they are programmatically assessed in the PEIS to the extent practicable. As DOE stated in section 3.3.3 of the Implementation Plan, "these next generation facilities can be described in general terms such that a consideration of cumulative impacts that might be related to the ultimate science-based stockpile stewardship program can be qualitatively assessed." Section 4.11 of the PEIS describes what the impacts of these three next-generation facilities might be, to the extent they can be forecast at this time. The purpose of section 4.11 is to provide an assessment of the potential cumulative environmental impacts associated with the ultimate science-based stockpile stewardship program.

For each next generation facility, data were developed using a surrogate facility. For example, for AHF, which would be a facility for conducting hydrodynamic tests and dynamic experiments, the tests and experiments themselves can be anticipated to be similar to such activities as analyzed at DARHT; therefore, the DARHT impacts were used for reference. For HEPPF, surrogate data from BEEF, an HE test facility at NTS, were utilized. For the ARS (X-1) and Jupiter, surrogate data were developed from the existing Saturn and Particle Beam Fusion Accelerator (PBFA) facilities at SNL. Section 4.11 has been expanded in the Final PEIS to describe more fully the foreseeable impacts of the next generation facilities.

Regarding the comments that next generation facilities are included in budget planning documents and thus, should be analyzed as proposed actions in the PEIS, the budget process does not address the issue of whether, for NEPA purposes, a project has been proposed or not. Because of the time requirements for Congressional funding, projects are often submitted for line item funds before NEPA completion. Some money needs to be spent during R&D in order to define facilities so that they can then be proposed and evaluated; it is therefore consistent with NEPA to spend money to develop this information. In the case of sophisticated scientific R&D like that for enhanced experimental capability for weapon physics, these expenditures often can be substantial, just for the preliminary stages of exploring theories and proving concepts. This process often involves performing complex experiments using existing facilities that have high operating costs. This experimentation occurs well in advance of the development of the basic information needed for eventual conceptual facility design.

DOE agrees that the ability to perform detailed (i.e., site-specific) environmental impact analysis is not the relevant standard for whether a facility should be included in a programmatic EIS. This is why DOE has included the next generation facilities in the PEIS and has developed a programmatic-level evaluation of potential cumulative program impacts. However, in order for a facility to be a "proposal" in the NEPA sense, the facility must be ripe for decisionmaking. This in turn requires more than just speculative definitions of facility designs.

The following is a more detailed discussion of why each of the next generation stockpile stewardship facilities is not included as a proposed action in the PEIS:

AHF: DOE has modified the Final PEIS (section 3.1.2) to include additional clarifying information on the status of research toward a definition of a future AHF. The commentor quotes extracts from DOE's fiscal year 1997 budget request, among other items, and concludes that DOE's plans for an AHF are sufficiently mature to warrant full consideration and NEPA analysis in the Stockpile Stewardship and Management PEIS. R&D activities relevant (and indeed, necessary) to DOE's ability to determine the feasibility and form of a future AHF are being pursued within the ongoing DOE R&D program. Such radiographic technology R&D has been a historical part of weapons R&D activities. At this point, the feasibility and definition of an AHF is still insufficiently determined for DOE to propose such a facility or adequately analyze it for the purposes of NEPA. For example, performance requirements for such a facility have not been fully established; the type of technology to provide the basis for the facility has not been determined and concepts for the resultant physical plant vary significantly; and therefore impacts from facility construction and operation remain speculative. DOE's present judgment is that significant R&D activity, spanning years, will be necessary.

Early in its planning for the Stockpile Stewardship and Management PEIS, DOE intended to propose that an AHF, representing the next generation of hydrotest capability beyond DARHT, be included within the scope of the PEIS. Conceptually, AHF would improve on the capabilities of DARHT and apply data and information gained from DAHRT. AHF thus could never be an alternative to DAHRT, because DAHRT is an essential precursor to AHF. The intent to propose AHF was to make the document as forward-looking as possible with regard to the future of science-based stewardship. Upon further reflection, however, DOE decided not to propose AHF in the PEIS because AHF's parameters were so minimally defined that a meaningful analysis of its environmental impacts would have been impossible to perform.

Possible technology approaches to an AHF have been discussed within the DOE technical community. These technologies still require development and validation. The specifications and technical requirements for an AHF (that is, determination of what capabilities should be required of an AHF for assessment of stockpile aging and related effects, beyond those of DARHT) are also still being defined. This was noted in the DARHT Final EIS (Volume I, page 3-45) and in the Stockpile Stewardship and Management Draft PEIS. The items excerpted by commentors from the DOE fiscal year 1997 budget request reflect a portion of the research activities both ongoing and anticipated, that are necessary to evaluate and develop these technologies, understand requirements, and provide a decision basis for a possible future AHF proposal by DOE.

Three basic technology approaches are currently being examined. These include linear induction accelerators of a type similar to those in the baseline DARHT design, an inductive-adder pulsed-power technology based on technology now in use for other purposes at SNL and elsewhere, and high-energy proton accelerators similar to technology in use at Los Alamos Neutron Science Center and elsewhere in the United States and internationally. The first two represent different approaches to accelerating a high-current burst of electrons, which produce x rays when stopped in a dense target. The x rays actually produce the flash radiograph. This is the approach used in the existing PHERMEX and FXR facilities and to be used in DARHT when completed. The third approach would use bursts of very energetic (approximately 20 billion electron volt) protons, magnetic lenses, and particle detectors to produce the radiographic image. The impacts associated with construction and operation of facilities based on these different technologies cannot be fully defined at this time (because of technical uncertainties) and could be significantly different depending on the technology approach. For example, acreage required could be comparable to or somewhat larger than the 3.6 ha (9 acres) of land resources required for DARHT, but use of proton radiography could require an accelerator comparable in scale to the kilometer-long Los Alamos Neutron Science Center or to other large accelerators operated by DOE. Therefore, the size of the footprint, as well as other factors which to some degree govern environmental impacts, is speculative at this time.

Each of these technology approaches not only has some technical promise, but also has technical issues to be resolved or demonstrated. Therefore, DOE is examining approaches to perform the necessary R&D. As commentors have noted, DOE has proposed increases in future operating budgets to Congress to better address these research issues. DOE does not believe that these individual details of its ongoing and evolving R&D activities, within the historical and ongoing mission of the DOE's weapons R&D responsibilities, in themselves constitute a distinct "proposed action" appropriate for NEPA analysis and alternatives in this PEIS.

HEPPF : DOE has modified the Final PEIS to include additional clarifying information on HEPPF, and its relationship to ongoing pulsed power research and the Atlas Facility. A discussion of the relationship of HE pulsed power with Atlas and of the complementary nature of laser and pulsed-power experiments is also contained in the Atlas site-specific analysis in appendix K, which has also been revised in the Final PEIS to incorporate updated information.

A new HEPPF would be a direct outgrowth of the longstanding Athena program; however, this activity is no longer known by that name. (The name Athena was a Los Alamos identifier only, and such R&D has also been performed under other designations. It is now pursued within the high energy density physics element of Los Alamos' Stockpile Stewardship Program activities.) Since the 1960s, DOE has pursued weapon research applications of electrical pulsed power on the microsecond time scale. This R&D program has involved HE pulsed-power generators of various types, which have been exploded at existing HE firing sites in the Complex, as well as fixed-facility capacitor banks such as Pegasus II. Some HE firing sites (e.g., TA-39 at Los Alamos) have been specially configured to support these pulsed-power experiments; a principal firing site at TA-39 has within its bunker a capacitor bank to provide the seed electrical current for the HE pulsed-power generators. Impacts of these ongoing R&D activities are included in the No Action alternative in the PEIS.

Commentors may be confusing evolutionary development beyond a particular design of HE pulsed-power generator (Procyon), with a possible follow-on HE firing site, configured specially for pulsed-power experiments, beyond the existing capabilities in the Complex. It is the latter that would be the prospective purpose of HEPPF. The Final PEIS has been modified in order to clarify this distinction. An HE pulsed-power generator, such as Procyon, is basically an assembly of HE and metal (e.g., copper) and other components which is explosively and destructively detonated a single time, resulting in a brief pulse of high electrical current being delivered to the experimental configuration. High magnetic fields result from the high current pulse and may either be directly used to study materials phenomena or may be used to produce high pressures and implosions of (typically) cylindrical shells. (See the discussion in the Atlas site-specific analysis, appendix sections K.1 and K.2.1.) Procyon is therefore the name of a type of explosive generator, and is not a facility. A typical Procyon generator with the experimental region attached is about 3 m (10 ft) long. In principle such an experiment could be performed at any appropriately equipped explosive firing location, within applicable environmental limits. DOE believes that the continued evolutionary R&D on explosive generators and their use in pulsed-power experiments, within the historical and ongoing mission of DOE's weapons R&D responsibilities, do not in themselves constitute a distinct "proposed action" appropriate for NEPA analysis and alternatives in this PEIS. Rather, such R&D activities are needed to develop the required information so that DOE can formulate a proposal.

As distinct from an explosive generator, a firing site is a facility typically consisting of a firing location, associated hardened bunkers, and related equipment, in an area from which personnel can be excluded. Many different HE experiments (including those in which pulsed electrical power is produced) can be performed at a HE firing site, as long as the explosive blast, and other experiment parameters, do not exceed the capabilities of the firing site. Currently most of the largest-scale HE pulsed-power experiments in the United States, whether for technology development, weapons stockpile stewardship, or for unclassified scientific collaborations (conducted separately) including those with Russian scientists, are conducted at a Los Alamos pulsed-power firing point at TA-39. As noted in the PEIS, section 3.3.4.2, this experimental capability has a limit of approximately 500 kg (1,100 lbs) of HE. Therefore a potential need for a new HEPPF was postulated to support generators using much larger explosive charges, which though not yet demonstrated could produce higher pressures in larger masses and volumes than can be accessed at the LANL site. Existing laboratory sites cannot readily support experiments with much larger charges, as noted in the section 3.3.4.2.

Since the idea of an HEPPF was first conceived some years ago, BEEF was separately developed as a firing site at the NTS, based on refurbished bunkers originally developed for atmospheric nuclear tests. Although not specially configured for HE pulsed power like the principal LANL firing site, in its current configuration BEEF is suitable for a variety of HE experiments including many pulsed-power technology experiments, and experiments related to such purposes have been part of recent qualification tests. Therefore, it may be possible to make modifications to BEEF when the need for and definition of such modifications is clear, to satisfy any future need for a new HEPPF. (As at other firing sites many pulsed-power experiments could be performed at BEEF without capital modifications.) At this time, the definition of such modifications is insufficient to make a full analysis meaningful; however, section 4.11 describes these modifications and impacts to the extent that they can currently be foreseen. Analysis of the impacts of operating the existing BEEF facility for explosive experiments, including experiments that involve pulsed-power technology, is incorporated in the NTS Site-Wide EIS.

Commentors note correctly that both HE pulsed power and R&D associated with capacitor banks, such as Pegasus II or the proposed Atlas, are activities within the Stockpile Stewardship and Management Program. For some years DOE has pursued both capacitor bank facilities and HE experiments in pulsed power, since HE generators offered a means to explore higher energy (higher current) frontiers without major capital investment, albeit at a relatively low data rate, and capacitor banks offered the advantages of repeatable (and indoors) experimental facilities with higher data rates, for broad experimental use. Data from HE experiments, for example, have helped provide validation of technical issues used in the Atlas design concept. Thus both kinds of activities are sensible aspects of DOE's overall R&D program. Appendix K considers reliance on explosive-driven pulsed-power experiments and discusses why this is not a reasonable alternative to Atlas.

While it is true that if pursued a HEPPF could be available sooner and with less expense than NIF, microsecond pulsed power is complementary, rather than a reasonable alternative, to a laser such as NIF. The technologies provide different physical regimes and experimental scales, both necessary to address stockpile stewardship issues. Relative to this specific comment, neither high explosive nor capacitor-bank microsecond pulsed power is able to provide as high a temperature or pressure as would be provided by NIF. Discussion of this point has been expanded in the Final PEIS in section 3.3 and is also provided in appendix K.

ARS (X-1) and Jupiter : ARS (X-1) and Jupiter have been presented in the PEIS as next generation facilities because extensive R&D of this technology in the existing Saturn and PBFA facilities will be required before DOE would be in a position to propose either of these facilities for NEPA evaluation and decisionmaking. To the extent that specifics of these yet-to-be designed facilities are known, the ARS and the Jupiter facilities would both have an advanced pulsed-power x-ray source to provide enhanced experimental capabilities in the areas of weapons physics, inertial confinement fusion, and weapons effects.

The ARS (X-1) facility would utilize a pulsed-power accelerator capable of producing more than 8 MJ of x-ray energy to study the physics of radiation flow, opacities, high energy densities, the effects of radiation on weapons, and potentially inertial confinement fusion relevant physics. Conceptually, the Jupiter would generate about 32 MJ of x-ray energy, compared to the existing PBFA which is expected to generate 2 MJ of x-ray energy. Since both of these facilities would expand on a research and technology infrastructure already existing at SNL, it is expected that they would also be located at SNL.

The concept for ARS (X-1) grew out of the initial vision at SNL to develop an advanced pulsed-power facility that could provide the source environments for weapon effects testing after the loss of underground nuclear testing. That initial capability was called Jupiter; a 60 MA driver generating ~18 MJ of x-ray energy. In assessing the feasibility of successfully building Jupiter, SNL came to the conclusion that the 36 times increase in x-ray output energy, in going from the existing facility Saturn to Jupiter, represented too high a technical risk. A more logical step is the ARS (X-1), which will allow an increase (by a factor of two) in current to 40 MA and a factor of four in x-ray energy output to 8 MJ over that of the PBFA. Data to support eventual development of the ARS (X-1) will be obtained from research associated with the existing PBFA. This R&D will establish the necessary level-of-confidence to proceed with ARS (X-1). The step to Jupiter, given validation of scaling laws on the ARS (X-1), would follow a similar logical track and would be projected to increase the current by a factor of two (to ~80 MA) and increase x-ray energy output by a factor of four (to ~32 MJ).

The entire development process may be viewed as risk management. It is not prudent to take too large a technical jump at great risk if it is possible to manage the risk and still achieve significant technical progress. Recent breakthroughs in pulsed power (generating record power and hohlraum temperatures) demonstrated on existing facilities at SNL, may be extrapolated to future facilities such as the ARS (X-1) and Jupiter to predict sources that could provide significant new capabilities to support the stockpile stewardship program. However, the performance requirements for these future facilities have not been fully established; the type of technology to provide the basis for the facility has not been determined, nor have concepts for the resultant physical plant. Consequently, impacts from facility construction as well as from facility operation can only be theorized. Thus, neither the ARS (X-1) nor the Jupiter have reached the stage where the concepts can be defined well enough for decisionmaking purposes.

41.18

Several commentors express disagreement with the justification for the No Action alternative as an unreasonable alternative and also state that the alternative is both misnamed and not clearly explained in the Draft PEIS. Commentors indicate that the No Action alternative effectively embraces most of the DOE's actual proposed Stockpile Stewardship and Management Program, when one looks at new construction planned or underway. The commentors state that as a result of its fragmented and segmented approach, the discussion of the entire Stockpile Stewardship Program has been unreasonably narrowed down to a discussion of three specific projects. The commentors contend that the following list of publicly acknowledged major Stockpile Stewardship and Management Program components were not adequately discussed, or in many cases mentioned in the current Draft PEIS: DARHT, Processing and Environmental Technology Laboratory, Chemistry and Metallurgy Research building, Accelerated Strategic Computing Initiative, Los Alamos Neutron Science Center, Weapons Experimental Tritium Facility, Los Alamos Critical Experiments Facility, Lyner Facility, BEEF, and the contained firing facility at PHERMEX. Another commentor adds that DOE is already building stockpile management facilities like the Chemistry and Metallurgy Research building upgrades at LANL and the Processing and Environmental Technology Laboratory at SNL before any public involvement. Another commentor indicates that the Enhanced Surveillance Program was not addressed in the Draft PEIS.

- Response: Given the national security policy decision by the President to enter into a zero-yield CTBT, our Nation will no longer have a proof-positive means to ensure the continued safety and reliability of the nuclear weapons stockpile. The three specific projects (NIF, Atlas, and CFF) described in the PEIS as enhanced experimental capabilities, represent the proposed action for the stockpile stewardship portion of the Program. Each of these projects would provide new capabilities in distinct weapons physics regimes. They would be used to assist in the assessment and certification that the nuclear weapons stockpile is safe and reliable in the absence of underground nuclear testing. Also see the response to comment summary 40.85.

  In accordance with NEPA, the PEIS also assesses the No Action alternative. The No Action alternative is described in broad terms in section 3.1.4 of the PEIS, and in more detail in chapter 4 and appendix A of the PEIS. Under No Action, DOE would not take the actions proposed in the PEIS, but would continue with existing actions. For stockpile stewardship, this means continuing the existing actions at LANL, LLNL, SNL, and NTS related to stockpile stewardship. A table has been added to the site descriptions in appendix A of the Final PEIS to identify and describe the major stockpile stewardship facilities and activities. The relationship between the facilities described by the commentor and the Stockpile Stewardship and Management Program is as follows:

  DARHT : Impacts of construction and operation are covered in its own EIS, discussed in section 1.6.2, and DARHT has been judged to be an appropriate interim action by the U.S. District Court for the District of New Mexico (No. 94-1306-m, April 16, 1996). The Stockpile Stewardship and Management PEIS considers DARHT in the No Action alternative in sections 3.1.4 and 3.3.1.1. See the response to comment summary 41.20 for additional discussion on DARHT.

  Processing and Environmental Technology Laboratory: This project would construct a new building at SNL to consolidate the activities from three existing buildings that are old and inefficient. No change in mission or capabilities would result from the construction of the Processing and Environmental Technology Laboratory. The EA was completed in November 1995, and a Finding of No Significant Impact (FONSI) was issued in December 1995. Construction and operation of this facility are included in the Stockpile Stewardship and Management PEIS No Action alternative.

Chemistry and Metallurgy Research Building Upgrades Project: Three phases of upgrades have been identified: (1) Phase I-upgrades to fix ES&H deficiencies; required even if the life of Chemistry and Metallurgy Research building is not extended; upgrades were categorically excluded; (2) Phase II-upgrades to extend the life of the Chemistry and Metallurgy Research building for an additional 20 to 30 years to support current R&D mission; an EA is in progress to determine whether a FONSI is appropriate or whether the project should be included in the LANL Site-Wide EIS; (3) Phase III-upgrades not required to support current missions, but rather to support potential future missions; not included in the Chemistry and Metallurgy Research building EA, but is assessed in the Stockpile Stewardship and Management PEIS as appropriate for alternatives that establish new missions at LANL. The Phase III upgrade is also expected to be included in the LANL Site-Wide EIS if the ROD for this PEIS expands LANL missions that require the Chemistry and Metallurgy Research building Phase III upgrades. See the response to comment summary 40.90 for additional discussion on the Chemistry and Metallurgy Research building.

Accelerated Strategic Computing Initiative: Computer systems to be procured to support the science-based stockpile stewardship program. The NOI for the Stockpile Stewardship and Management PEIS discussed computational capabilities as follows: "To handle simulations of weapon performance and assessments of weapons safety without underground nuclear testing, improved computational capabilities are needed. However, because there are not expected to be any environmental impacts from this activity, the PEIS is not expected to provide any assessment of these capabilities." No comments were received on this issue during scoping, and because there are no environmental impacts from procuring and operating computers, they are not assessed in the PEIS. See the response to comment summary 41.19 for additional discussion on the Accelerated Strategic Computing Initiative.

Los Alamos Neutron Science Center: In October 1995, there was an administrative action that transferred landlord responsibility for this facility from Energy Research to DP. Despite this administrative change, this facility still performs the same historic missions. Specific impacts from continued operations are being assessed in the LANL Site-Wide EIS. The Stockpile Stewardship and Management PEIS includes the impacts from Los Alamos Neutron Science Center in No Action.

Weapons Engineering Tritium Facility: An EA covering construction and operation of the Weapons Engineering Tritium Facility was proposed and a FONSI issued in April 1991. This facility has been operational for the past 2 years to support ongoing stockpile stewardship and management missions. Continued operations of this facility are included in the Stockpile Stewardship and Management PEIS No Action alternative.

Los Alamos Critical Experiments Facility: The proposed action would consolidate surplus machines for nuclear materials criticality training and experimentation from various Complex sites to LANL. No change to current activities at LANL and no new capability results from this consolidation. This consolidation improves the efficiency and management of facilities that are used for the hands-on training of workers on nuclear materials criticality issues. The EA was completed in April 1996 and a FONSI was issued in May 1996. The Stockpile Stewardship and Management PEIS includes the impacts from this facility in No Action.

Lyner Facility: Stockpile stewardship activities at NTS have been analyzed in EISs, as well as the NTS Site-Wide EIS. These EISs have identified the impacts of nuclear tests, safety tests, and equation-of-state experiments. Although the term "subcritical" is not used in the previous EISs, some tests and experiments conducted over the past decades, as well as their impacts, are substantially the same as those contemplated by the new terminology. The term "subcritical experiments" is intended to clarify the fact that such experiments would not achieve the condition of criticality, consistent with the President's pursuit of a zero-yield CTBT. The terminology is not intended to define a new form of activity. The NTS Site-Wide EIS, the purpose of which is to evaluate the impacts of near-term (next 5 to 10 years) activities at NTS, includes a project-specific impact analysis of subcritical tests and experiments at the Lyner facility under alternatives 1 and 3. The subcritical tests and experiments are not new activities at NTS for purposes of the Stockpile Stewardship and Management PEIS, but rather are considered in the context of continuing activities, and are included in the No Action alternative. See the response to comment summary 40.02 for additional discussion on the Lyner facility.

BEEF: This facility at NTS is used to study hydrodynamic motion associated with HE detonations as discussed in sections 3.3.1.1 and 3.3.4.3. The operation of BEEF is addressed in the NTS Site-Wide EIS. See the response to comment summary 41.17 for additional discussion on BEEF.

PHERMEX: This facility is used to perform high-speed radiography at LANL. It is discussed in section 3.3.1.1. See the response to comment summary 41.17 for additional discussion on PHERMEX.

Enhanced Surveillance Program: This is a term used to describe R&D activities which are aimed at ensuring that the nuclear weapons remaining in the stockpile will continue to be safe and reliable. The Enhanced Surveillance Program is part of the stockpile stewardship and management ongoing program.

41.19

One commentor cites a figure of $2.1 billion for the cost of the Accelerated Strategic Computing Initiative as proof that the Stockpile Stewardship and Management Program is already proceeding, and is doing so without constraint. The commentor states that the implication of this is that decisions on the Stockpile Stewardship and Management Program have already been made, or will be prejudiced by Accelerated Strategic Computing Initiative.

- Response: No decisions have been made for the proposed actions described in the Stockpile Stewardship and Management PEIS. Any decisions resulting from the PEIS process will not be made until at least 30 days after the Final PEIS has been filed with EPA.

  The Accelerated Strategic Computing Initiative is a multi-staged computer development program whose goal is to increase by more than a thousand-fold the computational speed and data storage that currently exists. Without underground nuclear testing, computational simulation will be an essential (and sometimes only) means of predicting the effects of aging on component and weapon safety and reliability. Due to the complexity of nuclear weapons, increases of more than a thousand-fold are needed to simulate weapon performance and assess weapon safety.

Because each advance in computational speed and data capabilities is a precursor to the next advancement, Accelerated Strategic Computing Initiative can only be developed in stages. Through the end of fiscal year 1996, the commitment of funds to support the Accelerated Strategic Computing Initiative will be less than $90 million. The funds committed to date are for R&D of the prototype system that will eventually support the stockpile stewardship computational requirements. These R&D activities to date are part of the ongoing stockpile stewardship program, which is independent of the proposed actions described in the PEIS (i.e., regardless of whether or not DOE proceeds with enhanced experimental facilities, all of the expected Accelerated Strategic Computing Initiative procurements will be part of the existing program to maintain a safe and reliable stockpile without underground nuclear testing). Because of the independent utility of these Accelerated Strategic Computing Initiative procurements, the commitment of resources that has been made does not prejudice the ultimate decisions related to the proposed actions in the PEIS.

41.20

The commentor believes that it is unacceptable that the DARHT Second Axis is not included in the PEIS whereas the Atlas Facility is. In the commentor's opinion, the two projects (DARHT's Second Axis and Atlas) are roughly comparable in costs and start dates.

- Response: Splitting a construction project into separate line items for Congressional budgeting (or combining previously separate line items) does not automatically imply that additional NEPA review is needed, especially when the entire project has already been subject to a NEPA review. While it is true that in the early 1990s, DOE decided to include funding for the second axis of DARHT as a separate line item for Congressional budgeting purposes, DOE has recently determined that it will not now be a separate line item. Citing its decision in the October 1995 DARHT ROD to complete the dual-axis facility with phased containment, DOE submitted a new Construction Project Data Sheet to Congress as part of its fiscal year 1997 budget request. The new data sheet combines both axes into a single line item (new Budget Number 97-D-102). However, no additional funding was requested in fiscal year 1997 for the second axis. The new Congressional data sheet includes all actions directed by the ROD, including constructing the second axis, but indicates that funding for the second axis will be requested only when the "most optimum" funding profile has been determined.

  DOE has addressed the need for dual-axis radiography, and the environmental impacts from implementing a decision to construct and operate both the first and second axis, in the DARHT EIS and the related ROD. As commentor notes, the courts have found that DOE properly analyzed the DARHT proposal in the DARHT EIS prior to completing the Stockpile Stewardship and Management PEIS. Therefore, there is no need to include in the Stockpile Stewardship and Management PEIS any additional project-specific analyses of the environmental impacts of the 1995 decision to construct and operate the second axis of DARHT since the analysis has already been completed in the DARHT EIS. This PEIS, however, does include the impacts from construction and operation of both axes of DARHT in the cumulative impacts under the No Action alternative.

42 Relationship to Other DOE Programs/Activities

42.01

The commentors urge better integration and timing of the NTS and Pantex Site-Wide Draft EISs, the Stockpile Stewardship and Management Draft PEIS, and the Storage and Disposition Draft PEIS. Another commentor suggests an integrated program to find the most cost-effective solution. The commentor states that site-wide decisions will be made before programmatic decisions and that this will limit public involvement and full analysis of the alternatives. The commentor wonders why site-wide decisions will be made before programmatic decisions, especially since the programmatic decisions will have an impact at the site. The commentor also questions why different plutonium pit storage options are considered in the Stockpile Stewardship and Management PEIS, the Storage and Disposition Draft PEIS, and the Pantex Site-Wide Draft EIS. Another commentor asks if there will be an attempt to produce a simplified document showing the relationship between the PEISs and site-wide EISs.

- Response: The CEQ's minimum comment period requirement on draft EISs is 45 days (40 CFR 1506.10(c)). The public comment period on the Stockpile Stewardship and Management Draft PEIS was 60 days and was considered appropriate for review and comment on the document. The public comment period on the Storage and Disposition Draft PEIS, which did not identify any preferred alternatives for storage and disposition, was extended from 60 to 90 days to allow the public to fully review and comment on the proposed alternatives. Each of the other documents, as with all DOE NEPA documents, has a public comment period of at least 45 days. The schedules for release and the duration of the comment periods for each document was determined in accordance with the directives of the individual programs. Although DOE coordinates all programs and the preparation of NEPA documents, the sheer number of documents being prepared by DOE sometimes results in the release of several documents at the same time. Every effort is made to provide adequate public review of the documents in these cases, balanced with DOE's needs and mission.

  Overlapping issues between the PEISs and the site-wide EISs (e.g., storage of plutonium) have been coordinated and analyzed in the respective documents based on the scope of each document. The decision strategy has also been identified in each of these documents for the overlapping issue of concern. For example, the Stockpile Stewardship and Management PEIS will support decisions on the long-term storage of pits that will be needed for national security requirements (strategic reserve pits). The Storage and Disposition PEIS will support decisions on the long-term storage of all pits (strategic reserve and surplus) and the approach for dispositioning pits that are surplus to national security requirements. Decisions on the long-term storage of pits would be made in a joint ROD of the PEISs, and a decision relating to the storage of the pits until implementation of the selected long-term storage option would be made in the ROD for the Pantex Site-Wide EIS.

  Sections 1.7.1 through 1.7.5, under Other National Environmental Policy Act Reviews, of the PEIS discuss the relationship between the Stockpile Stewardship and Management PEIS and the Pantex, LANL, and NTS Site-Wide EISs. As described in these sections, any decisions on the future roles of these sites in the Stockpile Stewardship and Management Program will be identified in the ROD for this PEIS. These Stockpile Stewardship and Management Program decisions will not compromise any of the analyses presented in the site-wide documents, but will provide additional information on the future missions at these sites that will require consideration in the site-wide EISs.

42.02

The commentor would like to see additional nonweapons work at LANL and recommends that the site-wide EIS look at the enhancement of nonweapons work. Another commentor thinks it is ironic that the Stockpile Stewardship and Management PEIS proposes an upgrade of pit production at LANL while the Storage and Disposition PEIS is concerned about what to do with these pits.

- Response: LANL is a multi-disciplinary research facility engaged in a variety of programs for DOE and other Government agencies. Its primary mission is the nuclear weapons Stockpile Stewardship and Management Program and related emergency response, arms control, and nonproliferation and environmental activities. It conducts R&D activities in the basic sciences, mathematics, and computing with applications to these mission areas and to a broad range of programs including: nonnuclear defense; nuclear and nonnuclear energy; atmospheric, space, and geosciences; bioscience and biotechnology; and the environment. A more detailed discussion of the complete spectrum of laboratory activities can be found in the current LANL Institutional Plan, which is unclassified and available to the public. The LANL Site-Wide EIS is currently being prepared and analyzes alternatives for LANL's operation over the next 5 to 10 years. Nonweapons work, and any enhancements thereto, would be included in the site-wide EIS.

42.03

The commentor expresses concern that new programs such as bringing spent nuclear fuel rods from other countries and wastes produced from new programs will contribute to waste management problems since there is no place to dispose of this waste.

- Response: The Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Study (DOE/EIS-0203-F) analyzes at a programmatic level the potential environmental impacts over the next 40 years of alternatives related to the transportation, receipt, processing, and storage of spent nuclear fuel under the responsibility of DOE. This EIS formed the basis for deciding, on a programmatic level, which sites will be used for the management of the various types of spent nuclear fuel to which DOE holds title. It included the amount of foreign research reactor spent nuclear fuel that might be accepted in its assessment of potential impacts, and addressed the sites at which the foreign research reactor spent nuclear fuel could be stored if a decision is made to accept foreign research reactor spent nuclear fuel. In addition to this document, the Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel (DOE/EIS-0218F) *evaluates* the potential environmental impacts that could result from the DOE and Department of State joint proposal to adopt a policy to manage spent nuclear fuel from foreign research reactors. Based on these and other environmental impact studies, DOE intends to make decisions and take actions to identify sites for waste management facilities in order to protect public health and safety, comply with Federal law, and minimize adverse effects to the environment.

42.04

The commentor notes that the Lyner facility remains classified so that the "enemy" cannot determine the equation of state information, yet there is no way to determine the environmental impacts of this project.

- Response: A brief description of the Lyner Complex may be found in the NTS Site-Wide EIS appendix section A.1.1.1.3, Dynamic Experiments and Hydrodynamic Tests. Further Lyner Complex details will be addressed in a classified appendix to the document noted above. The details of the Lyner Complex were included in the DP environmental consequences analysis in chapter 5 of the same document. See the response to comment summary 40.02 for additional discussion on the Lyner facility.

42.05

The commentor states that no DOE NEPA document programmatically covers reprocessing. The commentor states that reprocessing is partially covered in a number of different DOE NEPA documents but that there is a need for an integrated document that evaluates reprocessing as a whole over the Complex.

- Response: As the commentor noted, reprocessing of spent nuclear fuel is not relevant to the Stockpile Stewardship and Management Program. With a decreasing stockpile DOE no longer has a need for reprocessing and is not proposing this action as part of the Stockpile Stewardship and Management Program. The recent NEPA studies referred to by the commentor addresses proliferation concerns and issues, or activities to stabilize nuclear materials because of a health, safety, or environmental concern related to the condition of the material. Since the defense-related chemical separations activities (i.e., reprocessing) were shut down at SRS in March 1992, there is a large inventory of in-process solutions containing a wide variety of special isotopes including plutonium-242. These stored solutions could present an unreasonable risk and require continuing vigilance to assure their continued safe storage and to avoid potentially severe radiological impacts should an accident occur. Therefore, the solution containing plutonium-242 is being converted to an oxide which has a stewardship programmatic use. This PEIS analyzes the environmental impacts of storing the oxide material at SRS or transporting the plutonium-242 oxide to LANL or LLNL for storage (section 4.19). Also see the response to comment summary 40.41 for more discussion of plutonium-242.

42.06

The commentors have reservations about an expanded role for Pantex that would include permanent storage of plutonium pits, plutonium scrap, uranium, and such, as well as processing and reprocessing of plutonium and the possibility that a nuclear reactor would be built there to burn mixed oxide fuel or to produce tritium. One commentor asks what kind of capacity does Pantex have right now and how close are they to reaching that capacity level. Another commentor asks what was the preferred alternative for HEU storage.

- Response: Storage of the plutonium strategic reserve could occur at Pantex and does fall within the Stockpile Stewardship and Management Program. If Y-12 is selected as the site for the secondary and case fabrication mission, HEU strategic reserve storage would remain at ORR. If Y-12 is not selected, then the HEU strategic reserve could also be stored at Pantex. The strategic reserve provides pits and secondaries which could be used for replacement in the enduring stockpile or as feedstock for nuclear fabrication. If the decision is made that strategic reserves be stored with non-strategic reserves, then consolidated storage could be at one of the five sites being considered in the Storage and Disposition PEIS, one of which is Pantex. The commentor is referred to the Storage and Disposition PEIS for information regarding an expanded role at Pantex that would include the long-term storage and disposition of nonstrategic plutonium. Tritium production will not take place at Pantex.

42.07

The commentor expresses concern regarding the Waste Management Draft PEIS proposed alternative for LLNL's Site 300, which is already on the EPA's Superfund List, as a regional facility for mixed LLW.

- Response: DOE needs to make decisions and take actions to identify sites for waste management facilities in order to protect public health and safety, comply with Federal law, and minimize adverse effects to the environment. The Waste Management Draft PEIS is intended to provide environmental information to assist DOE in determining at which sites it should modify existing waste management facilities or construct new facilities. The waste management facilities proposed in the Waste Management Draft PEIS include treatment and disposal facilities for mixed LLW. The Waste Management Draft PEIS analyzes potential environmental risks and costs associated with a range of mixed LLW management alternatives, including one regionalized alternative involving LLNL. After publication of the Waste Management Final PEIS (in late 1996), DOE will issue RODs on the treatment and disposal of mixed LLW. Please refer to the Waste Management Draft PEIS for more information regarding mixed LLW alternatives.

42.08

The commentor feels there are many expensive programs that need funding before undertaking unneeded installations that have a strong appearance of tools for the design and development of new weapons--examples include site cleanup, storage of LLW, long-term storage of plutonium, development of theater anti-ballistic missiles, and storage and reprocessing of spent reactor fuel. Commentor further suggests it would even make more sense to drill contingency holes in Nevada in case an unexpected international situation demanded a special nuclear weapon response for which a test would be required.

- Response: In response to direction from the President and Congress, DOE has developed its Stockpile Stewardship and Management Program to provide a single, highly integrated technical program for maintaining the continued safety and reliability of the nuclear weapons stockpile. It has evolved from existing predecessor programs that served this mission over previous decades. With no underground nuclear testing and no new-design nuclear weapons production, DOE expects existing weapons to remain in the stockpile well into the next century. This means that the weapons will age beyond original expectations, and an alternative to underground nuclear testing must be developed to verify the safety and reliability of weapons. To meet these new challenges, DOE's science-based Stockpile Stewardship and Management Program has been developed to increase understanding of the basic phenomena associated with nuclear weapons, to provide better predictive understanding of the safety and reliability of weapons, and to ensure a strong scientific and technical basis for future U.S. nuclear weapons policy objectives.

  Because there can be no absolute guarantee of complete success in the development of enhanced experimental and computational capabilities for stockpile stewardship, the United States will maintain the capability to conduct nuclear tests under a "supreme national interest" provision in the anticipated CTBT. DOE will need to maintain the capability for nuclear testing and experimentation at NTS and the necessary technical capabilities at the weapons laboratories to design and conduct such types.

DOE must set priorities, in consultation with DOD, the National Security Council, and other Federal agencies, in structuring a balanced program to meet national security objectives within constrained funding. The proposed Program is debated each year relative to Program and funding priorities both within the Executive Branch and with the Congress. DOE believes the funded program that results from this debate is one that best strikes a balance between competing interests, and best meets U.S. national security requirements.

42.09

The commentor states that DOE recommends that strategic storage should be collocated with A/D functions, but does not emphasize the protection of those reserves to meet future national security needs. Commentor believes Pantex should be the preferred site for such a mission in coordination with its stewardship functions. In addition, the commentor feels Pantex should be selected for all storage and disposition storage functions as it makes no sense from budget or other perspectives to site strategic storage at one site and surplus at another, and that this would minimize transportation risks and costs.

- Response: Both the Stockpile Stewardship and Management PEIS and the Storage and Disposition PEIS analyze reasonable alternatives for the long-term storage of strategic reserves of plutonium and HEU. Because the overall scope of each PEIS is significantly different, different long-term strategic reserve storage alternatives are reasonable for each PEIS. For example, the Stockpile Stewardship and Management PEIS evaluates alternatives for strategic reserve storage (in the form of pits and secondaries) at the weapons A/D facility (either Pantex or NTS; Pantex is DOE's preferred alternative). The Storage and Disposition PEIS has a relatively broader scope regarding fissile material storage, which will include the storage of all surplus material, Naval reactor fuel, and Naval reactor fuel feedstock, as well as nonweapons R&D materials. It analyzes alternatives, among others, that would collocate strategic reserve storage. Pantex is one such alternative for this collocation. Preparation of these two PEISs is being closely coordinated to ensure that all reasonable alternatives for long-term strategic reserve storage are assessed. No decision regarding the long-term storage of strategic reserves is expected to be made until both PEISs have been completed. Cost and other factors will be taken into account during the decisionmaking process.

42.10

A commentor expresses opposition to building a tritium facility. Another commentor asks that Southwestern Public Service comments on the Tritium Supply and Recycling Draft PEIS be included in the Stockpile Stewardship and Management and Storage and Disposition PEISs, and the Pantex Site-Wide EIS. Another commentor states that better integration between this PEIS and the Tritium Supply and Recycling Draft PEIS is required because the stockpile sizes considered in this PEIS builds in a bias toward future tritium production.

- Response: *The* Tritium Supply and Recycling Final Programmatic Environmental Impact

Statement (DOE/EIS-0161, October 1995) details the need for tritium and analyzes the potential environmental impacts associated with various site and technology alternatives for the production of tritium. It also includes responses to all public comments received on the Tritium Supply and Recycling Draft PEIS. In addition, the ROD published in the Federal Register (60 FR 63878) on December 12, 1995, outlines DOE's plans in pursuing a tritium supply for the enduring stockpile. Section 1.6 discusses the relationship between tritium supply and recycling and stockpile stewardship and management. The comments received on tritium supply and recycling were responded to in the Tritium Supply and Recycling Comment Response Document and considered in making the tritium supply and recycling ROD. They have not been repeated in this document because tritium is an interim action as discussed in section 1.6 of this PEIS.

42.11

The commentor asks, relative to section 1.6.1, what would the need date be for a new tritium facility if we had used START I as a planning base.

- Response: The need date for a tritium facility based on START I stockpile levels would be 2005. Producing tritium to support a START I-sized stockpile was analyzed in the Tritium Supply and Recycling Final PEIS in section 4.11.

42.12

The commentor states that DOE's approach to the relationship between its NEPA review for its rebuilt Complex and for management of waste from that Complex seems to be to simply assume in this Draft PEIS that all waste management problems will be solved through the Waste Management Draft PEIS, and in the Waste Management Draft PEIS it is assumed that all potential conflicts with the Waste Management Draft PEIS will be resolved in the Stockpile Stewardship and Management Draft PEIS. The commentor states that these documents are incompatible for comparison purposes. The commentor points out that there is no analysis in any document which allows citizens or policy makers to compare the aggregate environmental impacts of the various programmatic alternatives for the future of the Complex, no document that provides for any program alternative or comprehensive picture of that alternatives's impacts from materials handling and use in manufacturing, through waste management, to long-term storage or disposal. The compartmentalization of environmental review (separate analyses for weapons research and production and waste management) detracts from the usefulness of the Stockpile Stewardship and Management Draft PEIS. The commentor further states that the Draft PEIS waste management analyses for each site for the stockpile stewardship and management alternatives do not provide impacts of waste management, but rather impacts on waste management facilities. There is no analysis of health and environmental impacts of waste management activities which will be attributable to the individual alternatives, despite the fact that much of the contamination of air, soil, and water in the past has been the result of waste management operations. Additionally, the calculated impacts in the Draft PEIS do not include the total impacts of radioactive materials handling to serve stockpile management alternatives, and of treatment, storage, and disposal of stockpile management waste.

- Response: DOE has coordinated the preparation of the Stockpile Stewardship and Management PEIS with the preparation of the Waste Management Draft PEIS. The relationship between the two documents is discussed in section 1.7.1 of the Stockpile Stewardship and Management PEIS. The waste volume presented in the Waste Management Draft PEIS are for all DOE sites and facilities and not just the Stockpile Stewardship and Management Program activities. Waste management activities that would support the Stockpile Stewardship and Management Program are assumed to be per current site practice and are contingent upon decisions to be made through the Waste Management PEIS. The waste volumes from stockpile stewardship and management alternatives have been provided to the Office of Environmental Management to include in the Waste Management Final PEIS analysis. Section 4.13 of this PEIS includes the potential wastes management cumulative impacts at each site for the different waste categories and the potential program and projects affecting that site.

Because the nuclear weapon stockpile level is decreasing and due to waste minimization and pollution prevention practices, the volume of wastes generated from weapons program activities is decreasing. In addition, under the preferred alternative of downsizing and consolidating A/D, nonnuclear fabrication, and secondary and case fabrication, the waste generation would actually decrease at Pantex, KCP, and ORR.

The environmental and health impacts of site waste management facilities and activities are included in the description of the affected environment for each site in chapter 4 of the PEIS. The analysis in the PEIS assumes current and planned site waste management facilities and current handling, storage, and disposal practices in place for all site-generated waste. The types and volumes of waste generated by the stockpile stewardship and management activities would be handled in these facilities in the same manner as all other site waste and in accordance with all applicable Federal and state regulations, and DOE orders. Because these facilities are permitted and have been addressed by other NEPA documents and environmental review, and stockpile stewardship and management waste types and volumes would not change or exceed the operating conditions or capacities of these waste management facilities, the environmental and health impacts due to Stockpile Stewardship and Management Program activities would not be substantially different from that described for the existing conditions at each alternative site.

42.13

The commentor recommends that DOE shut-down NTS and convert it to a solar energy testing site if the area is not too hot.

- Response: Chapter 3.2 of the NTS Site-Wide EIS explains DOE's rationale to maintain NTS as a site with multiple programs. NTS has historically been a multi-purpose facility because of its remote location, arid climate, controlled access, and size. For these reasons, a single program alternative, such as the existing Solar Enterprise Zone, as described in the NTS Site-Wide EIS, would fail to meet DOE's need for a site that can support evolving DOE missions, including the capability to resume nuclear testing as mandated by the President.

42.14

One commentor states that the waste figures presented in the Waste Management Draft PEIS are not consistent with those in the Stockpile Stewardship and Management PEIS. Another commentor expresses shock that the amount of waste to be produced over the next 20 years by the stockpile stewardship and related nuclear research programs, as presented in the Waste Management Draft PEIS is much more than what is currently in storage.

- Response: DOE has sought to assure consistency between the two PEISs. The commentor should realize, however, that the Waste Management Draft PEIS makes a bounding analysis of potential waste generation from all DOE facilities and programs, while the Stockpile Stewardship and Management PEIS limits waste generation estimates to waste generated for the Stockpile Stewardship and Management Program. The Waste Management Final PEIS will be updated to include information consistent with that provided in the Stockpile Stewardship and Management PEIS.

42.15

The commentor is opposed to DARHT and increased weapons production.

- Response: Facilities required for stewardship purposes, such as DARHT, would be used to assess the safety and reliability of the nuclear weapons in the remaining stockpile. DOE does not plan increased weapons production, but rather is supporting a program to reduce the nuclear weapons stockpile, consistent with international agreements, while keeping the remaining stockpile safe and reliable.

42.16

The commentor states that the Storage and Disposition Draft PEIS and Stockpile Stewardship and Management Draft PEIS contradict each other in that the Storage and Disposition Draft PEIS indicates that ORR is considered for plutonium and the Stockpile Stewardship and Management Draft PEIS states that plutonium would not be located anywhere it is not already located. Conversely, continues the commentor, one of the sites that was not mentioned at all was LANL. The commentor wants to know why LANL was not included in the Storage and Disposition Draft PEIS.

- Response: The Stockpile Stewardship and Management Program sought alternatives that both built on existing site infrastructure and expertise and tended to further consolidate the Complex to support a smaller nuclear weapons stockpile. For these reasons, sites for plutonium pit production where no existing infrastructure and expertise existed were not considered reasonable. In addition, introducing plutonium to a site with no significant existing infrastructure and expertise would further expand the Complex and be contrary to DOE's desire to further consolidate and/or downsize the Complex. For these reasons, ORR was an unreasonable alternative for the plutonium pit production for the Stockpile Stewardship and Management Program. In contrast, the Storage and Disposition Program sought a broader range of alternatives. These alternatives would, due to international safeguards and inspection considerations, be independent of nuclear weapon program facilities. ORR was considered a reasonable alternative for this mission. Chapter 3 of the Storage and Disposition Draft PEIS provides further justification for the selection of ORR as a reasonable alternative site, and the lack of selection of LANL as a reasonable alternative site.

42.17

The commentor asks if DOE currently assumes that as material is transferred on the books from strategic into surplus, that it is then covered by the current Disposition of Surplus Highly Enriched Uranium Environmental Impact Statement (DOE EIS, June 1996) or will there be additional need for documentation to look at the additional material as it gets transferred over.

- Response: One reason that DOE is covering the storage of strategic reserve material in both the Stockpile Stewardship and Management PEIS and the Storage and Disposition PEIS is to address this comment. Both PEISs cover the storage of this material to assure that future Program decisions, including decisions to transfer material from strategic reserve to excess, have adequate NEPA coverage.

42.18

The commentor concurs that the Rocky Flats Environmental Technology Site is not suitable for the stewardship and management of nuclear weapon components and special nuclear materials and that these materials must be removed at the earliest date. Commentor indicates that in addition to nuclear weapons components and special nuclear material at Rocky Flats Environmental Technology Site there are large quantities of plutonium waste to be removed before D&D can begin, and that existing buildings are not suitable for this kind of storage. The commentor requests an immediate decision on the disposition and schedule of this liability, or permission for commentor's organization (Rocky Flats Cleanup Commission, Inc.) to provide interim storage at a dedicated offsite facility.

- Response: The Rocky Flats Environmental Technology Site was not considered for any Stockpile Stewardship and Management alternatives, and the comment addresses programmatic issues at Rocky Flats Environmental Technology Site that are outside the scope of the Stockpile Stewardship and Management Program. The commentor should address the DOE Environmental Management Office or the local DOE office at Rocky Flats Environmental Technology Site regarding the potential capabilities of the Rocky Flats Cleanup Commission, and its ability to address current Rocky Flats Environmental Technology Site cleanup problems.

43 General/Miscellaneous Environmental

43.01

The commentor feels that science has been totally neglected. At the last DOE meeting of the Yucca Mountain board, the commentor asked about colloidal studies. The Federal national laboratory did colloidal studies, according to the commentor, and the commentor now wants to know why the studies are not commercialized upon.

- Response: The commentor is referring to the basic issue that radionuclides may attach to colloids and be transported in water when they would otherwise not be expected to move. There have been a number of studies of the colloidal transport of radionuclides from underground nuclear testing in groundwater at NTS. Related studies on similar radionuclides and rocks have been performed for the Yucca Mountain geologic repository project, and DOE's Office of Subsurface Science has conducted studies on other rock types found at NTS. Migration of tritium in groundwater at NTS has been found to be more significant than transport of other radionuclides as colloids. Therefore, present studies focus on transport rates of radionuclides as a result of all mechanisms, not solely colloidal transport. It is also important to distinguish between groundwater flow and the much more rapid flow of water in streams on the earth's surface. Groundwater is subject to distinctly different chemical and physical processes than those applicable to surface waters.

43.02

The commentor asks why all of DOE's really bad Superfund sites are called a National Environmental Research Park (NERP) and suggests DOE should call it National Environmental Research Disaster Site (NERDS). Commentor's definition of a "park" is a piece of ground for ornament and recreation.

- Response: The naming of these sites is outside the scope of the PEIS.

43.03

The commentor believes that denial is a major roadblock to making progress towards peace in the United States because the people working in armaments are deep in denial about how their work is affecting the society and the public's health.

- Response: The proposed actions in the PEIS are consistent with national security policies. The impacts of these alternatives on public health are discussed in the PEIS.

43.04

The commentor wants to know why, in light of the Chernobyl accident and its health and environmental consequences, the U.S. Government insists that it needs to create more radioactive material with the potential for disaster even if the weapons are never used.

- Response: It is assumed that the commentor is referring to the production of special nuclear material (plutonium and HEU). This program does not plan to produce any additional special nuclear material.

43.05

The commentor does not support the new armory proposed for Taos, NM.

- Response: The siting of a new armory near Taos, NM and the environmental impacts of its construction and operation is not within the scope of this PEIS.

43.06

The commentor recommends that a section for the catastrophic environmental impacts of the past weapons program should be included in the summary of environmental impacts section. The commentor cites the Rocky Flats Environmental Technology Site as an example of how DOE activities have catastrophically affected the public and the environment. Another commentor suggests that leadership rather than technology was the problem at the Rocky Flats Environmental Technology Site. The commentor wants to know if the corporate culture that lead to the disaster has changed; what happened at the Rocky Flats Environmental Technology Site and why it had to be shut down; how much of the area around Colorado was contaminated; what is DOE's long-range plan for dealing with the waste; why is the pit fabrication mission being brought to LANL; and what measures DOE plans to undertake to ensure that LANL does not become another Rocky Flats Environmental Technology Site.

- Response: The No Action alternative as it relates to the Stockpile Stewardship and Management Program is discussed in section 3.1.4. All activities currently supporting the stockpile stewardship and management activities at each site within the Complex were projected to the year 2005 and were included in the No Action alternative. In this baseline, the environmental impacts of all DP activities, consistent with NEPA requirements, were identified for each resource or issue area and can be compared to the environmental impacts of the various stockpile stewardship and management alternative proposed actions. DOE plans to maintain the weapons stockpile using emerging technologies as appropriate to mitigate environmental impacts. These new technologies have the potential to further reduce waste generation from the rates described in the PEIS and raw material usage while reducing processing steps and operating costs.

43.07

Commentor suggests that LANL needs competitive bidding for its management contract and oversight by the New Mexican government.

- Response: Federal and state agencies share regulatory authority over DOE facility operations. DOE has entered into agreements with regulatory agencies on behalf of all of the DOE facilities being considered in the PEIS. These agreements normally establish a schedule for achieving full compliance at these DOE facilities. Table 5.3-4 lists the potential requirements imposed by the major state regulations applicable to the PEIS. DOE is committed to managing all facilities in compliance with all applicable regulations and guidelines. Competitive bidding practices are outside the scope of the PEIS.

43.08

The commentor suggests the United States take a leadership role in the elimination of anti-personnel mines but realizes the U.S. economic motivation of the production of mines may make this difficult.

- Response: Anti-personnel mines are beyond the scope of the PEIS.

43.09

The commentor states that no consideration is given to all the chemicals that are poisoning the human body by allowing the chemical companies to put all of their chemicals into food supplies which will harm all humanity in the United States. The commentor asks which is worse: the pollutants that go out by Pantex that affect the local population, or all the chemicals that go into our food supplies affecting the whole nation.

- Response: The use and the potential human health and environmental impacts of chemicals by consumers, manufacturing and industrial facilities, and the agricultural industry are beyond the scope of this PEIS. The affected environment section 4.5.2 describes the existing conditions at Pantex. The environmental impacts from the proposed alternatives at Pantex are described in section 4.5.3 including the potential impacts from site chemical use and emissions.

43.10

The commentor is concerned that the Federal Government is expanding nuclear programs in the State of New Mexico without investing any money in the state. The commentor believes that DOE has no commitment to public health surveillance in the state despite a rapid large-scale expansion of nuclear programs.

- Response: DOE would not be significantly expanding nuclear programs in New Mexico with implementation of its PEIS preferred alternative. However, DOE has and continues to make significant economic investments in the state. A recent University of New Mexico study (The Economic Impact of DOE on the State of New Mexico, jointly prepared by DOE and New Mexico State University, published July 1995, covering fiscal year 1994) attributed more than one in ten jobs in the state directly or indirectly to DOE activities. DOE has also made a significant commitment to public health oversight for its operations in New Mexico. Agreements exist with state regulatory and enforcement organizations for the continued oversight of environmental regulations and waste management. Funding has been provided to the state by DOE for this purpose.

43.11

The commentor asks all the employees of all the laboratories, all the way up to Hazel O'Leary, if there is a solid foundation in nonweapons production, then "wouldn't that be real job security when the balanced budget axe cutters come after you?" The commentor states that global competition for U.S. businesses could be affected tremendously. The commentor believes that scientists in Japan and Germany are helping their businesses design products to be sold around the world. The commentor states that we are doing great in weapons production, but in everything else, we seem to be falling apart.

- Response: DOE has always encouraged its production and laboratory facilities to perform work for other customers when this work did not interfere with DOE mission work and it could be shown that no private industrial facility was willing and capable of performing the work. Performance of this type of work had the advantage to the Government of deferring overhead costs and helping to retain core competencies. As DOD and other Federal agency procurements have decreased in recent years, it has been increasingly difficult to attract work of this kind to DOE facilities.

43.12

The commentor sees the nuclear issue as an issue for the rest of human time. We are the last generation, according to the commentor, that will have the opportunity to address this issue in a responsible manner simply because we are responsible for it. The commentor also stresses the need to have the best scientists working in the nuclear arena. Another commentor wants to know why safer alternatives to nuclear weapons are not being utilized.

- Response: The United States is promoting nonproliferation through the NPT and the CTBT and reductions in its nuclear weapon stockpile through treaties such as START II. Congress and the President have directed the Secretary of Energy to ensure that the stewardship program preserves the core intellectual and technical competencies of the United States in nuclear weapons without nuclear testing and without new weapons production. This includes competencies in research, design, development, testing, reliability assessment, certification, manufacturing, and surveillance capabilities.

43.13

The commentor states that Los Alamos has been billed "the little Oak Ridge" for quite some time, and it looks like a $600 million project. The commentor would like the PEIS to discuss whether Los Alamos has received $600 million for a capital project.

- Response: DOE is aware of concerns in the Oak Ridge community that DOE is taking actions at Los Alamos to establish uranium fabrication and processing capability to the detriment of future ORR Y-12 missions. These concerns are unfounded in fact. There has not been, nor is there planned to be, a "$600 million project" at Los Alamos to establish a "little Oak Ridge." The following actions are being taken at Los Alamos that relate to Y-12 missions.

  The Chemistry and Metallurgy Research facility is being upgraded to fix safety deficiencies and to extend the life of the facility. The primary mission of the facility is plutonium analytical chemistry in support of the LANL plutonium facility (TA-55). One of four operating wings of Chemistry and Metallurgy Research facility contains limited capability for HEU operations. A limited amount of DOE funding ($2 to $4 million per year) has been given to Los Alamos for work in this area in recent years. Most of the work has focused on chemical recovery technology for HEU so that LANL can process its onsite legacy residues of enriched uranium.

  The Sigma Complex facilities constitute the major LANL facilities for fabrication of components (which do not contain plutonium or HEU) for R&D. Work performed here that relates to Y-12 missions include fabrication of parts from depleted uranium and its alloys, lithium salts, and other specialty metals. These are traditional missions of these facilities that have been ongoing for decades. No significant upgrades have occurred to these facilities in recent years, and the only planned modifications are to accommodate missions transferred from the Rocky Flats Environmental Technology Site under the nonnuclear consolidation program.

43.14

The commentor states that the Government could save $18 million of the laboratory's $40 million travel budget if the top brass drove from Albuquerque airport instead of chartering flights.

- Response: DOE and LANL travel budgets and any potential savings that might be expected from alternative means of travel are beyond the scope of the PEIS. However, if the commentor is referring to the routine flights that were "chartered" between Albuquerque and Los Alamos, these flights were discontinued in 1995 due to reduced traffic demand.

43.15

The commentor believes that the history discussion in chapter 2 should go back further than the beginning of the Cold War in order to provide a better perspective on nuclear weapons issues. Another commentor asks about the differentiation of the terms "post-Cold War" and "neo-Cold War."

- Response: The purpose of and need for the Stockpile Stewardship and Management Program is discussed in chapter 2. This discussion provides sufficient justification for the proposed actions and the alternatives analyzed in the PEIS, and includes a brief discussion of the Cold War.

43.16

The commentor feels that a weapons program is needed to ensure national security. Another commentor feels national security will result from people working towards peace and justice.

- Response: Nuclear weapons are a key component of national security and the President has declared the maintenance of a safe and reliable nuclear weapons stockpile to be a supreme national interest. DOE has reduced the size of the stockpile as a result of arms control and nonproliferation objectives. DOE responds to the direction of the President and Congress. The preferred alternatives were chosen, in part, because they do satisfy U.S. arms control and nonproliferation objectives. One benefit of science-based stockpile stewardship is to demonstrate the U.S. commitment to NPT goals; however, the U.S. nuclear posture is not the only factor that might affect whether or not other nations might develop nuclear weapons of their own. Some nations that are not declared nuclear states have the ability to develop nuclear weapons. Many of these nations rely on the U.S. nuclear deterrent for security assurance. The loss of confidence in the safety or reliability of the weapons in the U.S. stockpile could result in a corresponding loss of credibility of the U.S. nuclear deterrent and could provide an incentive to other nations to develop their own nuclear weapons programs.

43.17

The commentor applauds DOE's efforts and the fact that we do have a Nation that is willing to put things together, and consolidate nuclear waste and/or enriched uranium and plutonium.

- Response: Within the Complex, there is a common waste management approach that emphasizes four areas of concern: the reduction of environmental impacts by hazardous or toxic substances, process improvements that minimize waste generation, recycling in order to minimize waste to be disposed and raw material use, and the treatment of generated waste. DOE is increasing its efforts at minimizing the use of hazardous materials and the number and volume of waste streams consistent with programmatic needs through active pollution prevention and waste minimization programs. DOE plans to maintain the weapons stockpile using emerging technologies to mitigate environmental impacts. These new technologies have the potential to reduce waste generation and raw material usage while reducing processing steps and operating costs.

43.18

The commentor believes that the effects of forest fires must be included in the discussion of the current environment at LANL. The commentor notes that a recent fire in the Los Alamos and Bandelier area came within two miles of LANL before it was brought under control, and any discussion of the current environment at LANL must include consideration of such fires.

- Response: DOE agrees with commentor that the Dome Fire, a wildfire that burned over 16,000 acres of National Forest Service and National Park Service land just south of LANL in April and May 1996, aptly illustrates the potential impact of wildfire on life, safety, property, and natural resources. Accordingly, DOE, LANL, Los Alamos County, and the Forest Service are working together to take immediate actions to reduce the fire hazard on and around LANL, and to plan for long-term forest management that would incorporate fire management techniques.

AIRNET and NEWNET are the two air quality monitoring systems employed by LANL; AIRNET data are reported to the public annually in the Environmental Surveillance Report, and NEWNET data are publicly accessible over the Internet computer links as they are collected. Neither AIRNET nor NEWNET stations went off-line during the Dome Fire. Over the past 8 months, LANL has eliminated several AIRNET stations that are no longer needed or were redundant with other sampling as part of an overall effort to streamline the sampling networks to ensure their effectiveness. Just prior to the outbreak of the Dome Fire, LANL reprogrammed four of five monitoring stations in the southern part of the laboratory to transmit data at longer intervals in order to determine long-clock stability, but returned to the original transmittal intervals during the Dome Fire to provide better coverage.

43.19

A number of commentors expressed opinions on issues such as changing the DOE seal, undiscovering plutonium, the neutron source of modern warhead designs, the cleanup of nuclear waste at Hanford, and the storage of spent fuel rods.

- Response: These issues are beyond the scope of this PEIS.

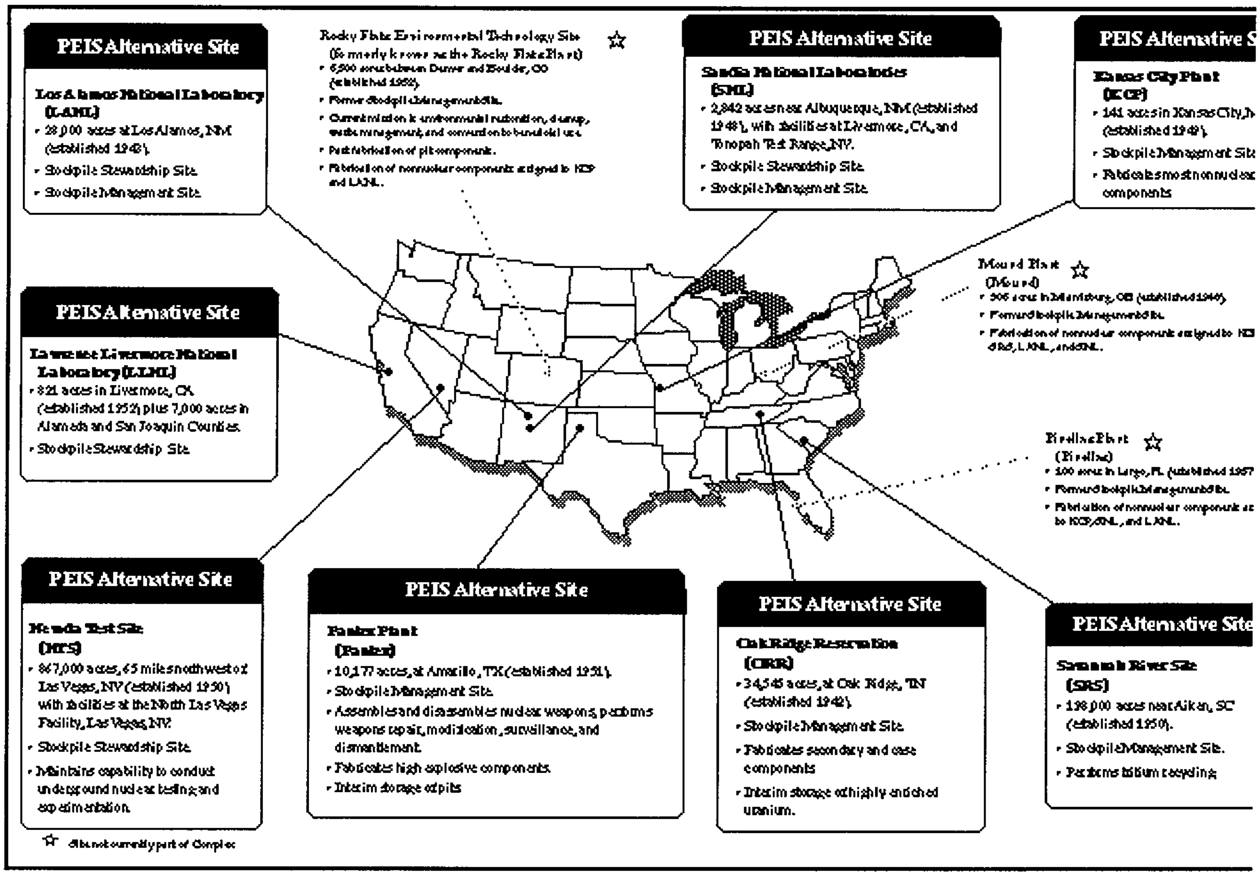
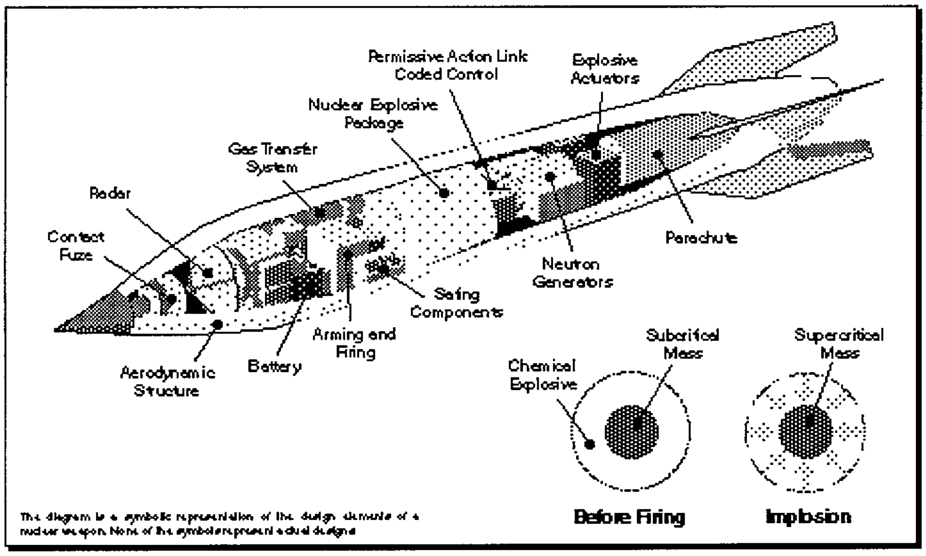


Figure S.1-1.—*Current Stockpile Stewardship and Management Sites (Includes Recent Consolidation of Three Former Sites).*



Nuclear explosions are produced by initiating and sustaining nuclear chain reactions in highly compressed material which can undergo both fission and fusion reactions. Modern strategic, and most tactical, nuclear weapons use a nuclear explosive package with two assemblies: the primary assembly, which is used as the initial source of energy, and the secondary assembly, which provides additional explosive energy release. The primary assembly contains a central core, called the "pit", which is surrounded by a layer of high explosive. The "pit" is typically composed of plutonium-239 and/or highly enriched uranium (HEU), and other materials. HEU contains large fractions of the isotope uranium-235.

Primary Detonation

The primary nuclear explosion is initiated by detonating the layer of chemical high explosive that surrounds the "pit" which in turn drives the pit material into a compressed mass at the center of the primary assembly. This implosion process is illustrated in the inset of the diagram.

Boosting

In order to achieve higher explosive yields from primaries with relatively small quantities of pit material, a technique called "boosting" is used. Boosting is accomplished by injecting a mixture of tritium (T) and deuterium (D) gas into the pit. The deuterium and tritium are stored in reservoirs until the gas transfer system is initiated. The implosion of the pit along with the onset of the fissioning process heats the D-T mixture to the point that the D-T atoms undergo fusion. The fusion reaction produces large quantities of very high energy neutrons which flow through the compressed pit material and produce additional fission reactions.

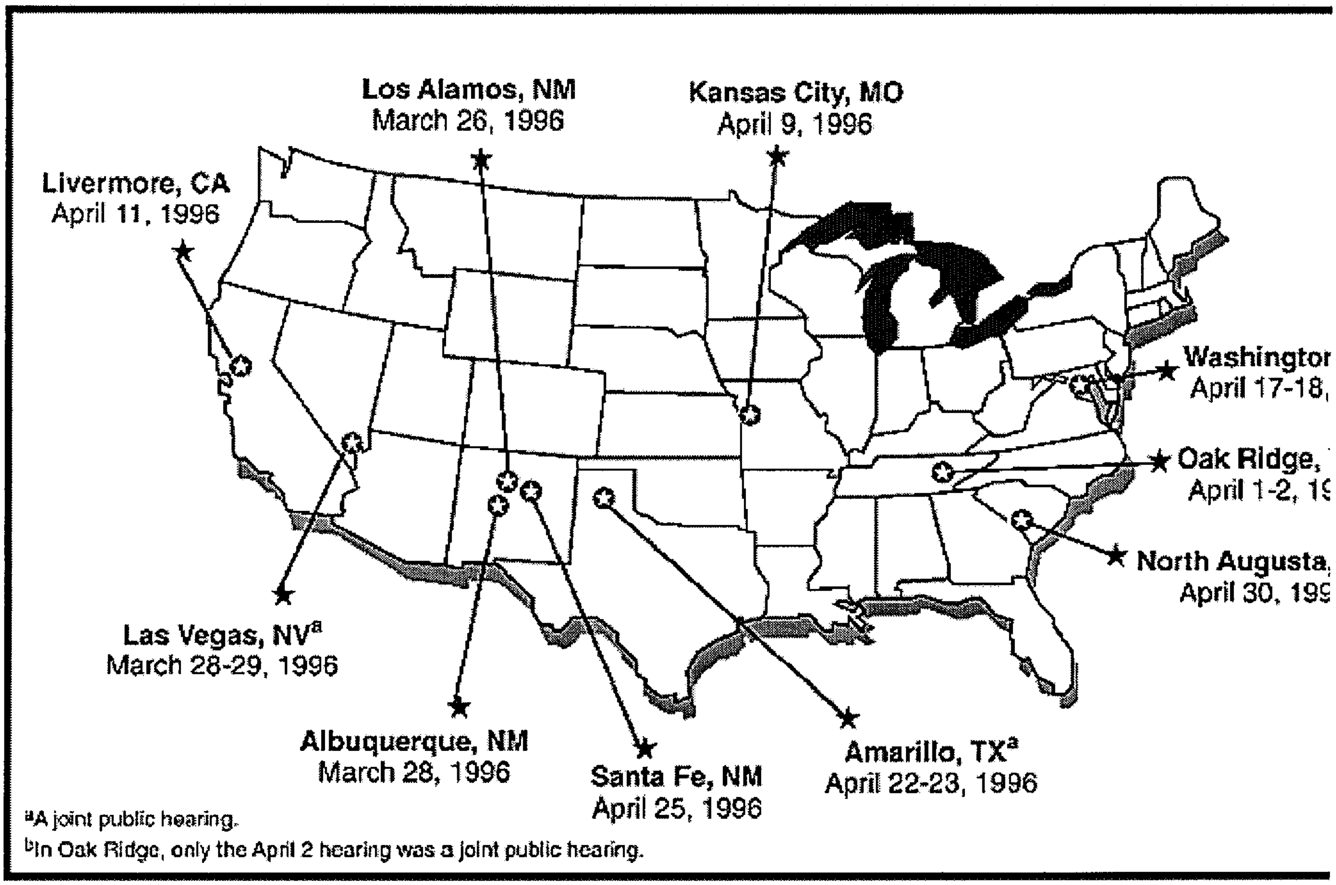
Secondary Activation

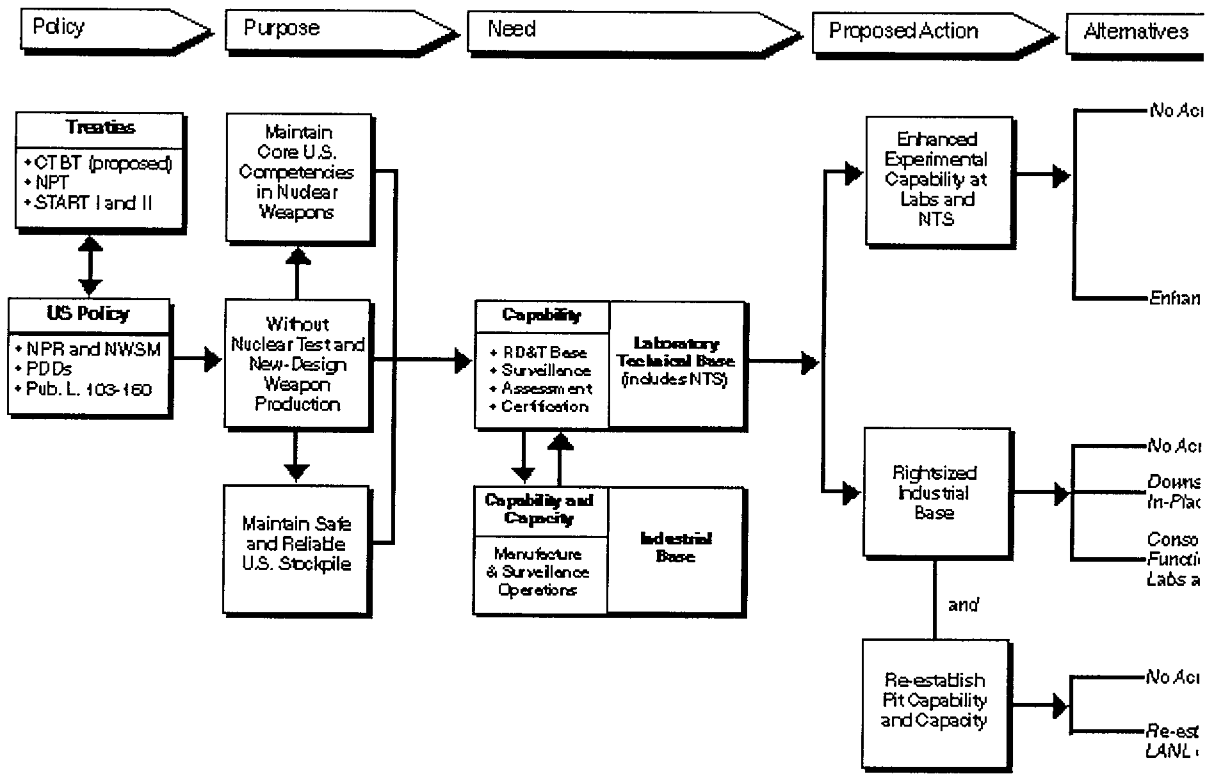
The energy released by the primary explosion activates the secondary assembly. The secondary assembly is composed of lithium deuteride and other materials. As the secondary implodes, the lithium, in the isotopic form lithium-6, is converted to tritium by neutron interactions, and the tritium product in turn undergoes fusion with the deuterium to create the thermonuclear explosion.

Nonnuclear Components

Nonnuclear components include contact fuzes, radar components, aerodynamic structures, arming and firing systems, gas transfer system, permissive action link coded controls, neutron generators, explosive actuators, safing components, batteries, and parachutes.

FIGURE S.1.1-1.—*Nuclear Weapons Design*


Los Alamos, NM
March 26, 1996
Kansas City, MO
April 9, 1996
Livermore, CA
April 11, 1996
Washingtor
April 17-18,
Oak Ridge,
April 1-2, 19
North Augusta,
April 30, 199
Las Vegas, NV[a]
March 28-29, 1996
Albuquerque, NM
March 28, 1996
Santa Fe, NM
April 25, 1996
Amarillo, TX[a]
April 22-23, 1996
[a]A joint public hearing.
[b]In Oak Ridge, only the April 2 hearing was a joint public hearing.



Note: CTBT–Comprehensive Test Ban Treaty; NPR–Nuclear Posture Review; NPT–Nuclear Nonproliferation Treaty; NWSM–Nuclear Weapons Stockpile Memorandum; PDD–Presidential Decision Directive; RD&T–research, development, and testing.

FIGURE S.2-1.—*Policy Perspective of the Stockpile Stewardship and Management Program*

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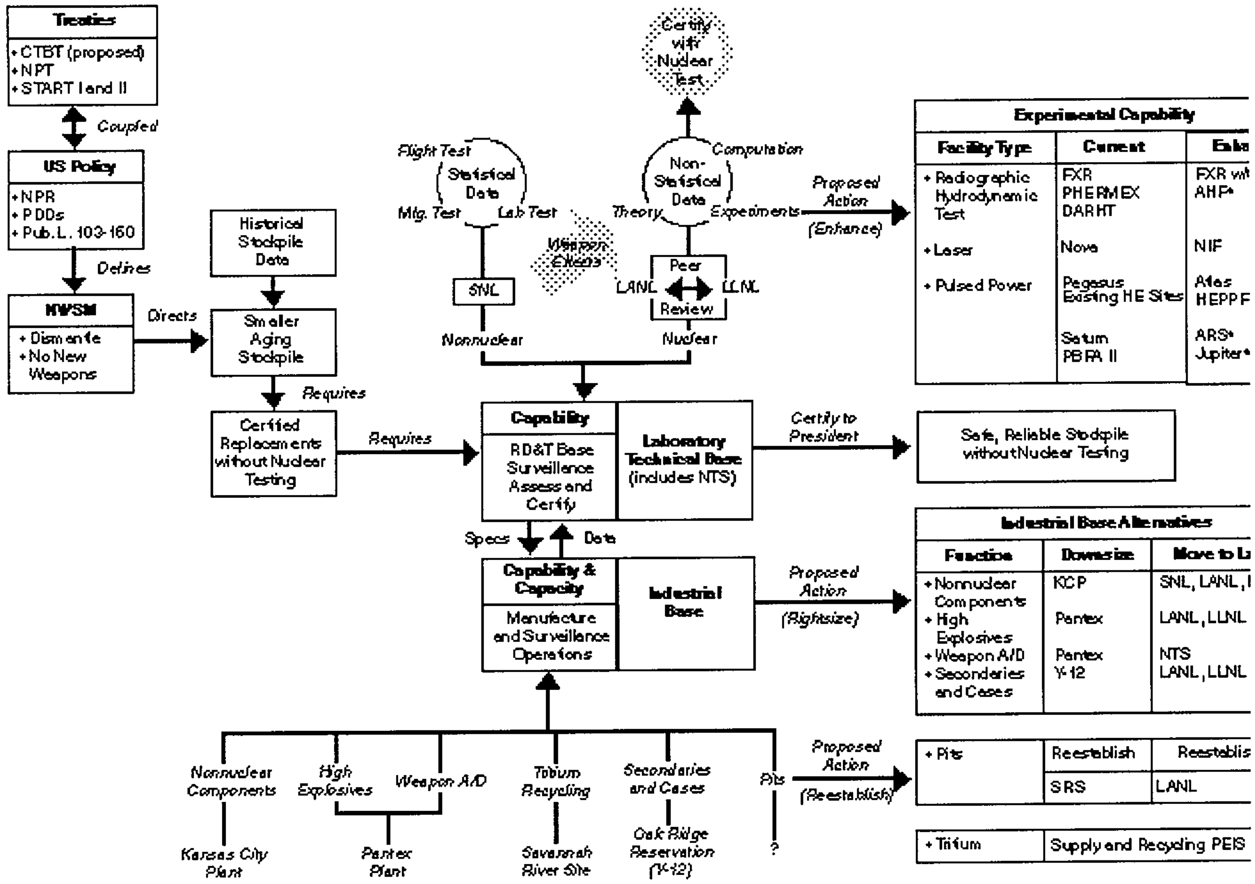
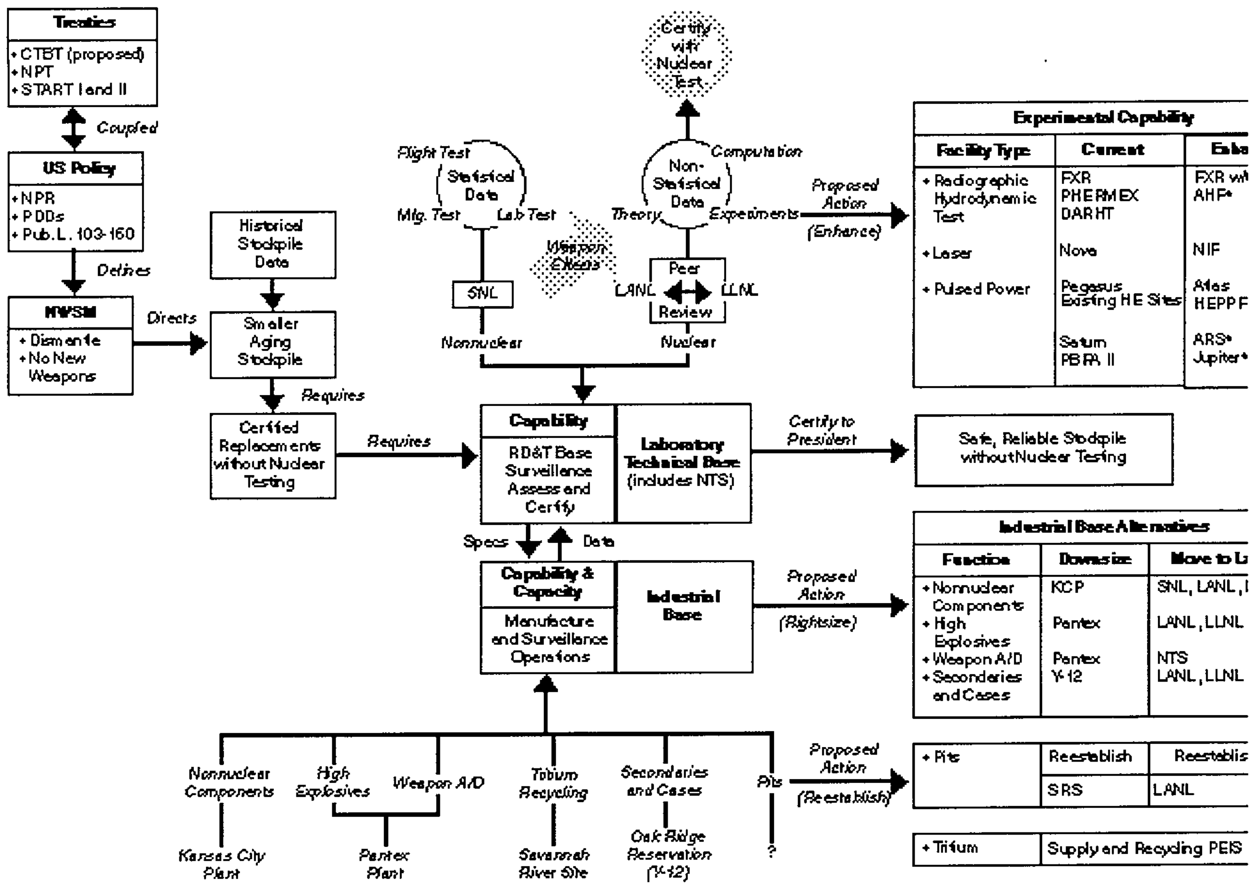


* Next generation, not proposed.
Note: A/D–Assembly/Disassembly; AHF–Advanced Hydrotest Facility; ARS–Advanced Radiation Source; CFF–Contained Firing Facility; CTBT–Comprehensive Test Ban Treaty; DARHT–Dual Axis Radiographic Hydrodynamic Test Facility; FXR– Facility; HE–High Explosive; HEPPF–High Explosive Pulsed Power Facility; NIF–National Ignition Facility; NPR–Nuclear Posture Review; NPT–Nuclear Nonproliferation Treaty; PBFA–Particle Beam Fusion Accelerator; PDD–Presidential Decision Directive; PHERMEX–Pulsed High-Energy Radiation Machine Emitting X-Rays (Facility); RD&T–Research, Development, and Testing.

FIGURE S.2–2.—*Stockpile Perspective of the Stockpile Stewardship and Management Program*



* Next generation, not proposed.

Note: A/D–Assembly/Disassembly; AHF–Advanced Hydrotest Facility; ARS–Advanced Radiation Source; CFF–Contained Firing Facility; CTBT–Comprehensive Test Ban Treaty; DARHT–Dual Axis Radiographic Hydrodynamic Test Facility; FXR–[illegible] Facility; HE–High Explosive; HEPPF–High Explosive Pulsed Power Facility; NIF–National Ignition Facility; NPR–Nuclear Posture Review; NPT–Nuclear Nonproliferation Treaty; PBFA–Particle Beam Fusion Accelerator; PDD–Presidential Directive; PHERMEX–Pulsed High-Energy Radiation Machine Emitting X-Rays (Facility); RD&T–Research, Development, and Testing.

FIGURE S.2-2.—*Stockpile Perspective of the Stockpile Stewardship and Management Program.*

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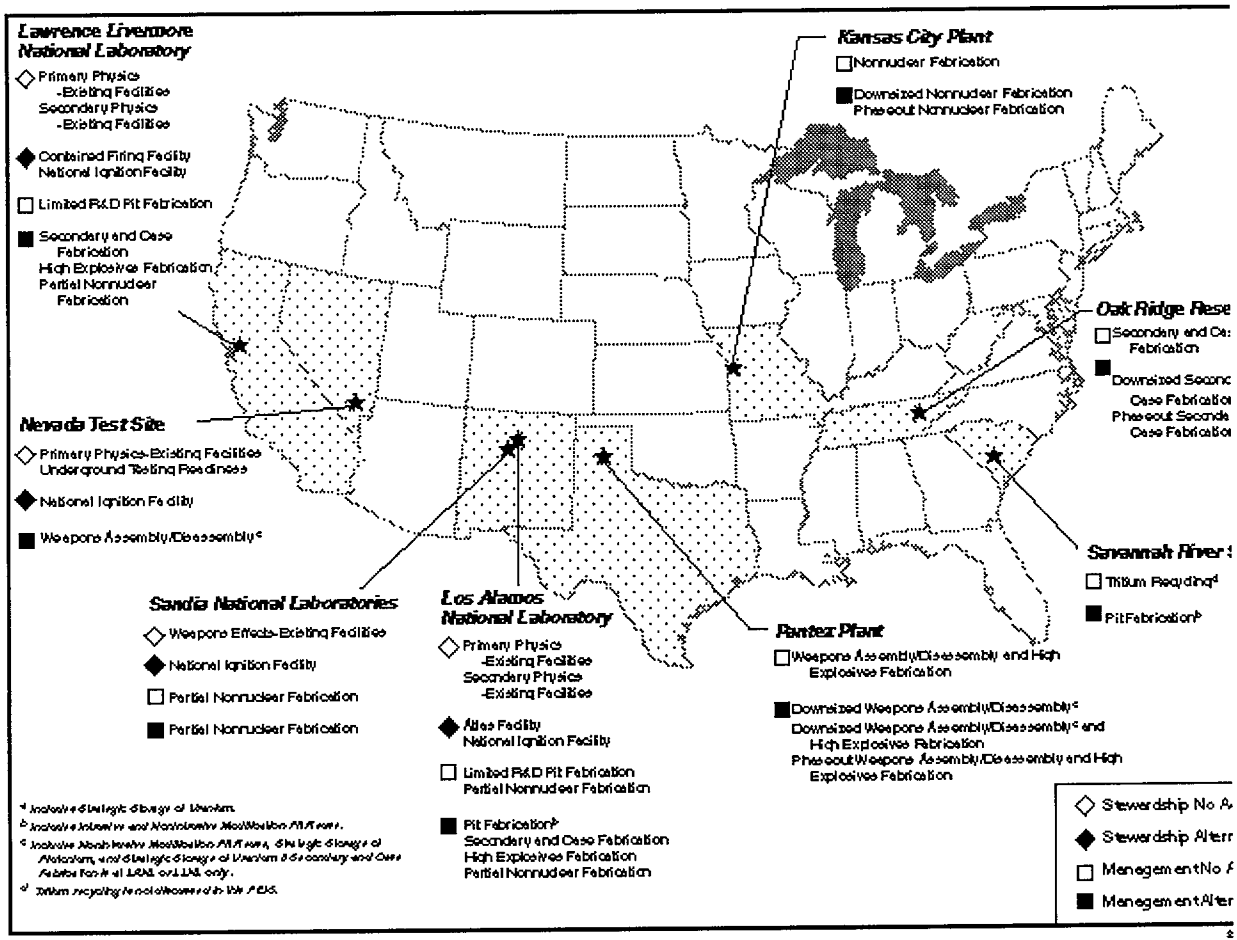

FIGURE S.3.1-1.—*Nuclear Weapons Complex Sites and Stockpile Stewardship and Management Alternatives*

Correction Sheet

Please replace the last two paragraphs in section S.1.5 (found on pages S-6 and S-7) with the following two paragraphs:

Both of these PEISs have progressed to the point where they are scheduled to have their RODs issued by the Fall of 1996, at or about the same time as the ROD for the Pantex Site-Wide EIS, which is scheduled for November 1996. Therefore, DOE is proposing that so long as the RODs of both the Programmatic EISs and the Pantex Site-Wide EIS occur within a short period of time of one another, decisions on the long-term storage of pits would be made in the RODs of the PEISs. A decision relating to the interim storage of pits at Pantex would be made in the ROD of the Pantex Site-Wide EIS pending implementation of the selected long-term storage option.

However, if there is a significant delay in the RODs for either of the PEISs, or if DOE does not make a decision on the long-term storage of pits in those RODs, then there would be a need to make a decision on the location of interim storage of pits uninformed by a decision on long-term storage. In any event, the Pantex Site-Wide EIS will be completed with the analysis of interim storage alternatives, including addressing the issues and comments received from the public on that EIS, to support a decision relating to the storage of pits until a long-term storage decision has been made and implemented.

On page S-41, please replace the second paragraph in section S.5 (Preferred Alternative), with the following:

Since February 9, 1996, the date when the enclosed Draft PEIS was sent to the printer, DOE has identified additional preferred alternatives. The complete list of preferred alternatives is as follows:

Stockpile Stewardship:

- Construct and operate the National Ignition Facility at Lawrence Livermore National Laboratory (LLNL)
- Construct and operate the Contained Firing Facility at LLNL
- Construct and operate the Atlas Facility at Los Alamos National Laboratory (LANL)

Stockpile Management:

Secondary and Case Component Fabrication--downsize the Y-12 Plant at Oak Ridge Reservation

- Pit Component Fabrication--re-establish capability and appropriate capacity at LANL
- Assembly/Disassembly--downsize Pantex Plant
- Nonnuclear Component Fabrication--downsize Kansas City Plant

There are currently no preferred alternatives for High Explosives Fabrication, and Strategic Reserve Storage of Plutonium Pits or Highly Enriched Uranium.

Summary: Foreword

This Final Programmatic Environmental Impact Statement (PEIS) for Stockpile Stewardship and Management addresses potential changes to the future missions of the three weapons laboratories, the four production facilities and the Nevada Test Site (NTS) and the potential environmental impacts resulting from the U.S. Department of Energy (DOE) Stockpile Stewardship and Management Program. Directed by the President and Congress to maintain the safety and reliability of the reduced nuclear weapons stockpile in the absence of nuclear testing, DOE has developed the Stockpile Stewardship and Management Program to provide a single, highly integrated technical program for maintaining the continued safety and reliability of the nuclear weapons stockpile. This document was prepared in compliance with the *National Environmental Policy Act* and in accordance with regulations issued and published by the Council on Environmental Quality (40 CFR Parts 1500-1508) and DOE (10 CFR Part 1021).

Several alternatives and environmental effects are assessed for implementing the Stockpile Stewardship and Management Program. Stockpile management refers to activities associated with the production, maintenance, surveillance, refurbishment, and dismantling of the tivities associated with research, design, development, and testing of nuclear weapons and the assessment and certification of safety and reliability. The stockpile stewardship portion of the PEIS assesses the potential impacts of three proposed facilities: the National Ignition Facility (NIF), the Contained Firing Facility (CFF), and the Atlas Facility. A No Action alternative is also analyzed.

For each management alternative, DOE proposes to either downsize or to transfer the mission to alternative sites with the exception of pit fabrication. The pit fabrication mission has been proposed to be reestablished at two of DOE nuclear complex sites. For the stockpile stewardship proposals, DOE proposes to locate one or all of the facilities at the weapons laboratories or at the NTS. DOE has identified the following as the preferred alternatives for stockpile stewardship and stockpile management.

For stockpile stewardship:

- Construct and operate the NIF at Lawrence Livermore National Laboratory (LLNL)
- Construct and operate the CFF at LLNL
- Construct and operate the Atlas Facility at Los Alamos National Laboratory (LANL)

For stockpile management:

- Downsize the secondary and case fabrication mission at the Y-12 Plant at Oak Ridge Reservation (ORR)
- Reestablish the pit component fabrication capability and appropriate capacity at LANL
- Downsize the weapons A/D mission at the Pantex Plant (Pantex)
- Downsize the HE production mission at Pantex with limited production at LANL and LLNL
- Downsize the nonnuclear component fabrication mission at the Kansas City Plant (KCP)

Based on the analyses performed to support this PEIS, the preferred alternatives for strategic reserve storage are as follows: (1) highly enriched uranium strategic reserve storage at Y-12 and (2) plutonium pit strategic reserve storage in Zone 12 at Pantex. The preferred alternatives for strategic reserve storage could change based upon analyses conducted in support of the Storage and Disposition of Weapons-Usable Fissile Materials Final PEIS. Decisions on strategic reserve storage are not expected to be made until both the Stockpile Stewardship and Management Final PEIS and the Storage and Disposition of Weapons-Usable Fissile Materials Final PEIS are completed. [The preferred alternative for the plutonium-242 oxide at SRS is to transport the material to LANL.]

A Notice of Intent to prepare this document was published in the Federal Register on June 14, 1995. Public scoping meetings were held at the eight proposed sites from June 29 to August 3, 1995. The period for acceptance of public scoping comments closed on August 11, 1995. In December 1995, the Implementation Plan was issued to provide guidance for the preparation of the Draft PEIS and to record DOE's disposition of comments received during the scoping process.

The Draft PEIS was issued in February 1996. The public comment period was from March 8 to May 7, 1996. During this period, DOE held public hearings in the locations most likely to be directly affected by the proposed alternatives as well as two hearings in Washington, DC. The Draft PEIS was made available to the public through mailings, requests to DOE's Office of Reconfiguration, and DOE Public Reading Rooms and other designated information locations.

In consideration of public comments, DOE has added information to the Final PEIS including: more detailed discussions of alternatives considered but eliminated from detailed study; updated worker numbers and associated socioeconomic impacts at Pantex, the Y-12 Plant at ORR, and the KCP; updates to accident impacts at Pantex; updates to normal operation of the radiological and chemical impact sections; changes to the cumulative impacts discussion; and a more complete discussion of the "next generation stockpile stewardship and management facilities" and the No Action alternative.

In response to comments submitted after issuance of the Draft PEIS and due to additional technical details not available at the time of issuance of the Draft, Volumes I, II, and III of the Final PEIS contain revisions and changes. The revisions and changes made since the issuance of the Draft document are indicated by a double underline for minor word changes or by a sidebar in the margin for paragraph or larger changes. In addition, Volume 1 and each appendix in Volume 3 provide a unique reference list to enable the reader to further review and research selected topics. Volume IV (Comment Response Document) of the PEIS contains the comments received during public review of the Draft PEIS and the DOE responses to those comments. DOE has public reading rooms near each affected site and in Washington, DC where these referenced documents may be reviewed or obtained for review.

Table 4.5.3.2.1. Site Infrastructure Requirements and Changes for Stockpile Management Alternatives at Pantex Plant

Alternative	Electrical		Fuel		
	Energy (MWh/yr)	Peak Load (MWe)	Liquid (L/yr)	Gas (m3/yr)	Coal (t/yr)
Current Resources (1994)	84,420 [1]	13.6 [2]	1,775,720	14,600,000 [3]	NA
No Action (2005)					
Total site requirement	46,266	10	795,166	7,200,000	NA
Change from current resources	-38,154	-3.6	-980,554	-7,400,000	NA
Downsize Weapons Assembly/Disassembly and High Explosives Fabrication					
Total site requirement	46,250	11	795,600	7,650,000	NA
Change from No Action	-16	1	434	450,000	NA
Downsize Weapons Assembly/Disassembly					
Total site requirement	43,000	10	740,000	7,150,000	NA
Change from No Action	-3,266	0	-55,166	-50,000	NA
Phaseout Weapons Assembly/Disassembly and High Explosives Fabrication					
Total site requirement	0	0	0	0	NA
Change from No Action	-46,266	-10	-795,166	-7,200,000	NA

1 System capacity is 201,480 MWh/yr. 2 System capacity is 22.5 MWe. 3 System capacity is 289,000,000 m3/yr.

Note: NA - not applicable.

Source: PX 1995a:2; PX 1996e:1; PX DOE 1995g; PX DOE 1996b; PX MH 1995a.

Table 4.5.3.3.1. Estimated Concentrations of Pollutants from No Action and Stockpile Management Alternatives at Pantex Plant

Pollutant	Averaging Time	Most Stringent Regulations or Guidelines (g/m3)	2005 No Action (g/m3)	Downsize Assembly/ Disassembly and High Explosives Fabrication (g/m3)	Downsize Assembly/Disassembly (g/m3)	P D F
Criteria Pollutant						
Carbon monoxide	8-hour	10,000 1	602	9.1	8.4	2
	1-hour	40,000 *a*	2,900	48.1	44.7	b
Lead	Calendar quarter	1.5 *a*	0.09	3	*c*	b
Nitrogen dioxide	Annual	100 *a*	2.15	0.7	0.7	b
Ozone	1-hour	235	*f*	*f*	*f*	b
Particulate matter	Annual	50 *a*	8.73	0.03	0.03	b
	24-hour	150 *a*	88.5	0.48	0.45	b
Sulfur dioxide	Annual	80 *a*	<0.01	<0.01	<0.01	b
	24-hour	365 *a*	<0.01	<0.01	<0.01	b
	3-hour	1,300 *a*	<0.01	<0.01	<0.01	b
	30-minute	1,045 *d*	<0.01	<0.01	<0.01	b
Mandated by Texas						
Hydrogen fluoride	30-day	0.8 *d*	<0.75	*c*	*c*	b
	7-day	1.6 *d*	*<0.75*	*c*	*c*	b
	24-hour	2.9 *d*	0.75	*c*	*c*	b
	12-hour	3.7 *d*	1.05	*c*	*c*	b
	3-hour	4.9d	4.21	c	c	b
Hydrogen sulfide	30-minute	111 *d*	*c*	c	c	*b*
Sulfuric acid	24-hour	15 *d*	*c*	c	c	*b*
	1-hour	50 *d*	*c*	c	c	*b*
Total suspended particulates	3-hour	200 *d*	*c*	c	c	*b*

	1-hour	400 *d*	*c*	c	c	*b*
Hazardous and Other Toxic Compounds						
Alcohols	30-minute		195	*c*	*c*	b
	Annual	*e*	0.70	*c*	*c*	b
Ammonia	30-minute	170 *d*	<0.01	<0.01	<0.01	b
	Annual	17 *d*	<0.01	<0.01	<0.01	b
Benzene	30-minute	30 4	19.50	0.02	*c*	b
	Annual	3 *d*	0.06	<0.01	*c*	b
Carbon disulfide	30-minute	30 *d*	22.60	*c*	*c*	b
	Annual	3 *d*	0.09	*c*	*c*	b
Carbon tetrachloride	30-minute	126 d	19.7	*c*	*c*	b
	Annual	13 d	0.08	*c*	*c*	b
Chlorobenzene	30-minute	460 d	19.5	*c*	*c*	b
	Annual	46 d	0.08	*c*	*c*	b
1,1,1-Chloroethane	30-minute	500d	127	*c*	*c*	b
	Annual	*50d*	0.53	*c*	*c*	b
Chromium	30-minute	1 *d*	0.13	*c*	*c*	b
	Annual	0.1 *d*	0.001	*c*	*c*	b
Cresol	30-minute	5d	0.41	*c*	*c*	b
	Annual	5	0.002	*c*	*c*	b
Cresylic acid	30-minute	5 *d*	0.51	*c*	*c*	b
	Annual	*e*	0.002	*c*	*c*	b
Dibenzofuran	30-minute	*e*	0.001	*c*	*c*	b
	Annual	*e*	0.00002	*c*	*c*	b
Ester glycol ethers	30-minute	*e*	35.9	*c*	*c*	b
	Annual	*e*	0.15	*c*	*c*	b

Hazardous and Other Toxic Compounds (Continued)						
Ethyl benzene	30-minute	2,000 *d*	31.1	*c*	*c*	b
	Annual	434 *d*	0.13	*c*	*c*	b
Ethylene dichloride	30-minute	40d	9.58	*c*	*c*	b
	Annual	4d	0.04	*c*	*c*	b
Formaldehyde	30-minute	15 *d*	0.37	*c*	*c*	b
	Annual	1.5 *d*	0.004	*c*	*c*	b
Hydrogen chloride	30-minute	75 *d*	6.17	0.23	0.20	b
	Annual	0.1 *d*	0.07	<0.01	<0.01	b
Ketones	30-minute	e	33.4	f	c	b
	Annual	*e*	0.14	f	c	b
Mercury	30-minute	0.5 *d*	<0.01	<0.01	<0.01	b
	Annual	0.05 *d*	<0.01	<0.01	<0.01	b
Methanol	30-minute	*e*	245	c	c	*b*
	Annual	*e*	0.58	c	c	*b*
Methyl cyanide	30-minute	*e*	*0*	c	c	*b*
	Annual	*e*	*0*	c	c	*b*
Methyl ethyl ketone	30-minute	3,900 *d*	1,400	5.48	2.61	b
	Annual	590 *d*	5.10	0.02	0.01	b
Methyl isobutyl ketone	30-minute	2,050d	4.45	c	c	b
	Annual	205d	0.02	c	c	b
Methylene chloride	30-minute	260 *d*	180	*c*	*c*	b
	Annual	26 *d*	0.74	*c*	*c*	b
Naphthalene	30-minute	440d	0.005	*c*	*c*	b
	Annual	50d	0.0001	*c*	*c*	b
Hazardous and Other Toxic Compounds (Continued)						

Nickel	30-minute	0.15 *d*	0.02	*c*	*c*	b
	Annual	0.015 *d*	0.0002	*c*	*c*	b
Nitrobenzene	30-minute	24d	0.51	*c*	*c*	b
	Annual	5d	0.002	*c*	*c*	b
2-Nitropropane	30-minute	50d	8.55	*c*	*c*	b
	Annual	5 *d*	0.04	c	c	b
Phenol	30-minute	154d	0.03	*c*	*c*	b
	Annual	19d	0.0006	*c*	*c*	b
Tetrachloroethylene	30-minute	340d	17.6	*c*	*c*	b
	Annual	34d	0.07	*c*	*c*	b
Toluene	30-minute	1,880d	556	c	c	b
	Annual	188d	1.73	c	c	b
1,1,2-Trichloroethane	30-minute	550d	17.3	*c*	*c*	b
	Annual	55d	0.08	*c*	*c*	b
Trichloroethylene	30-minute	1,350 *d*	51.1	*c*	*c*	b
	Annual	135 *d*	0.21	*c*	*c*	b
Triethylamine	30-minute	40d	1.08	*c*	*c*	b
	Annual	4d	0.002	*c*	*c*	b
Xylene	30-minute	3,700 *d*	145	c	c	*b*
	Annual	434d	0.47	c	c	*b*

1

Federal standard. 2

No air pollutants will be emitted from Pantex after phaseout of A/D and HE fabrication. 3

No sources indicated. 4

State standard. The effect screening levels are used in evaluation of hazardous and other toxic compounds. 5

No Standard.

f No data available, concentration assumed less than applicable standard.

30-minute concentrations are represented by 1-hour predicted concentrations; concentrations for downsized alternatives represent the alternative only.

40 CFR 50; PX 1996e:1; PX DOE 1996b; PX MH 1995a; PX MH 1995b; TX ACB 1987a; TX ACB1993a; TX NRCC 1992a; TX NRCC 1995a.

Table 4.5.3.4.1. Potential Changes to Water Resources from Stockpile Management Alternatives at Pantex Plant

Affected Resource Indicator	No Action Single-Shift Operation 2005	Downsize Assembly/Disassembly and High Explosives Fabrication Three-Shift Operation	Downsize Assembly/Disassembly Three-Shift Operation	Phaseout Assembly/Disassembl and High Explosives Fabrication
Construction				
Water Availability and Use				
Water source	Ground	Ground	Ground	Ground
Total site water operation requirement 1 (MLY)	0 2	249.7	249.5	0
Percent change from No Action water use (249 MLY)	NA	0.3	0.2	-100
Water Quality				
Wastewater discharge to playas 3 (MLY)	0b	141.5	141.3	0
Percentage change from No Action wastewater discharge (141 MLY)	NA	0.28	0.21	-100
Operation				
Water Availability and Use				
Water source	Ground	Ground	Ground	Ground
Total water requirement (MLY)	249	209	196	0

Percent change from No Action water use (249 MLY)	NA	-16	-21	-100
Percent change from current use (836 MLY)	-70	-75	-77	-100
Water Quality				
Wastewater discharge to playas *c* (MLY)	141	148	141	0
Percentage change from No Action wastewater discharge (141 MLY)	NA	5	0	-100
Percent change from current wastewater discharge (480 MLY)	-71	-69	-71	-100
Floodplain				
Actions in 100-year floodplains	NA	None	None	NA
Actions in 500-year floodplains	NA	None	None	NA

1 Total water requirements for construction at Pantex are based on a 3-year time period for A/D and HE fabrication. 2 No construction water would be used or construction wastewater generated. Total site water use and wastewater discharged would be the same as No Action operation. 3 All discharges to natural drainages require NPDES permits. Note: NA - not applicable; MLY - million liters per year. Source: PX MH 1995a.

Table 4.5.3.9.1. Potential Radiological Impacts to the Public Resulting from Normal Operation of Stockpile Management Alternatives at Pantex Plant

	No Action Single-Shift Operation	**Downsize Assembly/Disassembly Three-Shift Operation**	**Phaseout Assembly/Disassembly and High Explosives Fabrication**
Affected Environment	**Total Site[1]**	**Total Site[1]**	**Total Site[1]**
Maximally Exposed Individual (Public)			
Atmospheric Release			
Dose[2] (mrem/yr)	5.8×10^{-5}	9.8×10^{-5}	0
Percent of natural background[3]	1.7×10^{-5}	2.9×10^{-5}	0
25-year fatal cancer risk	7.2×10^{-10}	1.2×10^{-9}	0
Liquid Release			
Dose[2] (mrem/yr)	0	0	0
Percent of natural background[3]	0	0	0
25-year fatal cancer risk	0	0	0
Atmospheric and Liquid Releases			
Dose[2] (mrem/yr)	5.8×10^{-5}	9.8×10^{-5}	0
Percent of natural background[3]	1.7×10^{-5}	2.9×10^{-5}	0
25-year fatal cancer risk	7.2×10^{-10}	1.2×10^{-9}	0
Population Within 80 Kilometers			

Atmospheric and Liquid Releases in 2030			
Dose (person-rem)	$1.4x10^{-4}$	$5.4x10^{-4}$	0
Percent of natural background[3]	$1.5x10^{-7}$	$5.7x10^{-7}$	0
25-year fatal cancers	$1.8x10^{-6}$	$6.8x10^{-6}$	0

1 Includes impacts from all site operations.

2 The applicable radiological limits for an individual member of the public from total site operations are 10 mrem/yr from the air pathways, 4 mrem/yr from the drinking water pathway, and 100 mrem/yr from all pathways combined (DOE Order 5400.5).

3 Natural background radiation levels to the average individual is 334 mrem/yr; to the population within 80 km (50 mi) in 2030 is 95,300 person-rem. Source: PX DOE 1995d; PX MH 1995a.

Table 4.5.3.9-2. Potential Radiological Impacts to Workers Resulting from Normal Operation of Stockpile Management Alternatives at Pantex Plant

Affected Environment	No Action Single-Shift Operation	Downsize Assembly/Disassembly Three-Shift Operation	Phaseout Assembly/Disassembly and High Explosives Fabrication
Involved Workforce[1]			
Average worker dose[2] (mrem/yr)	10	10	0
25-year fatal cancer risk	1.0×10^{-4}	1.0×10^{-4}	0
Total dose (person-rem/yr)	10.7	3.0	0
Noninvolved Workforce[3] (HE Fabrication)			
Average worker dose[2] (mrem/yr)	0	0	0
25-year fatal cancer risk	0	0	0
Total dose (person-rem/yr)	0	0	0
Total Site Workforce[4]			
Dose (person-rem/yr)	10.7	3.0	0
25-year fatal cancers	0.11	0.030	0

1 The involved worker is a worker associated with operations of the A/D facilities. The estimated number of involved workers considered at risk for exposure is 300 for the downsize/consolidate alternative. The 1,070 workers for the No Action alternative are all considered at risk for exposure.

2 The radiological limit for an individual worker is 5,000 mrem/yr (10 CFR 835).

3 The noninvolved worker is an onsite worker unassociated with operation of the A/D facilities in question. The estimated number of noninvolved workers is 50.

4 The total site workforce is the sum of the number of involved and noninvolved workers. The estimated number of workers in the total site workforce is 350 for the downsize/consolidate alternative and 1,070 for the No Action alternative. Source: DOE 1993n:7; PX MH 1995a.

Table 4.5.3.9-3. Impacts of Accidents for Downsize Assembly/Disassembly at Pantex Plant

	Downsize Weapons Assembly/Disassembly			**Storage of Plutonium Strategic Reserves**		
Parameter	**EBA**	**BEBA**	**EBA and BEBA Combined**	**EBA**	**BEBA**	**EBA and BEBA Combined**
Composite Accident Frequency (Per Year)	**0.028**	**$1.1x10^{-6}$**	**0.028**	**$6.0x10^{-4}$**	**$5.0x10^{-8}$**	**$6.0x10^{-4}$**
Consequences						
Noninvolved Worker						
Cancer fatality[1]	$1.7x10^{-6}$	$6.2x10^{-3}$	$2.0x10^{-6}$	$2.3x10^{-6}$	$6.4x10^{-4}$	$2.3x10^{-6}$
Risk (cancer fatality per year)	$4.8x10^{-8}$	$7.4x10^{-9}$	$5.6x10^{-8}$	$1.4x10^{-9}$	$3.2x10^{-11}$	$1.4x10^{-9}$
Maximally Exposed Individual						
Cancer fatality[1]	$1.7x10^{-6}$	$8.0x10^{-3}$	$2.0x10^{-6}$	$9.0x10^{-7}$	$2.6x10^{-4}$	$9.2x10^{-7}$
Risk (cancer fatality per year)	$4.6x10^{-8}$	$9.7x10^{-9}$	$5.6x10^{-8}$	$5.4x10^{-10}$	$1.3x10^{-11}$	$5.5x10^{-10}$
Population Within 80 Kilometers[2]						
Cancer fatalities[3]	$4.8x10^{-4}$	0.94	$5.2x10^{-4}$	$1.0x10^{-4}$	0.03	$1.1x10^{-4}$
Risk (cancer fatalities per year)	$1.3x10^{-5}$	$1.1x10^{-6}$	$1.5x10^{-5}$	$6.2x10^{-8}$	$1.5x10^{-9}$	$6.4x10^{-8}$

1 Probability (increased likelihood of cancer fatality to a hypothetical member of the public located at the site boundary or to a noninvolved worker as a result of exposure to the indicated dose) if the accident occurred.

2 For the offsite population of 285,409, the average probability of cancer fatality/risk of cancer fatality (per year) for the combined EBA and BEBA is $1.8x10^{-4}$ /$5.3x10^{-11}$ and $2.1x10^{-10}$ /$1.4x10^{-12}$ respectively, for the listed alternative(s), downsize weapons A/D and storage of plutonium strategic

reserves.

3 Number of cancer fatalities in the population out to 80 km (50 mi) as a result of exposure to the indicated dose if the accident occurs. All values are mean values; BEBA - beyond evaluation basis accidents; EBA - evaluation basis accidents. Results shown are derived from accident analyses (see appendix F).

Table 4.5.3.9-4. Impacts of High Explosives Fabrication Accidents at Pantex Plant

Accident Description	Accident Frequency (Per Year)	TLV-TWA	Concentration to: Noninvolved Worker (mg/m^3)	Concentration to: Individual at Site Boundary (mg/m^3)	Potential Impacts of Exceeding: TLV-TWA Limits[1]
Fire and Release of Chemical TATB	0.01		3.0	0.87	
Concentration[1] (mg/m3)		1.5			Liver damage, cyanosis, sore throat, muscular pain, kidney damage, and anemia
Distances[2] (m)		1,500			
Area (m^2)		2.0x10^5			
Population[3]		0			
Fire and Release of Chemical TNT	0.01		3.0	0.87	
Concentration[1] (mg/m3)		0.5			Liver damage, cyanosis, sore throat, muscular pain, kidney damage, and anemia
Distances[2] (m)		3,100			
Area (m^2)		7.4x10^5			
Population[3]		0			
Explosion and Elevated Release of TATB	10-4 to 10-6		6.4	3.2	
Concentration[1] (mg/m3)		1.5			Liver damage, cyanosis, sore throat, muscular

Distances[2] (m)		180 to 3,500			pain, kidney damage, and anemia
Area (m^2)		$1.1x10^6$			
Population[3]		0			
Explosion and Elevated Release of TNT	10-4 to 10-6		2.4	1.2	
Concentration[1] (mg/m3)		0.5			Liver damage, cyanosis, sore throat, muscular pain, kidney damage, and anemia
Distances[2] (m)		170 to 3,700			
Area (m^2)		1.2x106			
Population[3]		0			

1 NIOSH 1990a.

2 From facility (downwind); exceedance begins at facility, 0 meters, unless indicated otherwise.

3 Offsite individual exposed to concentration exceeding the limit. TLV - threshold limit value; TWA - time weighted average; TATB - triaminotrinitrobenzene; TNT - trinitrotoluene. Results derived from accident analysis (see appendix F).

Table 4.5.3.10-1. Projected Waste Management Under No Action at Pantex Plant

Category	Annual Generation (m^3)	Treatment Method	Treatment Capacity (m^3/yr)	Storage Method	Storage Capacity (m^3)	Disposal Method	D C: (ı
Low-Level							
Liquid	8[1]	Solidification onsite pending	12	Staged for processing	Varies[2]	None	NA
Solid	32[1]	Compaction	168	Staged for shipment	Included in liquid low-level	Shipped offsite to NTS	NA
Mixed Low-Level							
Liquid	4[1]	None-onsite encapsulation pending	Planned	Staged for treatment in accordance with Pantex Site Treatment Plan	1,470[3]	None	NA
Solid	46[1]	Compaction and open burning (HE only)	Variable	Staged for treatment in accordance with Pantex Site Treatment Plan	Included in liquid mixed low-level	Offsite planned	NA
Hazardous							
Liquid[4]	2	Incineration (offsite)[5]	Variable	Staged for shipment	Included in liquid mixed low-level	Shipped offsite	NA
Solid	31	Open burninge	Variable	Staged for shipment	Included in liquid mixed low-level	Shipped offsite	NA

Nonhazardous (Sanitary)							
Liquid	141,000	Evaporation and filtration	898,000[6]	None	NA	Playa 1	898
Solid	339	Compaction	1,020	None	NA	Landfill (offsite)	NA
Nonhazardous (Other)							
Liquid	Included in liquid sanitary	Carbon absorption/ filtration	Included in liquid sanitary	None	NA	Playa 1 and 2	Inc liqu san
Solid	Included in solid sanitary	Compaction	Included in solid sanitary	None	NA	Landfill (onsite) - construction debris only	Exp

1 Assuming 260 weapons/yr, estimate based on extrapolation of table 4.13.1.2-3 (PX DOE 1996b).

2 Total amount of storage capacity available for LLW is a function of the percentage of total capacity currently occupied by hazardous wastes and mixed LLW.

3 Operating capacity. Permitted storage can accommodate both LLW and mixed LLW.

4 Includes solvent-contaminated wastewater, explosive-contaminated wastewater, and spent organic solvents contaminated with explosives.

5 HE - contaminated wastes only. Open burning done in thermal treatment units on a per burn basis.

6 Permit limit. NA - not applicable. Source: PX 1995a:2; PX DOE 1995i; PX DOE 1996b.

Table 4.5.3.10-2. Estimated Annual Generated Waste Volumes for Stockpile Management Alternatives at Pantex Plant

Category	No Action[1] (m^3)	Downsize Assembly/Disassembly and High Explosives Fabrication[2] (m^3)	Downsize Assembly/Disassembly[3] (m^3)	Phaseout of Assembly/Disassembly and High Explosives Fabrication (m^3)
Low-Level				
Liquid	8	<0.1 (-8)	<0.1 (-8)	None (-8)
Solid	32	21 (-11)	21 (-11)	None (-32)
Mixed Low-Level				
Liquid	4	<0.1 (-4)	<0.1 (-4)	None (-4)
Solid	46	Minimal (-46)	Minimal (-46)	None (-46)
Hazardous				
Liquid	2	2 (0)	2 (-0.2)	None (-2)
Solid	31	30 (-1)	<0.1 (-31)	None (-31)
Nonhazardous (Sanitary)				
Liquid	141,000	148,000 (+7,060)	141,000 (-59)	None (-141,000)
Solid	339	357 (+18)	340 (+1)	None (-339)
Nonhazardous (Other)				
Liquid	Included in liquid sanitary	Included in liquid sanitary	Included in liquid sanitary	Included in liquid sanitary
Solid	Included in solid sanitary	Included in solid sanitary	Included in solid sanitary	Included in solid sanitary

1 No Action volumes are from table 4.5.3.10-1 and are based on single-shift operations.

2 Waste volumes for the increment due to HE fabrication are from table 3.4.5.2-3 and are based on surge operations (three shifts), which were added to downsize A/D volumes.

3 Waste generation volumes for the downsize A/D Facility are from table 3.4.1.2-3. Waste generated volumes were rounded to three significant figures. Waste effluent volumes (i.e., after treatment and

volume reduction), which are used in the narrative description of the impacts, are also found in tables 3.4.5.2-3 and 3.4.1.2-3.

Table 4.5.3.10-3. Estimated Decontamination and Decommissioning Wastes at Pantex Plant

Category	Phaseout of High Explosives Fabrication (m^3)	Phaseout of Assembly/Disassembly and High Explosives Fabrication (m^3)
Low-Level		
Liquid	1,000	1,700
Solid	9,600	16,700
Mixed Low-Level		
Liquid	2,400	4,200
Solid	23,900	41,700
Hazardous		
Liquid	13,600	21,000
Solid	143,200	220,000
Nonhazardous (Sanitary)		
Liquid	596,000	1,175,000
Solid	**None**	**None**
Nonhazardous (Other)		
Liquid	**None**	**None**
Solid	2,367,000	4,660,000

Waste generation volumes have been rounded to three significant figures.

PX 1995a:5.

4.7.3 Environmental Impacts

4.7.3.1 Land Use

No Action. Under No Action, DOE would continue current and planned activities at LLNL as described in section 3.2.7. No additional land-use impacts are anticipated at LLNL beyond the effects of existing and future activities that are independent of the proposed action.

Management Alternatives

Secondary and Case Fabrication. The secondary and case fabrication alternative at the Livermore Site would use existing facilities, equipment, and infrastructure to support production requirements for the secondary and case fabrication mission. Facilities for this proposed action would require approximately 21,739 m^2 (234,000 ft^2) of floor space, and all operations would be carried out within those facilities. Additional land would not be used to implement the new mission. The proposed secondary and case fabrication activities would be compatible and consistent with existing operations, and LLNL land-use plans and policies. No land-use impacts are expected.

High Explosives Fabrication. The HE fabrication alternative at the Livermore Site would use existing facilities and infrastructure to support the HE feedstock, main charge, and component procurement and fabrication activities. Additional land would not be used to implement the mission. The proposed HE fabrication activities would be compatible and consistent with existing operation and LLNL land-use plans and policies. Land-use impacts are not expected.

Nonnuclear Fabrication. Nonnuclear fabrication and assembly activities for nonnuclear components would be incorporated into existing buildings with mission modification. Modification activities would be limited to upgrades within existing facilities. Additional land would not be used to implement the mission. The proposed nonnuclear fabrication activities would be compatible and consistent with existing operations and LLNL land-use plans and policies. Impacts to land-use are not expected.

Sensitivity Analysis. LLNL would be able to accommodate the high and low case operation for all proposed management alternatives with the base case production facilities. No land-use impacts are expected.

Stewardship Alternatives

Proposed National Ignition Facility . The proposed site for NIF would occupy an estimated 8.1 ha (20 acres) of vacant undeveloped land in the northeast corner of the Livermore Site. The site acreage would account for 11 percent of the land currently designated as available for development inside the Livermore Site boundaries. The project would be located in an area where similar types of research and experimentation activities occur. The proposed NIF would be compatible and consistent with LLNL land-use plans and policies. No impacts to land-use are expected.

Proposed Contained Firing Facility. The proposed CFF would be a modification to the existing B801 Flash X-Ray (FXR) Facility located at Site 300. Approximately 1.2 ha (3 acres) of hillside land adjacent to the present B801 complex would be disturbed during construction of the proposed CFF. The proposed action would be compatible and consistent with existing operations at Site 300 and

LLNL land-use plans and policies. Construction and operation of CFF would not result in land-use impacts.

Combined Program Impacts

Livermore Site. Of the four stockpile stewardship and management alternatives proposed for the Livermore Site, existing facilities would be used for three of the alternatives. Additional land would not be used to implement these three missions. The proposed NIF would require clearing 8.1 ha (20 acres) of land for buildings, walkways, and buffer space. An additional 2 ha (4.9 acres) would be temporarily required for a construction laydown area. The total land-use impact from placing all potential Program alternatives at the Livermore Site would be the use of 8.1 ha (20 acres) of undeveloped land for the new NIF mission.

Site 300. Combined Program impacts would be limited to land-use impacts from construction and operation of CFF, which are expected to be negligible.

Potential Mitigation Measures . Additional mitigation measures are not anticipated.

4.7.3.2 Site Infrastructure

This section discusses site infrastructure at LLNL for No Action and the modifications needed for actions due to construction and operation of new stockpile stewardship and management facilities. A comparison of site infrastructure and facilities resources needs for No Action and the proposed alternatives is presented in table 4.7.3.2-1.

No Action. This alternative continues the LLNL missions described in section 3.2.7. As shown in table 4.7.3.2-1, the site infrastructure would continue to adequately supply facility requirements. There would be a 12-percent increase in petrochemical (oil) use and a 13-percent increase in natural gas use over current site requirements.

Management Alternatives

Secondary and Case Fabrication. The site infrastructure would require facility improvements to implement this alternative. Table 4.7.3.2-1 shows the total site requirements and the changes over No Action for electricity and fuel to support the secondary and case fabrication mission. Impacts to site energy infrastructure include a 108-percent increase in liquid fuel use and a 4-percent increase in electrical energy and natural gas use over No Action requirements.

High Explosives Fabrication. The site infrastructure would require slight facility improvements to implement this alternative. The changes in LLNL site infrastructure requirements are shown in table 4.7.3.2-1. Impacts to site infrastructure include a 67-percent increase in liquid fuel use over No Action requirements. No other impacts to site infrastructure are expected. This analysis assumes the entire mission is relocated to LLNL. If it is shared with LANL, the impact would be appropriately less.

Nonnuclear Fabrication. As shown in table 4.7.3.2-1, the site infrastructure requirement changes would be small to implement this alternative. Impacts to site infrastructure are not expected.

Sensitivity Analysis. No change in site infrastructure impacts are expected for the high and low production cases for the nonnuclear and HE fabrication alternatives. For secondary and case fabrication, facility upgrades and utility improvements would be required to support the high production case. No changes are expected to meet the low case production scenario.

Stewardship Alternatives

Proposed National Ignition Facility. Table 4.7.3.2-1 shows the energy requirement to support the proposed NIF at LLNL. The LLNL site infrastructure would require slight facility improvements to implement this alternative. Impacts to site infrastructure include a 9-percent increase in electrical energy use, a 33-percent increase in peak electrical load, and a 4-percent increase in natural gas use over No Action requirements. The electric power pool has sufficient capacity margins to accommodate the proposed NIF.

Proposed Contained Firing Facility. As shown in table 4.7.3.2-1, the site infrastructure would require slight facility improvements to implement this alternative. Impacts to site infrastructure include slight increases in electrical energy and liquid fuel use over No Action requirements.

***Combined Program Impacts*.** If all applicable alternatives were to be located at LLNL, the combined impacts would exceed current site resources. The largest impact would be a 179-percent increase in liquid fuel use. Electrical peak load would increase by 40 percent with an associated increase in electrical energy use of 14 percent. Consumption of natural gas would increase by about 8 percent.

Table 4.7.3.2-1.--Site Infrastructure Requirements and Changes for Stockpile Stewardship and Management Alternatives at Lawrence Livermore National Laboratory

Potential Mitigation Measures. No additional mitigation measures for proposed stockpile stewardship and management alternatives at LLNL are anticipated.

	Electrical		**Fuel**		
Alternative	**Energy (MWh/yr)**	**Peak Load (MWe)**	**Liquid (L/yr)**	**Gas (m^3/yr)**	**Coal (t/yr)**
Current Resources (1994)	343,377	59.8	75,220	14,160,000	NA
No Action (2005)					
Total site requirement	352,050	60.3	79,022	15,970,000	NA
Change from current resources	8,673	0.5	3,802	1,810,000	NA
Nonnuclear Fabrication					
Total site requirement	352,158	60.4	79,022	15,998,900	NA
Change from No Action	108	0.1	0	28,900	NA
Secondary and Case Fabrication					
Total site requirement	367,050	62.3	164,222	16,536,000	NA
Change from No Action	15,000	2	85,200	566,000	NA
High Explosives Fabrication					

Total site requirement	356,350	61.3	132,122	15,970,000	NA
Change from No Action	4,300	1	53,100	0	NA
National Ignition Facility					
Total site requirement	382,050	80.3	79,722	16,580,000	NA
Change from No Action	30,000	20	700	610,000	NA
Contained Firing Facility					
Total site requirement	353,650	61.5	81,62	15,970,000	NA
Change from No Action	1,600	1.2	2,650	0	NA
Combined Program Impacts					
Total site requirement	403,058	84.6	220,672	17,174,900	NA
Change from No Action	51,008	24.3	141,650	1,204,900	NA

NA - not applicable.
Source: LLNL 1995e; LLNL 1995f; LLNL 1995i:1; LLNL 1995i:2; LLNL 1995i:3; LLNL 1995j; appendix I; appendix J.

4.7.3.3 Air Quality

No Action. No Action air quality utilizes estimated air emissions data from operations at the Livermore Site and Site 300 in 2005 assuming continuation of current site missions to calculate pollutant concentrations at or beyond the Livermore Site and Site 300 boundaries. The emission rates for criteria and toxic/hazardous pollutants for No Action are presented in appendix table B.3.7-1. Tables 4.7.3.3-1 and 4.7.3.3-2 present the No Action pollutant concentrations calculated from the 2005 emission rates for the Livermore Site and Site 300, respectively. In this table pollutant concentrations are compared with applicable Federal and state regulations and guidelines. Concentrations are expected to remain within these standards. Modeled estimates for the 1-hour nitrogen dioxide concentration at the Livermore Site, however, result in a concentration above the applicable standard.

Management Alternatives

Secondary and Case Fabrication. The secondary and case fabrication mission would generate criteria and toxic/hazardous emissions resulting from the operation of the plant boiler, component manufacturing, and chemical processes. Reasonably available control technology would be used to minimize pollutant emissions. This would include using HEPA filters to contain particulate emissions and providing liquid scrubbing prior to HEPA filtration to remove chemical vapors such as nitric acid. Emission rates for criteria and toxic/hazardous pollutants from secondary and case fabrication are presented in appendix table B.3.7-1. Table 4.7.3.3-1 presents the concentrations of criteria and toxic/hazardous pollutants resulting from No Action and those generated from operation of secondary and case fabrication. The resulting concentrations of criteria and toxic/hazardous pollutants are expected to be within Federal and state regulations and guidelines. Modeled estimates for 1-hour nitrogen dioxide concentration at the Livermore Site, however, are above the applicable standard.

Table 4.7.3.3-1.-- Estimated Concentrations of Pollutants from No Action and Stockpile Stewardship and Management Alternatives at the Livermore Site

Pollutant	Averaging Time	Most Stringent Regulations or Guidelines (g/m^3)	2005 No Action (g/m^3)	Secondary and Case Fabrication (g/m^3)	Nonnuclear Fabrication (g/m^3)	National Ignition Facility (g/m^3)	Combi Progra Impact (g/m^3)
Criteria Pollutant							
Carbon monoxide	8-hour	10,000[1]	55.79	65.70	55.79	60.05	69.9(
	1-hour	23,000[2]	187.80	221.17	187.80	202.15	235.5
Lead	Calendar quarter	1.5[1]	<0.01	<0.01	<0.01	<0.01	<0.0:
	30-day	1.5[2]	<0.01	<0.01	<0.01	<0.01	<0.0:
Nitrogen dioxide	Annual	100[1]	5.46	5.78	5.46	5.76	6.08
	1-hour	470[2]	1,082.64	1,146.03	1,082.64	1,142.36	1,205.'
Ozone	1-hour	180[2]	[3]	[3]	[3]	[3]	[3]
Particulate matter	Annual	30[2]	0.78	0.80	0.78	0.81	0.83
	24-hour	50[2]	15.32	15.65	15.32	15.85	16.1{
Sulfur dioxide	Annual	80[1]	0.07	0.08	0.07	0.08	0.08
	24-hour	105[2]	1.42	1.49	1.42	1.52	1.59
	3-hour	1,300[1]	9.35	9.79	9.35	10.0	10.4
	1-hour	655[2]	14.35	15.01	14.35	15.35	16.0]
Mandated by California							
Beryllium	30-day	0.01 [4]	0.000089	0.000089	0.000089	0.000089	0.0000
Hydrogen sulfide	1-hour	42[2]	[3]	[3]	[3]	[3]	[3]
Sulfate	24-hour	25[2]	[3]	[3]	[3]	[3]	[3]
Vinyl chloride	24-hour	26[b]	[3]	[3]	[3]	[3]	[3]
Hazardous and Other Toxic Compounds							
Acetone	8-hour	[5]	8.11	8.11	9.01	8.11	9.01
Benzene	8-hour	[5]	0.99	0.99	0.99	0.99	0.99
2-Butoxyethanol	8-hour	[5]	1.52	1.52	1.52	1.52	1.52
Carbon tetrachloride	8-hour	[5]	2.03	2.03	2.03	2.03	2.03
Chlorine	8-hour	[5]	[3]	0.50	[3]	[3]	0.50
Chlorofluorocarbons	8-hour	[5]	86.28	86.28	86.28	86.28	86.2{

Chloroform	8-hour	[5]	1.87	1.87	1.87	1.87	1.87
Ethanol	8-hour	[5]	3.19	3.19	3.19	3.19	3.19
Formaldehyde	8-hour	[5]	0.53	0.53	0.53	0.53	0.53
Glycol ethers (other)	8-hour	[5]	0.03	0.03	0.03	0.03	0.03
Hexane	8-hour	[5]	0.59	0.59	0.59	0.59	0.59
Hydrogen chloride	8-hour	[5]	0.64	16.50	0.64	0.64	16.5(
Hydrogen fluoride	8-hour	[5]	[3]	3.15	c[3]	c[3]	3.15
Isopropyl alcohol	8-hour	[5]	7.23	7.23	9.03	7.23	9.03
Methyl ethyl ketone	8-hour	[5]	3.35	3.35	3.43	3.35	3.43
Methylene chloride	8-hour	[5]	1.33	1.33	1.33	1.33	1.33
Methanol	8-hour	[5]	9.41	54.01	9.41	9.41	54.0]
Naphthalene	8-hour	[5]	0.73	0.73	0.73	0.73	0.73
Nitric acid	8-hour	[5]	[3]	22.80	[3]	[3]	22.8(
Styrene	8-hour	[5]	12.59	12.59	12.59	12.59	12.5[illegible]
Sulfuric acid	8-hour	[5]	[3]	5.95	[3]	[3]	5.95
Tetrohydrofuran	8-hour	[5]	0.61	0.61	0.61	0.61	0.61
Toluene	8-hour	[5]	3.81	3.81	3.89	3.81	3.89
1,1,1-Trichloroethane	8-hour	[5]	9.73	9.73	9.73	9.73	9.73
Trichloroethylene	8-hour	[5]	1.74	1.74	1.74	1.74	1.74
Xylene	8-hour	[5]	2.20	2.20	2.20	2.20	2.20

Table 4.7.3.3-2.--Estimated Concentrations of Pollutants from No Action and Stockpile Stewardship and Management Alternatives at Site 300

Pollutant	Averaging Time	Most Stringent Regulations or Guidelines (g/m^3)	2005 No Action (g/m^3)	High Explosives Fabrication (g/m^3)	Contained Firing Facility[6] (g/m^3)	Combined Program Impacts (g/m^3)
Criteria Pollutant						
Carbon monoxide	8-hour	10,000[7]	4.96	5.26	-	5.26
	1-hour	23,000[8]	39.68	42.11	-	42.11
Lead	Calendar quarter	1.5[7]	<0.01	<0.01	-	<0.01

	30-day	1.5[8]	<0.01	<0.01	-	<0.01
Nitrogen dioxide	Annual	100[7]	0.28	0.29	-	0.29
	1-hour	470[8]	183.54	188.88	-	188.88
Ozone	1-hour	180[8]	[9]	[9]	-	[9]
Particulate matter	Annual	30[8]	0.03	0.03	-	0.03
	24-hour	50	0.91	0.93	-	0.93
Sulfur dioxide	Annual	80[7]	<0.01	<0.01	-	<0.01
	24-hour	105	0.09	0.10	-	0.10
	3-hour	1,300	0.71	0.80	-	0.80
	1-hour	655[8]	2.12	2.41	-	2.41
Mandated by California						
Beryllium	30-day	0.01[10]	0.000049	0.000049	-	0.000049
Hydrogen sulfide	1-hour	42	[9]	0.71	-	0.71
Sulfate	24-hour	25	[9]	[9]	-	[9]
Vinyl chloride	24-hour	26	[9]	[9]	-	[9]
Hazardous and Other Toxic Compounds						
Acetone	8-hour	[11]	0.12	0.12	-	0.12
Acetonitrile	8-hour	[11]	[9]	0.04	-	0.04
Ammonia	8-hour	[11]	[9]	0.01	-	0.01
Benzene	8-hour	[11]	<0.01	[9]	-	<0.01
Chlorofluorocarbons	8-hour	[11]	0.44	0.44	-	0.44
Chloroform	8-hour	[11]	<0.01	[9]	-	<0.01
1,2-Dichloroethane	8-hour	[11]	[9]	<0.01	-	<0.01
Ethanol	8-hour	[11]	<0.01	[9]	-	<0.01
Formaldehyde	8-hour	[11]	0.01	0.01	-	0.01
Gasoline vapors	8-hour	[11]	0.98	0.98	-	0.98
Glycol ethers (other)	8-hour	[11]	0.14	0.14	-	0.14
Hydrogen chloride	8-hour	[11]	0.16	0.28	-	0.28
Hydrogen fluoride	8-hour	[11]	[9]	0.24	-	0.24
Isopropyl alcohol	8-hour	[11]	<0.01	[9]	-	<0.01
Methyl ethyl ketone	8-hour	[11]	<0.01	0.02	-	0.02
Methylene chloride	8-hour	[11]	<0.01	[9]	-	<0.01
Toluene	8-hour	[11]	0.05	0.05	-	0.05
Trichloroethylene	8-hour	[11]	0.01	0.01	-	0.01
Xylene	8-hour	[11]	0.01	0.02	-	0.02

High Explosives Fabrication. Gaseous emissions of criteria and toxic/hazardous air pollutants would be generated from the HE fabrication mission. These emissions would result from open burn/open detonation of nonradioactive scrap HE and HE-contaminated waste, plant boiler operation, cleaning operations using solvents, and formulation and synthesis operations. Emission rates for criteria and toxic/hazardous pollutants from HE fabrication are presented in appendix table B.3.7-1. Table 4.7.3.3-2 presents the concentrations of criteria and toxic/hazardous pollutants resulting from No Action and those generated from operation of the HE mission. The resulting concentrations of criteria and toxic/hazardous pollutants are expected to be within Federal and state regulations and guidelines.

Nonnuclear Fabrication. The primary source of emissions would be fugitive emissions of numerous small amounts of solvents from nonnuclear component fabrication processes. These solvents include acetone, isopropyl alcohol, methyl ethyl ketone, and toluene. Table 4.7.3.3-1 presents the concentrations of toxic/hazardous pollutants resulting from No Action and nonnuclear fabrication. Emission rates of toxic/hazardous pollutants for annual operation of nonnuclear fabrication are presented in appendix table B.3.7-1. Concentrations of pollutants resulting from operation of nonnuclear fabrication added to No Action concentrations are expected to be within Federal and state regulations. Modeled estimates for the 1-hour concentration of nitrogen dioxide at the Livermore Site, however, are above the applicable standard.

Sensitivity Analysis. Impacts to air quality from either the low or high case scenario of the program alternatives at the Livermore Site and Site 300 would result in higher and lower concentrations of criteria and toxic/hazardous pollutants for the high and low case, respectively. The concentrations of pollutants for both cases are expected to be within applicable Federal and state regulations and guidelines. The 1-hour concentrations of nitrogen dioxide at the Livermore Site may result in a concentration above the applicable standard.

Stewardship Alternatives

Proposed National Ignition Facility. Operation of the proposed NIF would generate criteria and toxic/hazardous pollutants resulting from the combustion of boiler fuel for heating, operation of diesel generators, and solvent cleaning processes. The emissions consist of particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, and volatile organic compounds. Boiler fuel is assumed to be natural gas. Emission rates of criteria and toxic/hazardous pollutants for annual operation of the proposed NIF are presented in appendix table B.3.7-1. Table 4.7.3.3-1 presents the concentrations of criteria and toxic/hazardous pollutants resulting from No Action and those generated from operation of the proposed NIF. Concentrations of pollutants resulting from operation of the proposed NIF added to No Action concentrations are expected to be within Federal and state regulations. Modeled estimates for the 1-hour concentration of nitrogen dioxide at the Livermore Site, however, are above the applicable standard.

Proposed Contained Firing Facility. It is expected that emissions (such as particulate metal oxides and soot, acid gases, and VOCs) from the proposed CFF operations would be below regulatory limits because of the extensive air scrubbing, filtration, and absorption systems that would be operated in conjunction with the proposed CFF. Resulting emissions from the air control system should then be limited to those such as carbon dioxide, nitrogen, water, and, when tritium is used in the chamber, tritiated water as well as very minor amounts of activated air gas molecules (appendix J).

Combined Program Impacts. The combined impacts to air quality assuming that each of the proposed stockpile stewardship and management alternatives is located at the Livermore Site and Site 300 are small. Tables 4.7.3.3-1 and 4.7.3.3-2 present the Program total concentrations of criteria and toxic/hazardous pollutants derived by adding the contribution from each alternative at each site. The contribution to air pollutants was determined for each alternative independently from each of the other alternatives. Therefore, adding the respective contributions presents a conservative estimate of the combined impacts to air quality since the maximum pollutant concentration for each alternative would not occur at the same time or location at or beyond the site boundary.

Using this conservative estimate of the combined impacts to air quality at the Livermore Site and Site 300, the data indicate that the 1-hour concentration of nitrogen dioxide may result in a concentration above the applicable State of California ambient air quality standard at the Livermore Site. All other criteria and/or toxic/hazardous air pollutants are expected to be within applicable standards.

Potential Mitigation Measures. The reduction of emissions of nitrogen dioxide from the Livermore Site using reasonable available control technology would contribute to the reduction of concentrations of nitrogen dioxide at or beyond the site boundary.

4.7.3.4 Water Resources

Environmental impacts associated with the construction and operation of the proposed stockpile stewardship and management facilities at LLNL could affect surface and groundwater resources. The proposed sites for the facilities would be outside the 100-year floodplain. An assessment of the 500-year floodplain would be performed before construction began. A description of the functions to be transferred to LLNL and the facility locations selected to house these activities is presented in sections 3.3 and 3.4. Tables 4.7.3.4-1 and 4.7.3.4-2 present existing surface and groundwater resources and the potential changes to water resources at the Livermore Site and Site 300 resulting from the proposed alternatives. The total site water resource requirements for each alternative, including No Action, are displayed in this table.

Surface Water

No Action. At the Livermore Site, water would continue to be obtained from county and state suppliers described in section 4.7.2.4. No construction would occur under No Action; therefore, no additional construction water would be required or discharged. Current public water usage of 968 MLY (256 MGY) would decrease to 967 MLY (255 MGY) by 2005. Current wastewater discharges to the city of Livermore are expected to increase 56 MLY (14.8 MGY) by 2005.

At Site 300, current wastewater discharges of 4.8 MLY (1.3 MGY) are anticipated to decrease 0.4 MLY (0.1 MGY) by 2005. Adverse impacts to surface water or surface water quality at the Livermore Site or Site 300 are not expected under the No Action alternative.

Management Alternatives

Secondary and Case Fabrication. The estimated 3.0 MLY (0.79 MGY) of public water withdrawals during modifications of the secondary and case fabrication facilities at the Livermore Site would compose no more than a 0.3-percent increase over the projected water use of 967 MLY (255 MGY). The 461 MLY (122 MGY) of treated wastewater effluent would be released to the city of Livermore Water Reclamation Plant during construction; this would be approximately a 15-percent increase over current Livermore Site wastewater discharges of 400 MLY (106 MGY). All discharges would be monitored to comply with NPDES permit and other discharge requirements. To minimize soil erosion impacts, stormwater management and erosion control measures would be implemented. With appropriate controls, adverse impacts to surface water are not expected.

An additional 194 MLY (51.2 MGY) would be required to support three-shift surge operations of the secondary and case fabrication facilities. This is approximately a 20-percent increase over the projected amount of water use. Approximately 102 MLY (27 MGY) of treated wastewater would be released to the city of Livermore Water Reclamation Plant during operations, resulting in a 40-percent increase over projected Livermore Site wastewater discharges. All discharges would be to the city of Livermore sewer system and would be monitored to comply with NPDES permit and other discharge requirements. Adverse impacts to surface water are not expected.

Table 4.7.3.4-1.--Potential Changes to Water Resources from Stockpile Stewardship and Management Alternatives at the Livermore Site

Affected Resource Indicator	No Action Single-Shift Operation 2005	Secondary and Case Fabrication Three-Shift Operation	Nonnuclear Fabrication Three-Shift Operation	National Ignition Facility	Combined Program Impacts
Construction					
Water Availability and Use					
Water source	Municipal Supply	Municipal Supply	Municipal Supply	Municipal Supply	Municipal Supply
Total site water operation requirement[12] (MLY)	0[13]	970	967.02	970	970.02
Percent change from No Action water use (967 MLY)	NA	0.3	0.002	0.3	0.3
Water Quality					
Wastewater discharge to the city of Livermore[14] (MLY)	0[13]	461	456.1	459	464.1
Percent change from No Action wastewater discharges (456 MLY)	NA	1.1	0.02	.7	1.8
Operation					
Water Availability and Use					

Water source	Municipal Supply	Municipal Supply	Municipal Supply	Municipal Supply	Municipal Supply
Total site water operation requirement (MLY)	967	1,161	971	1,119	1,317
Percent change from No Action water use (967 MLY)	NA	20	0.4	16	36
Percent change from current use (968 MLY)	-0.1	20	0.4	16	36
Water Quality					
Wastewater discharge to the city of Livermore (MLY)	456	558	462	474	582
Percent change from No Action wastewater discharge (456 MLY)	NA	22	1.3	3.9	28
Percent change from current wastewater discharge (400 MLY)	14	40	16	17	46
Floodplain					
Actions in 100-year floodplain	NA	None	None	None	None
Actions in 500-year floodplain	NA	Uncertain	Uncertain	Uncertain	Uncertain

Table 4.7.3.4-2.--Potential Changes to Water Resources from Stockpile Stewardship and Management Alternatives at Site 300

Affected Resource Indicator	No Action Single-Shift Operation 2005	High Explosives Fabrication Three-Shift Operation	Contained Firing Facility
Construction			
Water Availability and Use			
Water source	Ground	Ground	Ground

Total site water operation requirement[15] (MLY)	0[16]	91.2	91.9
Percent change from No Action water use (90 MLY)	0	1.3	2.1
Water Quality			
Wastewater discharge to leach fields and septic systems[17] (MLY)	0[13]	5.8	5.8
Percent change from No Action wastewater discharge (4.4 MLY)	NA	32	32
Percent of leach fields and septic systems capacity (12 MLY)	36.7	48	48
Operation			
Water Availability and Use			
Water source	Ground	Ground	Ground
Total site water operation requirement (MLY)	90	148	92.3
Percent change from No Action water use	NA	65	2.6
Water Quality			
Wastewater discharge to leach fields and septic systemsc (MLY)	4.4	12.2	4.7
Percent change from No Action discharge to leach fields and septic systems (4.4 MLY)	NA	178	6.8
Percent change from current discharge (4.8 MLY)	-8.3	154	-2.1
Percent of leach fields and septic systems capacity (12 MLY)	36.7	102	39.2
Floodplain			
Actions in 100-year floodplain	NA	None	None
Actions in 500-year floodplain	NA	Uncertain	Uncertain

Nonnuclear Fabrication. Public water use of 0.02 MLY (0.005 MGY) during modification of the nonnuclear fabrication facilities at the Livermore Site would comprise less than a 0.1-percent increase over the projected water use of 967 MLY (255 MGY). Approximately 0.02 MLY (0.005 MGY) of treated wastewater effluent would be released to the city of Livermore Water Reclamation Plant during the modification phase. All discharges would be to the city of Livermore sewer system and monitored to comply with NPDES permits and other requirements.

An additional 3.8 MLY (1 MGY) of public water is needed for operating the nonnuclear fabrication facilities. The estimated 462 MLY (122 MGY) of treated wastewater released to the city of Livermore Water Reclamation Plant during operations would be a 1.2-percent increase over projected wastewater discharges. All discharges would be *to the city of Livermore sewer system* and monitored to comply with NDPES permit and other discharge requirements. Adverse impacts to surface water are not expected.

High Explosives Fabrication. During construction and operations of these facilities at Site 300, surface, groundwater, public water supply (Hetch Hetchy Reservoir), or a combination of both, could be used to meet water requirements. If reservoir water is used, withdrawals of 91.2 MLY (24.1 MGY) during construction and modifications of the HE facilities would compose no more than 13 percent of the 693 MLY (183 MGY) capacity of the newly constructed tap line to the Hetch Hetchy Aqueduct. The **5.8** MLY (**1.5** MGY) of treated wastewater effluent released to the General Service Area leach fields and septic systems during construction would be **48** percent of the wastewater leach fields and septic systems capacity of 12 MLY (3.2 MGY). All discharges would be monitored to comply with NPDES permit and other discharge requirements. To minimize soil erosion impacts to surface waters, stormwater management and erosion control measures would be implemented. Adverse impacts to surface waters are not expected.

An additional 12.2 MLY (3.2 MGY) of treated wastewater would be released to the General Service Area leach fields and septic systems during operations. The additional wastewater represents a 178-percent increase over current wastewater discharges and exceeds the capacity of the leach fields and septic systems by 2 percent. Additional leach fields or modifications to the septic systems would have to be planned to meet the projected discharges. All discharges would be monitored to comply with permit and other discharge requirements.

Stewardship Alternatives

Proposed National Ignition Facility. Constructing the proposed NIF at the Livermore Site would require approximately 3 MLY (0.79 MGY) of water over the 5-year construction period or a 0.3-percent increase in the projected water requirements of 967 MLY (255 MGY). NIF's construction would require a California General Construction Activity Stormwater Permit, which satisfies the requirements of both the NPDES and State of California stormwater regulations. Construction activities would be expected to have minor to negligible effects on water quality, assuming that a stormwater pollution prevention plan is prepared and implemented to minimize soil erosion, sedimentation, and contamination of stormwater. During construction, the additional 0.4 MLY (0.1 MGY) of wastewater generated would be handled by the existing city of Livermore sewer and treatment system. During operation, the proposed NIF would require approximately 152 MLY (40.2 MGY) of additional water, of which 17.9 MLY (4.7 MGY) would be used for domestic purposes. This amount is approximately 16 percent of the projected amount of the Livermore Site's water use. The proposed NIF operation would not exceed water and wastewater utility capacities.

Proposed Contained Firing Facility. Constructing the proposed CFF would require some excavation and terrain sloping. The direction and volume of existing runoff would not be altered by the proposed site work because all earth work would be accomplished within the same micro-drainage area below the division for adjacent watersheds. To minimize soil erosion impacts, stormwater management and erosion control measures would be implemented. Appendix J provides more detailed analyses of the proposed CFF.

Groundwater

No Action. Under No Action, the relatively small amount of groundwater used for irrigation and cooling tower makeup at the Livermore Site would remain the same. At Site 300, projected water use is expected to remain at the current 90 MLY (23.8 MGY) level. The two existing groundwater supply wells in the southeastern portion of the site are the sole source of this water; however, a tap line from the Hetch Hetchy Aqueduct has been constructed with a capacity of 693 MLY (183 MGY) and is expected to be in operation in the near future. It is not known at this time how much Site 300 will rely on this additional water source. No additional impacts to groundwater quality are anticipated since there are no direct discharges to groundwater.

Management Alternatives

Secondary and Case Fabrication. During modification activities and operation of the secondary and case fabrication facilities at the Livermore Site, water would be obtained from the public suppliers described in section 4.7.2.4. There are no plans for withdrawal from groundwater resources. All process, utility, and sanitary wastewater would be discharged to the city of Livermore sewer systems for treatment at the Livermore Water Reclamation Plant. No adverse impacts to groundwater or groundwater quality are expected.

Nonnuclear Fabrication. During modification activities and operation of the nonnuclear fabrication facilities at the Livermore Site, water would be obtained from the public suppliers described in section 4.7.2.4. There are no plans for withdrawal from groundwater resources. All process, utility, and sanitary wastewater would be discharged to the city of Livermore sewer system for treatment at the Livermore Water Reclamation Plant. No adverse impacts to groundwater or groundwater quality are expected.

High Explosives Fabrication. The groundwater used while constructing and modifying the HE facilities would be approximately equal to current groundwater withdrawals of 90 MLY (23.8 MGY) from Site 300. During construction, no wastewater would be discharged directly to the ground. Adverse impacts to groundwater or groundwater quality are not expected.

Operating the facilities would require an additional 58.2 MLY (15.4 MGY), an approximate 65-percent increase over the projected amount of groundwater withdrawn from the aquifer. As previously mentioned, water could also be obtained from the newly constructed tap line connecting Site 300 to the Hetch Hetchy Aqueduct. This new tap line has a supply capacity of 693 MLY (183 MGY). No wastewater would be discharged directly to groundwater. All discharges to the leach fields and septic systems would be monitored to comply with permit and other discharge requirements. Adverse impacts to groundwater or groundwater quality are not expected.

Sensitivity Analysis. Surface water or surface water quality would not be affected by either the low or high case production scenario for stockpile management alternatives at the Livermore Site and Site 300. Groundwater or groundwater quality is not expected to be impacted by the high or low case production scenario for stockpile management alternatives at the Livermore Site or Site 300.

Stewardship Alternatives

Proposed National Ignition Facility. During construction and operation of the proposed NIF facilities at the Livermore Site, water would be obtained from the public suppliers described in section 4.7.2.4. There would be no withdrawal from groundwater resources. All process, utility, and sanitary wastewater would be discharged to the city of Livermore sanitary sewer system for treatment at the Livermore Water Reclamation Plant. No adverse impacts to groundwater or groundwater quality are expected. Appendix I provides a more detailed analysis of the proposed NIF.

Proposed Contained Firing Facility. During construction and operation of the proposed CFF at Site 300, water would either be obtained from groundwater via the two onsite groundwater supply wells or from public water supply (Hetch Hetchy Aqueduct). An additional 1.9 MLY (0.5 MGY) would be required for construction activities and 2.3 MLY (0.60 MGY) for operation of the proposed CFF. These requirements compose less than a 3-percent increase from projected groundwater use. No adverse impacts to groundwater or groundwater quality are expected. Appendix J provides a more detailed analysis of the proposed CFF.

Combined Program Impacts. The combined Program impacts to water resources if each proposed alternative was implemented at the Livermore Site are shown in table 4.7.3.4-1. During construction approximately 973 MLY (257 MGY) of public supply water would be used. Approximately 1,317 MLY (348 MGY) of public supply water would be required for operation of the facilities; this represents a 36-percent increase from the projected water use. Wastewater discharges during construction and operation of the facilities would total 458 MLY (121 MGY) and 582 MLY (154 MGY), respectively. All wastewater would be discharged to the city of Livermore sewer systems. Adverse impacts to both surface water and groundwater quality are not anticipated.

Potential Mitigation Measures. Additional leach fields or modifications to the septic systems would have to be planned in order to meet the projected HE fabrication wastewater discharges. Reclaiming or recycling wastewater would reduce sanitary discharges and minimize the impact on the existing Site 300 sanitary treatment system.

4.7.3.5 Geology and Soils

The alternatives proposed for LLNL would have no adverse impact on geological resources described in section 4.7.2.5. Although a relatively high seismic risk exists at LLNL, this would be considered in the design of any new structures. The existing seismic risk does not preclude safe construction, modification, or operation of any proposed facilities. All new functions, with the exceptions of the proposed NIF and CFF, would be accommodated in existing structures. For the management alternatives, LLNL has sufficient warehousing space, parking space, and yard area to accommodate construction area requirements. Control measures would be used to minimize any soil erosion. Potential changes to geology and soils associated with the proposed alternatives at LLNL are discussed below.

No Action. Under No Action, DOE would continue current and planned activities at LLNL. Any impacts to geology and soils would be independent of and unaffected by the proposed action.

Management Alternatives

Secondary and Case Fabrication. Soil disturbance is not expected during modification of existing buildings for the secondary and case fabrication mission at the Livermore Site. Since facilities needed for the secondary and case fabrication mission already exist, only laydown areas for receiving and staging equipment and construction materials are needed. The Livermore Site has sufficient warehousing space and developed yard area to accommodate this requirement. Offices for construction engineering and management would be provided by plant engineering, or trailers would be located adjacent to facilities undergoing modification. Parking for construction workers is available onsite. Adverse soil impacts are not expected. The construction of a 167-m^2 (1,800-ft^2) steel-framed Butler-type building that is needed to provide covered space within the Superblock protected area would not affect geology or soils.

The potential for surface faulting at the Livermore Site is very low (LL DOE 1992c:4-84). Ground shaking is more likely. Based on the seismic history of the area, a high seismic risk exists but should not preclude safe modification and operation of the proposed facilities. Potential sources of future ground motion at LLNL include the major regional faults and the local faults: Greenville, Las Positas, Verona, Corral Hollow, Carnegie, and Williams (LL DOE 1992c:4-83,4-84). The location of the proposed facilities would be evaluated at the Livermore Site during project-specific studies so that these faults and any associated potential ground rupture would be considered in facilities design. All facilities would be designed for earthquake-generated ground acceleration in accordance with DOE O 420.1 and accompanying safety guides. Potential health impacts from accidents associated with geological hazards are discussed in 4.7.3.9.

High Explosives Fabrication. No significant upgrades to either the HE Applications Facility at the Livermore Site or to Site 300 are anticipated should LLNL receive the HE fabrication mission for the Complex. All production operations would be housed within existing buildings, with the exception of a 116-m^2 (1,250-ft^2) facility for conventional HE storage. Soil disturbances during construction of the new storage facility would be minimal with standard construction erosion control measures.

Based on the seismic history of the area, a high seismic risk exists but should not preclude safe modification and operation of the proposed facilities. Potential sources of future ground motion at Site 300 include the major regional faults and the local faults: Greenville, Las Positas, Corral Hollow, Carnegie, Black Butte, and Midway (LL DOE 1992c:4-87). The location of the proposed facilities would be evaluated at LLNL during project-specific studies so that these faults and any associated potential ground rupture would be considered in facilities design. Surface faulting at Site 300 in areas adjacent to the active Carnegie fault is possible (LL DOE 1992c:4-87). However, no HE facilities are located in these areas. The potential for seismically induced ground deformation at Buildings 826, 851, and 854, located on landslide deposits, is considered to be moderate to high (LL DOE 1992c:4-89). All facilities would be designed for earthquake-generated ground acceleration in accordance with DOE O 420.1 and accompanying safety guides.

Nonnuclear Fabrication. All production operations can be housed within existing buildings at the Livermore Site. Material and equipment laydown and parking areas exist, and no additional areas would be required. Adverse soil impacts are not expected. Seismic risks would be similar to the risks associated with the secondary and case fabrication mission.

Sensitivity Analysis. The high or low case operation scenario for the proposed stockpile management alternatives at LLNL would not affect geology or soils.

Stewardship Alternatives

Proposed National Ignition Facility. The construction and operation of the proposed NIF at the Livermore Site would not adversely affect geological resources. The proposed NIF would require the clearing of an estimated 8.1 ha (20 acres) of land for structures, walkways, building access, and buffer space. Soil impacts during construction would be short term and minor with appropriate standard construction erosion and sediment control measures. Net soil disturbance during operation would be less than for construction because areas temporarily used for material and equipment laydown would be restored. Seismic risks would be taken into account during construction and operation of NIF (see appendix I).

Proposed Contained Firing Facility. Construction of the proposed CFF at LLNL would result in minor soil impacts at Site 300 in the vicinity of the B801 complex. About 36,700 m^3 (48,000 yd^3) of soil surrounding the current facility would be excavated and removed to provide space for the new portion of the facility. Approximately 1.2 ha (3 acres) would be permanently disturbed immediately around the B801 complex as a result of necessary slope contouring and construction of the proposed CFF. Soils exposed by project construction, especially on the hillsides, are considered to be moderately vulnerable to erosion; their clay content provides slightly more resistance to erosion than does the high loam content of entisols, which dominate Site 300 soil types. Erosion, if it occurs, would be minor and short term. Erosion of the small hillsides surrounding the proposed project would not be expected beyond one growing season. Cut hillsides would be sloped and, where local geology allows, revegetated (using hydroseeding) to prevent erosion. The direction and volume of existing runoff would not be altered by the proposed site work because all earthwork would be accomplished within the same micro-drainage area below the division for adjacent watersheds. Dust suppression and stormwater pollution prevention (runoff) mitigation technologies would be applied to reduce these impacts (see appendix J).

Existing B801 site slopes are stable. Unconsolidated overburden is only a few feet thick in the area and bedrock dips at a shallow angle (about 5 degrees) to the northeast. However, a recently active landslide deposit has been observed east of the site within about 244 m (800 ft). This landslide is reported to have generated a mudflow that reached the vicinity of the B801 site during a 15-year period prior to 1983. This mudflow appears to have been mitigated by placement of an earthen fill between the flow and the B801 site. Appropriate slope stabilization measures would be taken in the design and construction of graded slopes (see appendix J).

A number of active faults are considered capable of causing strong ground motion at Site 300. The nearest of these faults to Site 300 is the Carnegie-Corral Hollow fault, which crosses the southwest portion of the site. No significant recorded earthquakes have occurred on any of the local faults. The effect of seismic activity at Site 300 is likely to be confined to ground shaking with no surface displacement. Raber and Carpenter have identified the principal seismic hazard at Site 300 as being the potential for strong ground shaking caused by an earthquake on the Greenville fault, located about 8 km (5 mi) west of Site 300 (see appendix J). Facilities would be designed for earthquake-generated ground acceleration in accordance with DOE O 420.1 and accompanying safety guides.

Potential Mitigation Measures. No mitigation measures for stockpile stewardship and management alternatives at LLNL are anticipated.

4.7.3.6 Biotic Resources

The following sections address impacts to terrestrial resources, wetlands, aquatic resources, and threatened and endangered species at LLNL. Construction and operation of the HE Fabrication Facility, proposed CFF, and proposed NIF would result in loss of terrestrial habitat and possible impacts to threatened and endangered species. Temporary impacts to wildlife due to noise and human presence during construction are also possible for most of these alternatives.

No Action. Under No Action, the stockpile stewardship missions described in section 3.2.7 would continue at LLNL. There would be no changes to current biotic resource conditions at the site as described in section 4.7.2.6.

Management Alternatives

Secondary and Case Fabrication. The secondary and case fabrication mission at the Livermore Site would require modification of some existing structures and construction of one Butler-style building. New construction would take place within an area of the Livermore Site that is already developed. Temporary construction laydown and parking would utilize existing warehousing and yard area. Wastewater would be discharged to the sanitary sewer system. Except for some temporary disturbance to wildlife during construction of the new building, no adverse impacts to site biotic resources are expected.

High Explosives Fabrication. Most operations associated with the HE fabrication mission at LLNL would be housed within existing buildings within the B827 Area of Site 300. However, an HE storage area would need to be developed. This facility would be located just southeast of the B827 Area. Impacts to biotic resources are not expected from modification activities conducted at existing buildings. The HE storage area would result in the disturbance of about 0.8 ha (2 acres) of grassland. Proper erosion and sediment control measures would reduce the potential for disturbance of habitat adjacent to the construction area. Construction and operation would result in some disturbance to wildlife living in adjacent areas due to noise and human presence. Impacts to wetlands and aquatic resources would not be expected due to the general lack of these resources in the area. The presence of threatened and endangered species in the area to be disturbed is unknown. Preactivity surveys would be required to determine the occurrence of any special status species including the San Joaquin kit fox (*Vulpes macrotis mutica*), San Joaquin pocket mouse (*Perognathus inoratus*), western burrowing owl, (*Athene cunicularia hypugea*), California horned lizard (*Phrynosoma coronatum frontale*), and American badger (*Taxidea taxus*).

Nonnuclear Fabrication. Nonnuclear fabrication mission functions would be located in existing buildings at the Livermore Site. No new construction would be required and wastewater would be released through existing NPDES-permitted discharges. The relocation of the nonnuclear fabrication mission to the Livermore Site would not impact biotic resources.

Sensitivity Analysis. Implementation of either a low or high case workload for the stockpile management alternatives would not effect biological resources of LLNL with the exception of those already described for the proposed HE Fabrication Facility.

Stewardship Alternatives

Proposed National Ignition Facility

Terrestrial Resources. The proposed NIF would be sited on an 8.1-ha (20-acre) area of disturbed grassland located within the Livermore Site. Proper erosion and sediment control measures would reduce the potential for disturbance of habitat adjacent to the construction area. Animal species within the disturbed area would be either destroyed or displaced depending upon whether they were able to move from the area. Wildlife may also be disturbed by the increased level of human activity associated with the project.

Wetlands. The proposed NIF site does not contain, nor is it located near, wetlands. Construction and operation of the proposed NIF is not expected to adversely impact this resource. Proper erosion and sediment control measures would reduce the potential of impacting site wetlands.

Aquatic Resources. Because there are no aquatic resources on the proposed NIF site, this resource would not be disturbed by construction. Proper erosion and sediment control measures would reduce the potential of sediment-laden runoff from reaching site arroyos.

Threatened and Endangered Species. Adverse impacts to special status species would not be expected from construction or operation of the proposed NIF due to the lack of suitable habitat and the disturbed nature of the proposed site.

Proposed Contained Firing Facility

Terrestrial Resources. Construction of the proposed CFF would result in the disturbance of approximately 1.2 ha (3.0 acres) of hillside land adjacent to the present Site 300 B801 complex. While some of the area to be developed has been previously disturbed, some land adjacent to B801 would be impacted. Erosion and sediment control measures would reduce the potential for disturbance of habitat adjacent to the construction area. Animal species within the disturbed area would be either destroyed or displaced depending upon whether they were able to move from the area. Wildlife may also be disturbed by the increased level of human activity associated with the project.

Wetlands. Direct disturbance to wetlands from construction would not occur since there are no wetlands located on the site. However, a cattail wetland (resulting from cooling tower discharge), located about 60 m (197 ft) south-southwest of B801, could be affected by sediment runoff. Erosion and sediment control measures would be used to reduce the risk of indirect impacts to this wetland.

Aquatic Resources. There are no aquatic resources on or near the B801 area; therefore, aquatic resources would not be affected by construction or operation of the proposed CFF.

Threatened and Endangered Species. No known Federal- or state-listed endangered plant or animal species are present within the immediate vicinity of the B801 complex. The potential for impacts to the western burrowing owl and American badger from construction and operation of the proposed CFF are considered minimal. Western burrowing owl dens have become established during periods of road construction south of B801 and during long periods of outdoor explosives testing at the present B801 complex; thus, it is unlikely that construction and operation of the new facility would adversely affect this species. American badgers should not be affected due to the relatively small portion of the species' home range (less than 1 percent) that would be occupied by the project, the large amount of unrestricted land at Site 300, and the transient nature of American badgers. Preactivity surveys for special status species (i.e., San Joaquin kit fox, western burrowing owl, and American badger) would be conducted prior to the start of the project and, if found, appropriate mitigation measures would be implemented.

Potential Mitigation Measures. Minimization of the area to be disturbed, revegetation with native species, and implementation of a soil erosion and sediment control plan would help to lessen short- and long-term impacts to terrestrial species and habitats, as well as wetlands in the vicinity of the proposed CFF. Disturbance to wildlife living adjacent to facilities may be minimized by preventing workers from entering undisturbed areas. It may be necessary to survey the site for the nests of migratory birds prior to construction and to avoid clearing operations during the breeding season. If any threatened or endangered species occur on the site, specific mitigation measures would be developed in conjunction with the USFWS.

4.7.3.7 Cultural and Paleontological Resources

For the discussion of impacts, the term cultural resources includes prehistoric, historic, and Native American resources. Cultural and paleontological resources may be affected directly through ground disturbance, building modifications, visual intrusion of the project to the historic setting or environmental context of historic sites, visual and audio intrusions to Native American resources, reduced access to traditional use areas, and unauthorized artifact collecting and vandalism. Some cultural and paleontological resources may be affected by the proposed alternatives.

No Action. Under No Action, DOE would continue the existing and planned missions of the Livermore Site and Site 300. Any impacts to cultural or paleontological resources from these missions would be independent of and unaffected by the proposed action.

Management Alternatives

Secondary and Case Fabrication. The secondary and case fabrication mission at the Livermore Site would involve equipment movement, installation, building modification, and the construction of one 167 m*2* (1,800 ft^2) steel framed Butler-style building within the Superblock protected area. No cultural or paleontological resources are known to exist within the proposed area; however, some resources may be affected by the proposed alternative. NRHP-eligible resources would be identified through project-specific surveys, inventories, and evaluations, and any project-related effects would be addressed in tiered NEPA documentation.

High Explosives Fabrication. LLNL maintains most of the facilities necessary for HE fabrication within the B827 area of Site 300. An HE storage area would need to be developed. The proposed facility would be located to the southeast of the B827 area. About 0.8 ha (2 acres) would be disturbed during construction. Site 300 has been surveyed and does contain prehistoric and historic resources. Additional resources may exist in the acreage to be disturbed during construction. Some Native American and paleontological resources may also be affected. Project-specific evaluations and any project-related effects would be addressed in tiered NEPA documentation. No impacts to cultural or paleontological resources are expected. Sharing this mission with LANL would have no effects on cultural or paleontological resources at LLNL.

Nonnuclear Fabrication. The nonnuclear fabrication mission at LLNL would involve equipment movement, installation, and some modification to existing buildings. Some NRHP-eligible historic buildings may be affected under this alternative. NRHP-eligible resources would be identified through project-specific inventories and evaluations, and any project-related effects would be addressed in tiered NEPA documentation. No impacts are expected to prehistoric, Native American, or paleontological resources.

Sensitivity Analysis. The secondary and case, HE, and nonnuclear alternatives high and low case production scenarios would have the same impacts to cultural and paleontological resources as the base case production facilities.

Stewardship Alternatives

Proposed National Ignition Facility. The proposed alternative would require the construction of two buildings and the development of 8.1 ha (20 acres) of currently undeveloped land at the Livermore

Site. No prehistoric or historic resources exist on the proposed location for NIF at the Livermore Site. Six to 13 m (2 to 4 ft) of fill cover the proposed location, which is underlain by soils deposited approximately 15,000 years ago. These soils predate the earliest documented human settlement in the area, and it is unlikely that these soils contain prehistoric materials. Paleontological remains have not been recovered from the soils. Consultation is in progress with Native American groups to identify any important cultural resources on the Livermore Site (appendix I).

Proposed Contained Firing Facility. Under this alternative, 36,701 m^3 (48,000 yd^3) of soils surrounding the existing B801 facility at Site 300 would be excavated. A surface survey conducted in 1981 recorded one prehistoric site 394 m (1,300 ft) from the proposed project area. Additional NRHP-eligible prehistoric and historic sites may exist in the area. Should culturally significant materials be encountered during construction, work would stop until the discovery could be evaluated by a qualified archaeologist. Some paleontological resources with moderate research potential exist within Site 300 and may be affected by the proposed action. Consultation is in progress with Native American groups to identify any important cultural resources on Site 300 (appendix J).

Potential Mitigation Measures. If NRHP-eligible resources cannot be avoided through project design or siting, and would result in adverse impacts, then a Memorandum of Agreement would need to be negotiated between DOE, the California SHPO, and the Advisory Council on Historic Preservation. The Memorandum of Agreement would formalize mitigation measures agreed to by these consulting parties. Mitigation measures could include describing and implementing intensive inventory and evaluation studies, data recovery plans, site treatments, and monitoring programs. The appropriate level of data recovery for mitigation would be determined through consultation with the California SHPO and the Advisory Council on Historic Preservation, in accordance with Section 106 of the *National Historic Preservation Act* . Mitigation measures for specific NRHP-eligible sites would be identified during tiered NEPA documentation.

If Native American resources cannot be avoided through project design or siting, then acceptable mitigation measures to reduce project effects on them would be determined in consultation with the affected Native American groups. In accordance with the *Native American Graves Protection and Repatriation Act* and the *American Indian Religious Freedom Act* , such mitigations may include, but would not be limited to, appropriately relocating human remains, planting vegetation screens to reduce visual or noise intrusion, increasing access to traditional use areas during operations, or transplanting or harvesting important Native American plant resources.

Because scientifically important buried paleontological materials could be affected, paleontological monitoring of construction activities and data recovery of fossil remains would be appropriate mitigation measures.

4.7.3.8 Socioeconomics

No Action. Under No Action, the existing stewardship R&D missions would remain operational at LLNL. No new employment or in-migration of workers would be required. Projected regional economy and employment levels, population and housing changes, and public finance characteristics are presented in appendix D.

Regional Economy and Employment. Total employment in the regional economic area is projected to increase by about 2 percent annually between 1996 and 2000, and reach approximately 4,621,900 in 2000. Long-range projections show employment growth continuing at this rate until 2020 when annual growth falls to less than 1 percent. Total employment is projected to number 6,555,300 in 2030. No Action employment at LLNL is projected to reach 8,189 by 2005. Unemployment in the regional economic area was 7.6 percent in 1994 and is expected to remain near that level into the near future. Per capita income is projected to increase from approximately $27,215 to $41,570 between 1996 and 2030.

Population and Housing. Annual ROI county and city population and housing growth is projected to average about 2 percent from 1995 to 2000, but then slow to 1 percent between 2000 and 2030. The ROI population is projected to increase from 2,841,200 in 1995 to 4,421,000 in 2030. The total number of housing units is projected to increase from 1,074,200 to 1,671,600 during the same period.

Public Finance. Between 2000 and 2005, all ROI county, city, and school district total revenues are projected to increase at an annual average of less than 1.8 percent. Total expenditures are projected to increase at an annual average of less than 1.4 percent during the same period. These rates of increase should continue until 2030.

Management Alternatives

Secondary and Case Fabrication

Regional Economy and Employment. During peak construction, the modification and renovation of these facilities would employ 130 workers during 2000, the peak year of construction, and generate an additional 194 indirect jobs in the regional economy. Total employment in the regional economic area would increase by less than 1 percent from the No Action projections. There would be no perceptible change in either the regional economic area per capita income or the unemployment rate.

Although operation of the facility would require a larger and more permanent workforce than construction, resulting increases to the regional economic area's employment and income would still be less than 1 percent. During operation of the facility, the creation of 290 direct jobs at LLNL would generate 722 indirect jobs in other industries in the region. Because so few jobs are generated relative to the large regional economic area, the unemployment rate would remain unchanged from the No Action level of 7.6 percent. See figure 4.7.3.8-1.

Population and Housing. Sufficient available labor within the region eliminates the need for any in-migrant workers to fill direct or indirect jobs created as a result of this alternative; therefore, housing and population would remain the same as under the No Action alternative.

Public Finance. Construction and operation of the Secondary and Case Fabrication Facility would not require in-migrating workers. Therefore, changes to local finances compared to No Action projections would be attributed to income increases and would be negligible.

High Explosives Fabrication. The HE fabrication alternative would involve the transfer of HE fabrication functions from Pantex to LLNL. A variation of this alternative would divide the HE mission between LANL and LLNL. This latter option would require a smaller workforce at each of the receiving sites than if the entire mission were transferred to one laboratory. The regional economy would still benefit, but on a smaller scale than described below.

Regional Economy and Employment. During peak construction a total of 47 jobs (19 direct and 28 indirect) would be generated in the region. Total employment in the regional economic area would increase by less than 1 percent. There would be no perceptible change in either the regional economic area per capita income or unemployment rate.

Although operation of the facility would have a greater impact on the regional economic area's employment and income because of a larger required workforce, the resulting increases would still constitute a less than 1 percent increase from the No Action alternative. Operations would generate a total of approximately 255 jobs (100 direct and 155 indirect) in the region, too small a number to affect the unemployment rate in such a large urban regional economic area. See figure 4.7.3.8-1.

Population and Housing. Because all direct and indirect jobs created as a result of transferring the HE fabrication mission to LLNL would be filled by the available labor force within the regional economic area, housing and population would remain the same as in the No Action alternative.

Public Finance. Construction and operation of the HE Fabrication Facility would not require in-migrating workers. Therefore, changes to local finances compared to No Action projections would be due to income increases and would be negligible.

Nonnuclear Fabrication

Regional Economy and Employment. During peak modification activities a total of 15 jobs (6 direct and 9 indirect) would be generated. Changes in the regional economic area's employment would be less than 1 percent. There would be no perceptible change in either the regional economic area per capita income or the unemployment rate.

Although operations would have a greater impact on the regional economic area's employment, because of the larger workforce, the resulting increases in both employment and income would still be less than 1 percent. Operation of the facility would generate a total of about 131 jobs (60 direct and 71 indirect) in the region, too small a number to affect unemployment in such a large urban regional economic area. This is shown in figure 4.7.3.8-1.

Population and Housing. Projections indicate that available labor within the regional economic area would be sufficient to fill all direct and indirect jobs created by both modification and operation of the facility. Therefore, housing demand and population growth would remain unchanged from No Action projections.

Public Finance. Construction and operation of the Nonnuclear Fabrication Facility would not require in-migrating workers. Therefore, changes to local finances compared to No Action projections would be due to income increases and would be negligible.

Sensitivity Analysis Construction employment requirements for the low case secondary and case fabrication mission at LLNL are the same as for the base case surge discussed above. Therefore, the socioeconomic impacts on the region from the construction would also be the same. Construction to meet the high case production scenario would require 10 additional workers. However, the socioeconomic effects on the region would remain essentially unchanged from the base case surge level. Employment requirements for operation under the low case production scenario would be less than for the base case surge. Accordingly, the economic benefits would also be smaller than projected for the base case surge level.

High case operation of the Secondary and Case Fabrication Facility would require more workers than base case surge operation. However, the expected changes to the total regional economic area employment would still be less than 1 percent. Some of these additional workers would have to in-migrate to the regional economic area to fill specific employment requirements. Population would increase slightly, as would housing demand. However, these population increases would also be less than 1 percent and would be readily accommodated by projected vacancies within the housing stock.

Construction employment requirements for the high or low case HE fabrication and nonnuclear fabrication missions at LLNL are the same as for the base case surge level discussed above. Therefore, the socioeconomic impacts on the region from construction would also be the same.

During full operation, employment requirements for the base case surge of these alternatives would equal or exceed employment needs for the high and low cases. The region would still benefit economically from the high or low case, but on a smaller scale than from the base case surge due to a smaller workforce.

Stewardship Alternatives

Proposed National Ignition Facility. The following is a summary of the socioeconomic effects of construction of the proposed NIF at LLNL. See appendix I for a more detailed, project-specific discussion.

Regional Economic Impacts. Construction of the proposed NIF would require 470 construction workers during the peak year of construction and would generate an additional 2,400 indirect jobs in the regional economic area. Employment for operation would begin phasing in as the construction phase neared completion. Operation of the facility would require 330 direct workers and would generate an additional 560 indirect jobs in the regional economic area. Construction and operation of the proposed NIF would have only minimal affects on the regional economy and employment. During both phases there would be no perceptible change in the unemployment rate attributable to the proposed project, and changes to per capita income would be less than 1 percent.

Population and Housing. Both construction and operation of the facility would require workers and their families to in-migrate to the ROI. Population increases would total about 1,600 during construction and 350 during operation. This in-migration would cause a slight increase in the housing demand during both periods. However, the demand for additional housing during construction would absorb less than 2 percent of the projected vacant housing stock in the ROI. The increase in demand during operations would be much smaller and have no effect in the housing market.

Public Finance. Both revenues and expenditures would increase as a result of the construction and operation of the proposed NIF. Increases due to construction would peak in 1998 and then decline as construction nears completion in 2002. Increases due to operation of the facility would peak in 2003 and continue through the duration of NIF operation.

Proposed Contained Firing Facility. There are no identified effects over No Action to the socioeconomics of the LLNL regional economic area as a result of the modification activities or operation of CFF.

Combined Program Impacts. If the secondary and case fabrication, HE fabrication, nonnuclear fabrication, and NIF missions were all located at LLNL, the resulting benefits to the regional economy would be greater than from any one mission. However, the changes in regional total employment and per capita income would still be less than 1 percent. This is shown infigure 4.7.3.8-1. There would be sufficient labor available in the projected labor force to fill any employment requirements, and population and housing would remain as projected in the No Action alternative.

Potential Mitigation Measures . Adding any new missions to LLNL would create new jobs and generally benefit the local economy through increased earnings in the ROI. Because the effects on population and housing markets are so slight relative to the size of the region, and are generally perceived to be beneficial, no mitigation measures would be necessary.

4.7.3.9 Radiation and Hazardous Chemical Environment

This section describes the radiological and hazardous chemical releases and their associated impacts, which could result from No Action and the proposed alternatives at LLNL. Within this section, impacts resulting from the base case scenario are quantitatively discussed, and a sensitivity analysis of the high and low case scenarios is qualitatively discussed.

Summaries of the prevailing radiological impacts to the public and to workers associated with normal operation at LLNL are presented in tables 4.7.3.9-1 through 4.7.3.9-4. Radiological accident impacts are presented in figure 4.7.3.9-1 and in tables 4.7.3.9-5 through 4.7.3.9-9. The impact assessment methodology is described in section 4.1.9 and further supplementary methodological information is presented in appendixes E and F.

Normal Operation. There would be no radiological releases during the construction or modification of any facilities to support the Stockpile Stewardship and Management Program. However, limited hazardous chemical releases (e.g., small spills of diesel fuel and from equipment refueling) may occur because of construction activities for the base case scenario and may increase slightly for the high case scenario. The concentration of these releases is expected to be well within the regulated exposure limits and would not result in any adverse health effects.

Water from processes containing hazardous chemicals is not discharged directly into surface water or groundwater that serves as potable water. Process water that may contain hazardous chemicals is treated before discharge. Furthermore, discharges of wastewater through NPDES-permitted outfalls, which can be attributed to the activities associated with normal operation and operation of the stockpile stewardship and management alternatives at LLNL are expected to be below NPDES limits. Water quality would not be adversely affected. Thus, the primary pathway considered for the public and the onsite worker is the air pathway.

For normal operation at LLNL, all possible hazardous chemicals were examined for further analysis based on their toxicity, concentration, and frequency of use. The HI is a summation of the HQ for all chemicals. The HQ is the value used as an assessment of noncancer toxic effects of chemicals (e.g., kidney or liver dysfunction). It is independent of cancer risk, which is calculated only for those chemicals identified as carcinogens. The HI was calculated for the No Action chemicals and all alternative chemicals, proposed to be added (the increment) at the site, to yield cumulative levels for the site. An HI of 1.0 indicates that all noncancer exposure values meet OSHA standards; if the cancer risk is $1x10^{-6}$ (the default value, not a regulatory standard), no further analysis is indicated. A cancer risk of $1x10^{-6}$ is considered acceptable by EPA (40 CFR 300.430) because this incidence of cancers cannot be distinguished from the cancer risk for an individual member of the population. Information pertaining to OSHA-regulated exposure limits and toxicity profiles for all hazardous chemicals described in this PEIS may be found in the *Chemical Health Effect Technical Reference*

(TTI 1996b).

No Action

Radiological Impacts. Radiological impacts to the public resulting from the No Action alternative are presented in tables 4.7.3.9-1 and 4.7.3.9-2 for the Livermore Site and Site 300, respectively. These impacts are representative of the aggregated total which is estimated to exist from all future baseline operational contributions. Total impacts are provided to compare to applicable regulations governing total site operations. To place doses to the public from the No Action alternative into perspective, comparisons are made to natural background radiation. As shown in tables 4.7.3.9-1 and 4.7.3.9-2, the total dose to the maximally exposed member of the public from annual total site operations is within radiological limits and would be 0.065 mrem for the No Action alternative at the Livermore Site and 0.080 mrem at Site 300. The annual population dose within 80 km (50 mi) in 2030 would be 0.76 person-rem at the Livermore Site and 0.17 person-rem at Site 300.

Total site doses to onsite workers from normal operation for the No Action alternative are presented in table 4.7.3.9-3 for the Livermore Site and table 4.7.3.9-4 for Site 300. The estimated annual dose to the entire facility workforce for this alternative would be 18 person-rem at the Livermore Site and 0.42 person-rem at Site 300.

Based on the radiological impacts associated with normal operation under the No Action alternative, all resulting doses are within radiological limits and would be well below levels of natural background radiation. The associated risks of adverse health effects to the public and to workers would be small.

Table 4.7.3.9-1.--Potential Radiological Impacts to the Public Resulting from Normal Operation of Stockpile Stewardship and Management Alternatives at the Livermore Site

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	No Action	Secondary and Case Fabrication Three-Shift Operation	National Ignition Facility	Combined Program Impacts[18]
Affected Environment	**Total Site**	**Total Site[19]**	**Total Site[19]**	**Total Site[19]**
Maximally Exposed Individual (Public)				
Atmospheric Release				
Dose [20] (mrem/yr)	0.065	1.3	0.17	1.4
Percent of natural background[21]	0.021	0.42	0.058	0.44
25-year fatal cancer risk	8.1×10^{-7}	1.6×10^{-5}	2.1×10^{-6}	1.7×10^{-5}
Liquid Release				
Dose[20] (mrem/yr)	0	0	0	0

Percent of natural background[21]	0	0	0	0
25-year fatal cancer risk	0	0	0	0
Atmospheric and Liquid Releases				
Dose[20] (mrem/yr)	0.065	1.3	0.17	1.4
Percent of natural background[21]	0.021	0.42	0.058	0.44
25-year fatal cancer risk	8.1×10^{-7}	1.6×10^{-5}	2.1×10^{-6}	1.7×10^{-5}
Population Within 80 Kilometers				
Atmospheric and Liquid Releases in 2030				
Dose (person-rem)	0.76	1.6	0.96	1.8
Percent of natural background[21]	3.3×10^{-5}	6.9×10^{-5}	4.2×10^{-5}	7.7×10^{-5}
25-year fatal cancers	9.4×10^{-3}	0.020	0.012	0.023

Hazardous Chemical Impacts. Hazardous chemical impacts to the public resulting from normal operation under No Action at LLNL are presented below. Analyses to support the values presented in this section are provided in appendix table E.3.4-20. This PEIS does not purport to provide the level of detail needed to go beyond a conservative screening process for hazardous chemicals. As such, the analysis in this PEIS for the No Action alternative should not be relied upon as a basis for judging the sites as having a hazardous chemical health concern. The model used to calculate HI and cancer risk in this PEIS only establishes a baseline for comparison of alternatives among sites. The baseline is then used to determine the extent by which each alternative adds or subtracts from the No Action HI and cancer risk to the public at each site.

The HI for the maximally exposed member of the public at LLNL resulting from normal operation under the No Action alternative would be 1.34, and the cancer risk would be 4.55×10^{-7} . The HI for the onsite worker would be 2.39, and the cancer risk would be 4.53×10^{-6} .

The HIs for the public (1.34) and the onsite worker narrowly exceed the cumulative HQ screening level of 1.0 (the HI) as a result of the total emissions of over 100 of 130 hazardous chemicals listed in appendix table E.3.4-20 under the No Action alternative. Individual OSHA standards for specific effects were not necessarily exceeded. However, if reanalyzed according to organ/tissue specific effects (i.e., after second stage analysis), it is very likely that the HIs would prove acceptable. The cancer risks for the onsite worker (4.53×10^{-6}) narrowly exceed the EPA default value as a result of the emissions of 1,1-dichloroethylene, 1,4-dioxane, arsenic, benzene, cadmium, carbon tetrachloride, chloroform, chromium VI, epichlorohydrin, folpet, methylene chloride, nickel, and trichloroethylene.

Table 4.7.3.9-2.-- Potential Radiological Impacts to the Public Resulting from Normal Operation of Stockpile Stewardship Alternatives at Site 300

"Black"

Affected Environment	No Action	Contained Firing Facility	Combined Program Impacts[22]
	Total Site	Total Site[23]	Total Siteb
Maximally Exposed Individual (Public)			
Atmospheric Release			
Dose[24] (mrem/yr)	0.080	0.12	0.12
Percent of natural background[25]	0.026	0.039	0.039
25-year fatal cancer risk	$9.9x10^{-7}$	$1.5x10^{-6}$	$1.5x10^{-6}$
Liquid Release			
Dose[24] (mrem/yr)	0	0	0
Percent of natural background[25]	0	0	0
25-year fatal cancer risk	0	0	0
Atmospheric and Liquid Releases			
Dose[24] (mrem/yr)	0.080	0.12	0.12
Percent of natural background[25]	0.026	0.039	0.039
25-year fatal cancer risk	$9.9x10^{-7}$	$1.5x10^{-6}$	$1.5x10^{-6}$
Population Within 80 Kilometers			
Atmospheric and Liquid Releases in 2030			
Dose (person-rem)	0.17	0.49	0.49
Percent of natural background[25]	$7.4x10^{-6}$	$2.1x10^{-5}$	$2.1x10^{-5}$
25-year fatal cancers	$2.1x10^{-3}$	$6.1x10^{-3}$	$6.1x10^{-3}$

Table 4.7.3.9-3.--Potential Radiological Impacts to Workers Resulting from Normal Operation of Stockpile Stewardship and Management Alternatives at the Livermore Site

Affected Environment	No Action	Secondary and Case Fabrication Three-Shift Operation	National Ignition Facility	Combined Program Impacts
Involved Workforce[26]				

Average worker dose[27] (mrem/yr)	NA	2.2	30	NA
25-year fatal cancer risk	NA	$2.2x10^{-5}$	$3.0x10^{-4}$	NA
Total dose (person-rem/yr)	NA	0.55	8.0	8.6
Noninvolved Workforce[28]				
Average worker dose[27] (mrem/yr)	2.1	2.1	2.1	2.1
25-year fatal cancer risk	$2.1x10^{-5}$	$2.1x10^{-5}$	$2.1x10^{-5}$	$2.1x10^{-5}$
Total dose (person-rem/yr)	18	18	18	18
Total Site Workforce[29]				
Dose (person-rem/yr)	18	19	26	27
25-year fatal cancers	0.18	0.19	0.26	0.27

Table 4.7.3.9-4.-- Potential Radiological Impacts to Workers Resulting from Normal Operation of Stockpile Stewardship Alternatives at Site 300

Affected Environment	No Action	Contained Firing Facility	Combined Program Impacts
Involved Workforce[30]			
Average worker dose[31] (mrem/yr)	NA	<250	NA
25-year fatal cancer risk	NA	$<2.5x10^{-3}$	NA
Total dose (person-rem/yr)	NA	<0.75	<0.75
Noninvolved Workforce[32]			
Average worker dose[31] (mrem/yr)	2.1	<5.2	NA
25-year fatal cancer risk	$2.1x10^{-5}$	$<5.2x10^{-5}$	NA
Total dose (person-rem/yr)	0.42	<1.0	<1.5
Total Site Workforce[33]			
Dose (person-rem/yr)	0.42	<1.8	<2.3
25-year fatal cancers	$4.2x10^{-3}$	<0.018	<0.023

Management Alternatives

Secondary and Case Fabrication

Radiological Impacts. Radiological impacts to the public resulting from the secondary and case fabrication alternative are presented in table 4.7.3.9-1. These impacts are representative of the aggregate total which is estimated to exist from all future baseline operational Livermore Site contributions and from three-shift base case operations for secondary and case fabrication at the site. Total impacts are provided to compare to applicable regulations governing total site operations. To place doses to the public from this alternative into perspective, comparisons are made to natural background radiation. As shown in table 4.7.3.9-1, the total dose to the maximally exposed member of the public from annual total site operations is within radiological limits and would be 1.3 mrem for this alternative. The annual population dose within 80 km (50 mi) in 2030 would be 1.6 person-rem. Total site doses to onsite workers from normal operation for the secondary and case fabrication mission are presented in table 4.7.3.9-3. The average annual dose to involved workers for this alternative would be 2.2 mrem. The dose to the entire facility workforce (involved workforce) would be 0.55 person-rem. As stated in the methodology section 4.1.9, all worker doses were referenced from the Radiation Exposures for DOE and DOE Contractor Employees 1992 Database which reports doses for similar types of operations. The presented noninvolved worker impacts were not modeled due to the unavailability of certain site-specific information. There may also be small risks to construction workers who are involved with tasks that are in close proximity to potentially contaminated areas.

Hazardous Chemical Impacts. Hazardous chemical impacts for the public and for the onsite worker resulting from normal operation of the secondary and case fabrication alternative at the Livermore Site are presented below. The HI and cancer risk would remain constant over 25 years of operation provided exposures remain the same. Analyses to support the values presented in this section are provided in appendix table E.3.4-21.

The incremental HI for the maximally exposed member of the public would be $8.97x10^{-3}$, and the incremental cancer risk would be zero as a result of the secondary and case fabrication mission at the Livermore Site. The incremental HI for the onsite worker would be $6.16x10^{-3}$, and the incremental cancer risk would be zero as a result of the secondary and case fabrication mission.

Total site operations and the incremental effects of the secondary and case fabrication mission would result in the HIs for the public (1.35) and the onsite worker (2.40) narrowly exceeding the cumulative HQ screening level of 1.0 (the HI), but not necessarily exceeding the individual OSHA standards for specific effects. The cancer risks for the public ($3.80x10^{-7}$) are within the EPA default value of concern of $1x10^{-6}$. The cancer risks to the onsite worker ($4.53x10^{-6}$) narrowly exceed the EPA default value.

The HI for the public and the onsite worker exceeds the cumulative HQ screening level of 1.0 (the HI) as a result of the total emissions of over 100 of 130 hazardous chemicals due to No Action total site operations at LLNL. The individual OSHA standards for specific effects were not necessarily exceeded. However, if reanalyzed according to organ/tissue specific effects (i.e., after second stage analysis), it is very likely that the HIs would prove acceptable. The cancer risks for the onsite worker exceed the EPA default value as a result of the No Action emissions of 1,1-dichloroethylene; 1,4-dioxane; arsenic; benzene; cadmium; carbon tetrachloride; chloroform; chromium VI; epichlorohydrin; folpet; methylene chloride; nickel; and trichloroethylene.

High Explosives Fabrication

Radiological Impacts. There are no radiological impacts associated with this alternative.

Hazardous Chemical Impacts. Hazardous chemical impacts for the public and for the onsite worker resulting from normal operation of the HE fabrication alternative at LLNL are presented below. The HI and cancer risk would remain constant over 25 years of operation provided exposures remain the same. Analyses to support the values presented in this section are provided in appendix table E.3.4-22.

The incremental HI for the maximally exposed member of the public would be $1.42x10^{-3}$, and the incremental cancer risk would be $8.47x10^{-10}$ as a result of the HE fabrication mission at LLNL. The incremental HI for the onsite worker would be $5.62x10^{-4}$, and the incremental cancer risk would be $8.43x10^{-9}$ as a result of the HE fabrication mission.

Total site operations and the incremental effect of the HE fabrication mission would result in the HIs for the public (1.34) and the onsite worker (2.39) narrowly exceeding the cumulative HQ screening level of 1.0 (the HI), but not necessarily exceeding the individual OSHA standards for specific effects. The cancer risk for the public is within the EPA default value of $1x10^{-6}$. The cancer risk to the onsite worker (1.79x10-6) narrowly exceeds the EPA default value.

The HI for the public and the onsite worker exceeds the cumulative HQ screening level of 1.0 (the HI) as a result of the total emissions of over 100 of 130 hazardous chemicals due to No Action total site operations at LLNL. Individual OSHA standards for specific effects were not necessarily exceeded. However, if reanalyzed according to organ/tissue specific effects (i.e., after second stage analysis), it is very likely that the HIs would prove acceptable. The cancer risk for the onsite worker exceeds the EPA default value as a result of the No Action emissions of 1,1-dichloroethylene; 1,4-dioxane; arsenic; benzene; cadmium; carbon tetrachloride; chloroform; chromium VI; epichlorohydrin; folpet; methylene chloride; nickel; and trichloroethylene.

Sharing of the HE fabrication mission with LANL would be expected to reduce emissions of hazardous chemicals by up to 50 percent. Therefore, HI and cancer risk impacts may be reduced up to 50 percent, and the cancer risk could drop to approximately $1x10^{-6}$.

Nonnuclear Fabrication

Radiological Impacts. There are no radiological impacts associated with this alternative.

Hazardous Chemical Impacts. Hazardous chemical impacts for the public and for the onsite worker resulting from the normal operation of the nonnuclear fabrication alternative at the Livermore Site are presented below. The HI and cancer risk would remain constant over 25 years of operation provided exposures remain the same. Analyses to support the values presented in this section are provided in appendix table E.3.4-23.

The incremental HI for the maximally exposed member of the public would be $4.94x10^{-5}$, and the incremental cancer risk is zero as a result of the nonnuclear fabrication alternative at the Livermore Site. The incremental HI for the onsite worker would be 1.20x10-6, and the incremental cancer risk would be zero as a result of the nonnuclear fabrication mission.

Total site operations and the incremental effects of the nonnuclear fabrication mission would result in the HIs for the public (1.34) and the onsite worker (2.39) narrowly exceeding the cumulative HQ screening level of 1.0 (the HI), but not necessarily exceeding individual OSHA standards for specific effects. The cancer risk for the public (4.55x10-7) is within the EPA default value of $1x10^{-6}$. The cancer risk for the onsite worker (4.53x10-6) narrowly exceeds the EPA default value.

The HIs for the public and the onsite worker exceed the cumulative HQ screening level of 1.0 (the HI) as a result of the total emissions of over 100 of 130 hazardous chemicals due to No Action and total site operations at the Livermore Site. However, if reanalyzed according to organ/tissue specific effects (i.e., after second stage analysis), it is very likely that the HIs would prove acceptable. The cancer risk to the onsite worker exceeds the EPA default value as a result of the No Action emissions of 1,1-dichloroethylene; 1,4-dioxane; arsenic; benzene; cadmium; carbon tetrachloride; chloroform; chromium VI; epichlorohydrin; folpet; methylene chloride; nickel; and trichloroethylene.

Sensitivity Analysis. Radiological impacts may be subject to certain degrees of variance resulting from either high or low case operations for secondary and case fabrication. For the high case scenario, total impacts to both the public and worker would be similar to the three-shift base case operations. For the low case scenario, impacts to the public and site workforce would be expected to fall within the increment (range) projected between the No Action and the secondary and case fabrication alternatives (less than 1.2 mrem/year to the maximally exposed individual, less than 0.84 person-rem/year to the population, and less than 1 person-rem/year to the total site workforce).

Based on the radiological impacts associated with normal operation of this alternative, all resulting doses would be within radiological limits and are well below levels of natural background radiation. The associated risks of adverse health effects to the public and to workers would be small.

Operations under the low case scenario for secondary and case, HE, and nonnuclear fabrication are not expected to appreciably affect hazardous chemical emissions at LLNL and, therefore, would not adversely affect the HI impacts and cancer risks for the public and the onsite worker.

Operations under the high case scenario for secondary and case fabrication may result in up to a two- to four-fold increase in the emission of hazardous chemicals at LLNL. Chemical emissions under the high case scenario may substantially increase the HI impact to the public and raise the HI for the onsite worker above the cumulative HQ screening level of 1.0 (the HI), but not necessarily the individual OSHA standards for specific effects. Cancer risks for the public are below the EPA default value, but operations under the high case scenario may increase cancer risks above the EPA default value. Since cancer risks for the onsite worker already exceed the EPA default value, operations under the high case scenario would further contribute to the adverse cancer risk impacts.

Operations under the high case scenario for HE fabrication may result in up to a two-fold increase in the emission of hazardous chemicals at LLNL. Chemical emissions under the high case scenario may increase the HI impact for the public and raise the HI for the onsite worker above the cumulative HQ screening level of 1.0 (the HI), but not necessarily the individual OSHA standards for specific effects. Cancer risks for the public are below the EPA default value, but operations under the high case scenario may increase cancer risks above the EPA default value. Since cancer risks for the onsite worker already exceed the EPA default value, operations under the high case scenario would further contribute to the adverse cancer risk impacts.

Operations under the high case scenario for nonnuclear fabrication may result in up to a 2.5-fold increase in the emissions of hazardous chemicals at LLNL. Chemical emissions under the high case scenario would further adversely affect the HI impact for the public and raise the HI for the onsite worker above the cumulative HQ screening level of 1.0 (the HI), but not necessarily the individual OSHA standards for specific effects. The HI might still be acceptable upon reanalysis according to organ/tissue specific effects. Cancer risks for the public are below the EPA default value, but operations under the high case scenario may adversely affect cancer risks. Since cancer risks for the onsite worker already exceed the EPA default value, operations under the high case scenario would contribute to the adverse cancer risk impacts.

Stewardship Alternatives

Proposed National Ignition Facility

Radiological Impacts. Radiological impacts to the public resulting from normal operation of the proposed NIF for the enhanced option scenario are presented in table 4.7.3.9-1. These impacts are representative of the aggregate total which is estimated to exist from all future baseline operational Livermore Site contributions and from enhanced option operations of the proposed NIF at the site. Total impacts are provided to compare to applicable regulations governing total site operations. To place doses to the public from this alternative into perspective, comparisons are made to natural background radiation. As shown in table 4.7.3.9-1, the total dose to the maximally exposed member of the public from annual total site operations is within radiological limits and would be 0.17 mrem for this alternative. The annual population dose within 80 km (50 mi) in 2030 would be 0.96 person-rem.

Total site doses to onsite workers from normal operation for the proposed NIF are presented in table 4.7.3.9-3. The average annual dose to involved workers for this alternative would be 30 mrem. The dose to the entire facility workforce (involved workforce) would be 8.0 person-rem. The presented noninvolved worker impacts were not modeled due to the unavailability of certain site-specific information. There may also be small risks to construction workers who are involved with tasks that are in close proximity to potentially contaminated areas.

Based on the radiological impacts associated with normal operation of this alternative, all resulting doses would be within radiological limits and are well below levels of natural background radiation. The associated risks of adverse health effects to the public and to workers would be small.

Hazardous Chemical Impacts. No hazardous chemical impacts are expected from the operation of the proposed NIF (see appendix I). Therefore, the HI and cancer risks for the public and the onsite worker were not calculated nor assessed.

Proposed Contained Firing Facility

Radiological Impacts. Radiological impacts to the public resulting from normal operation of the proposed CFF alternative are presented in table 4.7.3.9-2. These impacts are representative of the aggregate total which is estimated to exist from all future baseline operational Site 300 contributions and from operations for the proposed CFF at the site. Total impacts are provided to compare to applicable regulations governing total site operations. To place doses to the public from this alternative into perspective, comparisons are made to natural background radiation. As shown in table

4.7.3.9-2, the total dose to the maximally exposed member of the public from annual total site operations is within radiological limits and would be 0.12 mrem for this alternative. The annual population dose within 80 km (50 mi) in 2030 would be 0.49 person-rem.

Total site doses to onsite workers from normal operation of the proposed CFF are presented in table 4.7.3.9-4. The average annual dose to involved workers for this alternative would be less than 250 mrem. The dose to the entire facility workforce (involved workforce) would be less than 0.75 person-rem. The presented noninvolved worker impacts were modeled for this alternative due to the availability of certain site-specific information. There may also be small risks to construction workers who are involved with tasks that are in close proximity to potentially contaminated areas.

Based on the radiological impacts associated with normal operation of this alternative, all resulting doses would be within radiological limits and are well below levels of natural background radiation. The associated risks of adverse health effects to the public and to workers would be small.

Hazardous Chemical Impacts. No hazardous chemical impacts are expected from the proposed CFF (see appendix J). Therefore, the HI and cancer risks for the public and the onsite worker were not calculated nor assessed.

Combined Program Impacts. Radiological impacts to the public and to workers from the simultaneous operation of all Livermore Site (and all Site 300) proposed alternatives, respectively, would result in very small increases over the No Action or the largest contributing individual alternative. All Program totals would be within radiological limits and are well below levels of natural background radiation. The associated risks of adverse health effects to the public and to workers would be small.

Combined Program impacts due to hazardous chemical emissions with operation of the No Action alternative and the incremental emissions incurred by the management alternatives (secondary and case fabrication, HE fabrication, and nonnuclear fabrication) result in a combined HI for the public of (1.13) and a cancer risk of (4.55×10^{-7}). The combined HI for the onsite worker is (2.40), and the combined cancer risk is (4.53×10^{-6}).

The combined Program HI for the public narrowly exceeds the acceptable health level; the HI for the onsite worker increases slightly, but remains narrowly within the acceptable health level. Cancer risks to the public would not increase above the acceptable level of regulatory concern. Cancer risks to the onsite worker would not increase, but would remain narrowly above the EPA default value.

Potential Mitigation Measures. Radioactive airborne emissions to the general population and onsite exposures to workers could be reduced by implementing the latest technology for process and design improvements. For example, to reduce public exposure from emissions, improved building and work area control methods could be used to remove radioactivity from the releases to the environment. Similarly, the use of remote, automated, and robotic production methods are examples of techniques that are being developed which would reduce worker exposure (see section 3.5).

Mitigation measures, such as substituting less toxic solvents and chemicals or modification processes, are proposed to reduce or eliminate the emissions of all hazardous chemicals due to operations under the No Action alternative. Particular attention would be given to 1,1-dichloroethylene, 1,4-dioxane, arsenic, benzene, cadmium, carbon tetrachloride, chloroform, chromium VI, epichlorohydrin, folpet, methylene chloride, nickel, and trichloroethylene.

Facility Accidents. The proposed actions have the potential for accidents that may impact the health and safety of workers and the public. The potential for and associated consequences of reasonably foreseeable accidents that have been evaluated are summarized in this section and are described in more detail in appendix F. The methodology used in the assessment is described in section 4.1.9. A list of documents reviewed for applicable accident data is provided in table F.1.1-1. The potential impacts from accidents, ranging from high-consequence/low-probability to low-consequence/high-probability events, have been evaluated in terms of potential cancer fatalities that may result for noninvolved workers and the public. The risk of cancer fatalities has also been evaluated to provide an overall measure of accident impacts and is calculated by multiplying the accident annual frequency (or probability) of occurrence by the consequences (number of cancer fatalities). Figure 4.7.3.9-1 shows the risk of latent cancer fatalities in the population within 80 km (50 mi) that may result from accidents for the alternatives. Specifically, the curve in the figure shows the probability (vertical axis) that the number of cancer fatalities in the offsite population within 80 km (50 mi) (horizontal axis) will be exceeded. The curve does show the probability of the accident.

In addition to the potential impacts to noninvolved workers and the offsite population, there are potential impacts to involved workers who would be located in the facilities associated with the proposed action. Quantitative statements of these impacts cannot be made until design details are developed further, at which time the number and location of facility workers protective and mitigating features can be estimated to support detailed accident impact analyses. However, depending on the type of accident, facility workers in close proximity to the point of the accident could receive high levels of exposure to radiation with potentially fatal impacts.

No Action. Under the No Action alternative, stewardship would continue to be performed at LLNL with no changes to facilities and operations. Under existing conditions, potential accidents and their consequences have been addressed in facility safety documentation according to requirements in DOE orders.

Management Alternatives

Secondary and Case Fabrication . A set of potential accidents have been postulated for the secondary and case fabrication alternative for which there may be releases of radioactive materials or other hazardous effects that may impact onsite workers and the offsite population. The potential accidents analyzed are described in appendix F. The probability distribution showing the range of probable cancer fatalities that may result for the composite set of accidents identified in appendix F is shown in figure 4.7.3.9-1. For example, the probability of a secondary and case fabrication accident causing more than one cancer fatality is approximately 10^{-6} per year. The curve reflects the probability of the accidents occurring. The impacts for the composite set of accidents and their consequences are shown in table 4.7.3.9-5. If an accident were to occur, there would be an estimated 0.063 cancer fatalities in the population within 80 km (50 mi) of the site. A noninvolved worker located 247 m (810 ft) (site boundary) from the accident would have an increased likelihood of cancer fatality of $1.5x10^{-4}$. A maximally exposed individual located at the site boundary would have an increased likelihood of cancer fatality of $1.8x10^{-4}$. The risks for the combined EBA and BEBA composite set of accidents, reflecting both the probability of the accident occurring and the consequences, are also shown in table 4.7.3.9-5. For the same worker, maximally exposed individual and population, the risks are $8.9x^{10}$

High Explosives Fabrication. A set of potential accidents have been postulated for the HE fabrication alternative for which there may be hazardous effects that could impact onsite workers and the offsite population. The potential accidents analyzed are described in appendix F. The chemical impacts of the accidents are shown in table 4.7.3.9-7. The threshold limit value-time weighted average (TLV-TWA) limits represent a time-weighted average limit to a worker for a 40-hour work week. Exposures exceeding these limits could result in a suite of symptoms including liver damage, cyanosis, sore throat, muscular pain, kidney damage, and anemia. Note that the toxic exposures considered here are of a much shorter duration, on the order of minutes.

Table 4.7.3.9-5.--Impacts of Accidents for Secondary and Case Fabrication at Lawrence Livermore National Laboratory

Parameter	Secondary and Case Fabrication		
	EBA	**BEBA**	**EBA and BEBA Combined**
Composite Accident Frequency (Per Year)	**$6.0x10^{-5}$**	**$5.0x10^{-7}$**	**0.052**
Consequences			
Noninvolved Worker			
Cancer fatality[34]	$1.4x10^{-4}$	$1.4x10^{-3}$	$1.5x10^{-4}$
Risk (cancer fatality per year)	$8.2x10^{-9}$	$6.8x10^{-10}$	$8.9x10^{-9}$
Maximally Exposed Individual			
Cancer fatality[34]	$1.7x10^{-4}$	$1.7x10^{-3}$	$1.8x10^{-4}$
Risk (cancer fatality per year)	$1.0x10^{-8}$	$8.5x10^{-10}$	$1.1x10^{-8}$
Population Within 80 Kilometers [35]			
Cancer fatality[36]	0.06	0.6	0.063
Risk (cancer fatalities per year)	$3.5x10^{-6}$	$2.9x10^{-7}$	$3.8x10^{-6}$

Table 4.7.3.9-6.-- Impacts of Chemical Accidents for Secondary and Case Fabrication at Lawrence Livermore National Laboratory

Accident Description	Accident Frequency (Per Year)	IDLH	TLV-STEL	TLV-TWA	Concentration to: Noninvolved Worker (mg/m^3)	Concentration to: Individual at Site Boundary (mg/m^3)	Potential Impa Exceeding: IDLH Limits[37] (m)	T Limi

Fire and Release of Lithium Oxide	10^{-6} to 10-4				>670	670	Irreversible health effects	Burn eyes, mout esopl musc twitc ment confi and t visio
Concentration[37] [m] (mg/m^3)		55	-	0.025				
Distances[37] (m)		87 to 2,000		46 to >9x10^4				
Area (m^2)		3.0x10^5		>5.8x10^8				
Population[38]		570		>600,000				
Hydrogen Fluoride Release	10^{-6} to 10^{-4}				>220	220	Irreversible health effects	Irrita burni skin, nose throa pulm eden bron
Concentration[37] [m] (mg/m^3)		36	5	2.5				
Distances[38](m)		720	2,500	3,900				
Area (m^2)		4.6x10^4	4.8x10^5	1.1x10^6				
Population[c]		59	1,000	2,800				
Hydrogen Cyanide Release	10^{-6} to 10^{-4}				>140	140	Irreversible health effects	Naus vomi gaspi breat weak and a level asph and c
Concentration[37] [m] (mg/m^3		56	5	-				
Distances[38](m)		420	1,800					

Area (m^2)	$1.6x10^4$	$2.6x10^5$
Population[c]	11	460

Table 4.7.3.9-7.--Accident Impacts for High Explosives Fabrication at Lawrence Livermore National Laboratory

			Concentration to:		Impacts of Exceeding:
Accident Description	**Accident Frequency (Per Year)**	**TLV-TWA**	**Noninvolved Worker (mg/m^3)**	**Individual at Site Boundary (mg/m^3)**	**TLV/TWA Limits**[39]
Fire and Release of Chemical TATB	0.01 to 10^{-4}		>54	54	Liver damage, cyanosis, sore throat, muscular pain, kidney damage, and anemia
Concentration[39] (mg/m3)		1.5			
Distances[40] (m)		2,200			
Area (m^2)		$3.8x10^5$			
Population[41]		740			
Fire and Release of Chemical TNT	0.01 to 10^{-4}		>54	54	Liver damage, cyanosis, sore throat, muscular pain, kidney damage, and anemia
Concentration[39] (mg/m3)		0.5			
Distances[40] (m)		4,500			
Area (m^2)		$1.4x10^6$			
Population[41]		3,800			
Explosion and Elevated Release of Chemical TATB	10^{-4} to 10^{-6}		6.4	6.7[42]	Liver damage, cyanosis, sore throat, muscular pain, kidney damage, and anemia

Concentration[39] (mg/m3)		1.5			
Distances[40] (m)		180 to 3,500			
Area (m^2)		$1.1x10^6$			
Population[41]		2,700			
Explosion and Elevated Release of Chemical TNT	10^{-4} to 10^{-6}		2.4	2.5[d]	Liver damage, cyanosis, sore throat, muscular pain, kidney damage, and anemia
Concentration[39] (mg/m3)		0.5			
Distances[40] (m)		170 to 3,700			
Area (m^2)		$1.2x10^6$			
Population[41]		3,100			

In addition to the chemical accident impacts, the potential for physical effects from a catastrophic explosion of the entire contents of a process-related building, which would have a probability of occurrence less than the explosion considered above (i.e., less than $1.0x10^{-6}$ per year), was also considered. The quantity of HE detonated could range up to 18 t (19.8 tons); the blast pressure could result in death (up to 40 m [131 ft]), lung damage (80 m [262 ft]), thoracic injury (130 m [427 ft]), and eardrum rupture (160 m [525 ft]) depending on an individual's distance from the accident. Injuries could also result from glass breakage and building debris

Nonnuclear Fabrication. The impacts of potential accidents associated with nonnuclear fabrication activities at LLNL were previously addressed in Nonnuclear Consolidation Environmental Assessment (DOE/EA-0792, June 1993) where it was determined that the then current accident profile would not change as a result of the relocation of nonnuclear fabrication functions to LLNL. The present proposed action to transfer the nonnuclear fabrication mission to LLNL is not expected to change the accident profile that presently exists at the site.

Stewardship Alternatives

Proposed National Ignition Facility . Studies of potential accidents associated with the proposed NIF have been performed. A bounding accident was postulated based on a preliminary hazard analysis. The bounding accident assumes a severe earthquake of 1 g horizontal ground acceleration occurring during a maximum-credible-yield fusion experiment. Beamlines leaking into the target chamber and building structures other than the target area building would fail during the postulated earthquake. The collapsed beamlines and building structures would provide a pathway for acute atmospheric releases of tritium in the tritium processing system, activated gases in the air, and activated material in the target chamber.

The frequency of this severe earthquake is estimated at $1x10^{-4}$ per year. The joint frequency of the severe earthquake during the maximum-credible-yield fusion experiment would be less than $2x10^{-8}$ per year. The radiological impacts of the accident, presented in table 4.7.3.9-8, were estimated using the GENII computer code.

Proposed Contained Firing Facility . Studies of potential accidents associated with the proposed CFF have been performed. The reasonably foreseeable accident scenarios that could produce the greatest potential impacts are the following:

Table 4.7.3.9-8.-- Consequences and Risk of the Bounding Proposed National Ignition Facility Accident at the Livermore Site

Health Impact	Conceptual Designs	Enhanced Baseline Option
Workers Onsite		
Dose (person-rem)	29	49
Fatal cancers	0	0
Risk (cancer fatalities per year)	$2x10^{-10}$	$4x10^{-10}$
Maximally Exposed Individual		
Dose (person-rem)	0.1	0.2
Fatal cancers	$5x10^{-5}$	$8x10^{-5}$
Risk (cancer fatality per year)	$1x10^{-13}$	$2x10^{-13}$
Population Within 80 Kilometers		
Dose (person-rem)	260	440
Fatal cancers	$1.3x10^{-1}$	0
Risk (cancer fatalities per year)	$3x10^{-9}$	$4x10^{-9}$

Source: Appendix I.

- **Scenario 1**: Accidental detonation of a test of a 60-kg (132-lb) charge of explosives at the B801 firing table. (Applicable to the No Action alternative.)
- **Scenario 2**: Accidental detonation of a 60-kg (132-lb) test that could contain up to 20 mg (200 curies) of tritium with dispersal through an unsecured blast door during final preparation. No neutron generation potential would exist because blast doors would be closed before any accident scenario that would involve neutron generation (misfire). (Applicable to either B801 or B851 alternatives.)

One beyond design basis accident configuration is considered as follows:

- **Scenario 3**: Same test configuration as Scenario 2, but the planned detonation takes place yielding the potential for neutron generation: accidental rupture of the CFF Firing Chamber occurs. (Applicable to either B801 or B851 alternatives.)

The impacts to involved workers for each accident scenario would probably be fatal injuries from blast effects due to peak overpressure and debris, but there would be no injury offsite to members of the public. No damage to current buildings offsite or in other areas of Site 300 would be expected. Projected radiation effects for the three scenarios are shown in table 4.7.3.9-9.

Table 4.7.3.9-9.-- Accident Radiation-Related Impacts for the Proposed Contained Firing Facility at Site 300

Health Impacts	Scenario 1	Scenario 2	Scenario 3
Involved Worker at 30 Meters			
Dose (rem)	0.0	0.026	0.031
Cancer fatality	0.0	$1x10^{-5}$	$1.2x10^{-5}$
Risk (cancer fatality per year)	43	43	43
Noninvolved Worker at 50 Meters			
Dose (rem)	0.0	0.015	0.015
Cancer fatality	0.0	$6x10^{-6}$	$6x10^{-6}$
Risk (cancer fatality per year)	43	43	43
Offsite Member of Public at 1,340 Meters			
Dose (rem)	0.0	$1.1x10^{-4}$	$1.1x10^{-4}$
Cancer fatalities	0.0	$5.5x10^{-8}$	$5.5x10^{-8}$
Risk (cancer fatalities per year)	43	43	43

4.7.3.10 Waste Management

This section summarizes the impacts on waste management at the Livermore Site and Site 300 under No Action and for each of the stockpile stewardship and management alternatives. There is no spent nuclear fuel, HLW, or TRU waste associated with secondary and case fabrication, HE fabrication, nonnuclear fabrication, the proposed CFF, or the proposed NIF; therefore, there is no further discussion of these wastes at LLNL. Table 4.7.3.10-1 lists the projected waste generation rates and treatment, storage, and disposal capacities under No Action for the Livermore Site. Table 4.7.3.10-2 lists the projected waste generation rates and treatment, storage, and disposal capacities under No Action for Site 300. Projections for No Action were derived from 1994 environmental data, with the appropriate adjustments made for those changing operational requirements where the volume of wastes generated is identifiable. The projection does not include wastes from future, as yet uncharacterized, environmental restoration activities.

Table 4.7.3.10-3 provides the total estimated operational waste volumes projected to be generated at LLNL as a result of the secondary and case fabrication, nonnuclear fabrication, and the proposed NIF alternatives. Table 4.7.3.10-4 provides the total estimated operational waste volumes projected to be generated at Site 300 as a result of the HE fabrication and proposed CFF alternatives. The net increase or decrease over No Action is provided in the table in parentheses. The waste volumes generated from the various alternatives and the resultant waste effluent used in the impact analysis can be found in table 3.4.4.4-3 for secondary and case fabrication, table 3.4.2.4-3 for nonnuclear fabrication, table 3.4.5.4-3 for HE fabrication, table 3.3.2.2-3 for NIF, and table 3.3.1.2-3 for CFF. Facilities that would support the Stockpile Stewardship and Management Program would treat and package all waste generated into forms that would enable long-term storage and/or disposal in accordance with the Atomic Energy Act, RCRA, and other applicable statutes as outlined in appendix section H.1.2.

Table 4.7.3.10-1.-- Projected Waste Management Under No Action at the Livermore Site

Category	Annual Generation (m^3)	Treatment Method	Treatment Capacity (m^3 /yr)	Storage Method	Storage Capacity (m^3)	Disposal Method	Disposal Capacity (m^3)
Low-Level							
Liquid	181	Neutralization, filtration, solidification, precipitation, oxidation, flocculation, and blending	34.1 Treatment episode	Hazardous waste management division facilities	627	Treated wastewater discharged to city of Livermore sanitary sewer if within approved limits	None
Solid	307	Shredding, drum crushing, and compaction	NA	Hazardous waste management division facilities	2,297	Shipped to NTS	NA
Mixed Low-Level							
Liquid	51	Neutralization, filtration, solidification, precipitation, oxidation, flocculation, and blending	8,750	Hazardous waste management division facilities	627	Treated wastewater discharged to city of Livermore sanitary sewer if within approved limits	NA
Solid	20	Shredding, drum crushing, and compaction	11,800	Hazardous waste management division facilities	2,297	None	None
Hazardous							

Liquid	342	Shipped to offsite RCRA-permitted TSD facilities, except silver recovery	97	Hazardous waste management division facilities	769	Shipped to offsite RCRA-permitted facilities	NA
Solid	237	Same as above	NA	Hazardous waste management division facilities	98	Shipped to offsite RCRA-permitted facilities	NA
Nonhazardous (Sanitary)							
Liquid	456,000	None	NA	Retention tanks	829 (spill control capacity) (828,662 L)	Discharged to city of Livermore sanitary sewer system	NA
Solid	4,280[44]	None	NA	Hazardous waste management division facilities	NA	Offsite landfill	NA
Nonhazardous (Other)							
Liquid	0	None	NA	Hazardous waste management division facilities	41	Autoclaved and disposed as sanitary waste	NA
Solid	2	None	NA	Hazardous waste management division facilities	41	Autoclaved and disposed as sanitary waste	NA

Table 4.7.3.10-2.--Projected Waste Management Under No Action at Site 300

Category	Annual Generation (m^3)	Treatment Method	Treatment Capacity (m^3/yr)	Storage Method	Storage Capacity (m^3)	Disposal Method	Disposal Capacity (m^3)
Low-Level							
Liquid	0	None	NA	NA	NA	NA	NA
Solid	463	None	NA	NA	NA	Shipped to NTS	NA

Mixed Low-Level							
Liquid	0	None	None	Shipped to the Livermore Site	NA	None	None
Solid	0	None	None	Shipped to the Livermore Site	NA	None	None
Hazardous							
Liquid	117	None	NA	Building 883, a RCRA-permitted storage facility	12.46	Shipped to the Livermore Site or offsite RCRA-permitted facilities	NA
Solid	45	Open burning[45]	91 kg/ episode	Building 883, a RCRA-permitted storage facility	12.46	Shipped to the Livermore Site or offsite RCRA-permitted facilities	NA
Nonhazardous (Sanitary)							
Liquid	4,420	NA	NA	NA	NA	Onsite evaporation pond, septic systems, and leach fields	NA
Solid	315	NA	NA	NA	NA	Offsite sanitary landfill	NA
Nonhazardous (Other)							
Liquid	2	Sent to LLNL for autoclaving	NA	NA	NA	Autoclaved infectious waste disposed as sanitary waste; autoclaved sharps waste is sent to a commercial incinerator	NA

Solid	2	Sent to LLNL for autoclaving	NA	NA	NA	Autoclaved infectious waste disposed as sanitary waste; autoclaved sharps waste is sent to a commercial incinerator	None

Table 4.7.3.10-3.--Estimated Annual Generated Waste Volumes for Stockpile Stewardship and Management Alternatives at the Livermore Site

Category	No Action[46] (m^3)	Secondary and Case Fabrication[47] (m^3)	Nonnuclear Fabrication[48] (m^3)	National Ignition Facility[49] (m^3)	Combined Program Impacts (m^3)
Low-Level					
Liquid	181	286	181	182	287
		(+105)	(0)	(+0.6)	(+106)
Solid	307	677	307	310	680
		(+370)	(0)	(+3)	(+373)
Mixed Low-Level					
Liquid	51	601	51	53	603
		(+550)	(0)	(+2)	(+552)
Solid	20	32	20	20	32
		(+12)	(0)	(+0.3)	(+12)
Hazardous					
Liquid	342	882	349	344	892
		(+540)	(+7)	(+2)	(+550)
Solid	237	255	237	245	263
		(+18)	(0)	(+8)	(+26)
Nonhazardous (Sanitary)					
Liquid	456,000	558,000	462,000	474,000	582,000
		(+102,000)	(+5,770)	(+17,900)	(+126,000)
Solid	4,280	8,600	4,410	10,300	14,700
		(+4,320)	(+127)	(+6,000)	(+10,400)
Nonhazardous (Other)					
Liquid	0	0	0	0	0
		(0)	(0)	(0)	(0)

Solid	2[50]	3,200[51] (+3,200)	2[50] (0)	2[50] (0)	3,200[51] (+3,200)

Table 4.7.3.10-4.-- Estimated Generated Waste Volumes for Stockpile Stewardship and Management Alternatives at Site 300

Category	No Action[52] (m^3)	High Explosives Fabrication[53] (m^3)	Contained Firing Facility[54] (m^3)	Combined Program Impacts (m^3)
Low-Level				
Liquid	0	0 (+0)	0 (+0)	0 (+0)
Solid	463	463 minimal	447 (-16)	447 (-16)
Mixed Low-Level				
Liquid	0	0 (+0)	0 (+0)	0 (+0)
Solid	0	0 (+0)	10 (+10)	10 (+10)
Hazardous				
Liquid	117	120 (+3)	123 (+6)	126 (+9)
Solid	315	369 (+54)	311 (-4)	365 (+50)
Nonhazardous (Sanitary)				
Liquid	4,420	11,700 (+7,270)	4,700 (+284)	12,000 (+7,550)
Solid	315	384 (+69)	328 (+13)	397 (+82)
Nonhazardous (Other)				
Liquid	2[55]	570 (+568)	2[55] (+0)	570 (+568)
Solid	2[55]	38 (+36)	2[55] (+0)	38 **(+36)**

No Action. Under No Action, TRU, low-level, mixed, hazardous, and nonhazardous wastes would continue to be generated at LLNL from the missions outlined in section 3.2.7. LLNL would continue to treat, store, and dispose of its legacy and newly generated wastes in current and planned facilities.

Liquid LLW would be neutralized and solidified and the treated wastewater discharged to the city of Livermore sanitary sewer. Solid LLW would be compacted, packaged, and stored for shipment to NTS. Hazardous waste would be packaged and shipped offsite to RCRA-permitted treatment, storage, and disposal facilities. Liquid mixed waste would undergo neutralization/pH adjustment, oxidation/reduction, precipitation, chelation/flocculation, and filtration in the Area 514 Wastewater Treatment Tank Farm, Area 514 Wastewater Filtration Unit, and Building 513 Solidification Unit. Both liquid and solid mixed waste would be treated and disposed of according to the LLNL Site Treatment Plan, which was developed pursuant to the Federal Facility Compliance Act of 1992. The resulting waste would then be stored in a RCRA-permitted facility in DOT-approved containers until it is shipped to an offsite DOE disposal facility. Some of this waste would be placed in interim storage until new technologies for treatment and disposal are identified and evaluated. Liquid nonhazardous sanitary wastes would be pretreated and discharged to the city of Livermore sanitary sewer system. Solid nonhazardous sanitary waste would be disposed of in a permitted offsite sanitary landfill sized to handle projected future waste volumes.

Under No Action, low-level, mixed, hazardous, and nonhazardous wastes would continue to be generated at Site 300 from the missions outlined in section 3.2.7. Site 300, in conjunction with LLNL, would continue to treat, store, and dispose of its legacy and newly generated wastes in current and planned facilities.

LLNL does not anticipate the future generation of mixed waste at Site 300. If mixed waste is generated at Site 300, the mixed waste would be limited to storage periods of 90 days or less. The mixed waste would then be taken either to LLNL for treatment and/or long-term storage or sent to commercial facilities for treatment and/or disposal. Site 300 LLW, including the gravel from firing table operations, would be packaged in approved waste containers and transported to Building 804 for staging, pending shipment to LLNL or shipment directly to NTS for disposal. Site 300 would hold hazardous waste before it is transferred to the Area 612 facility at LLNL for treatment, storage, and disposal or send it directly offsite to RCRA-permitted treatment, storage, and disposal facilities. Sanitary wastewater generated within the General Services Area at Site 300 would be discharged to an onsite sewer lagoon. Other more remotely located buildings on Site 300 would be serviced by septic systems and leach fields. Site 300 industrial wastewaters would be contained in retention tanks and analyzed to determine their proper disposition. These wastewaters could be shipped to LLNL for treatment and discharged to the sanitary sewer system or shipped directly to an offsite treatment and disposal facility. Solid waste generated at Site 300 would be transported to a permitted offsite sanitary landfill.

Management Alternatives

Livermore Site

Secondary and Case Fabrication . The Secondary and Case Fabrication Facility would not generate any TRU waste. Following treatment and volume reduction, 304 m^3 (398 yd^3) of solid LLW would be packaged in approved waste containers for staging, pending shipment directly to NTS for disposal. With no onsite LLW disposal capability, LLNL would require approximately 18 additional LLW shipments per year to NTS. Assuming a land usage factor of 6,000 m^3 /ha (3,180 yd^3 /acres), 0.05 ha/yr (0.13 acres/yr) of LLW disposal area at NTS would be required.

The LLNL Site Treatment Plan for mixed waste was developed pursuant to the Federal *Facility*

Compliance Act. The mixed waste streams identified at LLNL have been combined into 10 treatability groups, each with a preferred treatment option. The type of mixed wastes generated by secondary and case fabrication would fit into one of the established 10 treatability groups and would not require the creation of new treatability groups or new preferred treatment options. The 550 m3 (145,000 gal) annual generation of liquid mixed wastes and 12 m^3 (16 yd^3) annual generation of solid mixed wastes may impact the available storage capacity of the main areas for future mixed waste storage in RCRA-permitted hazardous waste management units. Existing and planned mixed waste treatment at LLNL would be adequate to handle the increased volume. Additional staging capacity for 540 m3 (143,000 gal) of liquid and 18 m3 (24 yd3) of solid hazardous wastes while awaiting shipment to offsite RCRA-permitted treatment and disposal facilities may be needed. Minimal impacts would result from the 102,000 m^3 (26.9 million gal) of liquid nonhazardous sanitary waste, which would be collected and routed to the sanitary and industrial waste treatment plant prior to discharge to the city of Livermore sanitary sewer system. Minimum impacts would result from the 4,320 m^3 (5,650 yd^3) of solid nonhazardous sanitary waste that would be disposed of in offsite industrial and sanitary landfills.

Nonnuclear Fabrication . The Nonnuclear Fabrication Facility would not generate any TRU waste, LLW, or mixed LLW. The generation of 7 m^3 (1,950 gal) of liquid hazardous wastes would have a small impact on LLNL's waste management infrastructure. The toluene/methanol waste stream would be recycled by distillation. The distillation bottoms (0.2 m^3 [0.26 yd^3]) would be shipped offsite to a RCRA-permitted disposal facility as solid hazardous waste. The remaining 3 m^3 (905 gal) of liquid hazardous waste would be staged in the onsite hazardous waste accumulation area and shipped to offsite RCRA-permitted treatment, storage, and disposal facilities. Minimal impacts would result from the 5,770 m^3 (1,530,000 gal) of liquid sanitary waste that would be collected and routed to the sanitary and industrial waste treatment plant. Minimal impacts would result from the 64 m^3 (83 yd^3) of solid nonhazardous sanitary waste that would be disposed of in offsite industrial and sanitary landfills after volume reduction.

Site 300

High Explosives Fabrication . The HE Fabrication Facility at Site 300 would not generate any TRU or mixed LLW. Minimal to zero quantities of LLW would be generated. If generated, these wastes would be packaged in approved waste containers and transported to Building 804 for staging, pending shipment to LLNL, or they would be shipped directly to NTS for disposal. Minimal impacts would result from the 3 m^3 (920 gal) of liquid hazardous waste and 54 m^3 (70 yd^3) of solid hazardous waste, which could be staged in the onsite hazardous waste accumulation area up to 1year before being shipped to LLNL or to offsite commercial RCRA-permitted treatment, storage, and disposal facilities. Existing infrastructure should be able to handle the 7,270 m^3 (1,920,000 gal) of liquid sanitary waste. Minimal impacts would result from the 55 m^3 (72 yd^3) of solid nonhazardous sanitary waste that would be disposed of in offsite industrial and sanitary landfills.

Sensitivity Analysis. The waste volumes generated from the secondary and case, nonnuclear, and HE fabrication facilities required to support a larger stockpile level (high case) operating on a single-shift basis are bounded by the base case under surge operations. There would be no additional waste management impacts associated with these fabrication facilities that would support a high case stockpile operating at a single shift. The volumes generated from these fabrication facilities required to support a low case stockpile would be reduced by a factor of at least three.

Stewardship Alternatives

Livermore Site

Proposed National Ignition Facility . The proposed NIF would not generate any TRU waste. The 0.7 m^3 (185 gal) of liquid LLW could be batch treated in the Area 514 Wastewater Treatment Tank Farm with minimal impact. The 3 m^3 (4 yd^3) of solid LLW would be packaged in approved waste containers and staged, pending shipment directly to NTS for disposal. Assuming a land usage factor of 6,000 m^3 /ha (3,180 yd^3 /acres), less than 0.0005 ha/yr (0.001 acres/yr) of LLW disposal area at NTS would be required.

The LLNL Site Treatment Plan for mixed waste was developed pursuant to the *Federal Facility Compliance Act.* The mixed waste streams identified at LLNL have been combined into 10 treatability groups, each with a preferred treatment option. The type of mixed wastes generated by NIF would fit into one of the established 10 treatability groups and would not require the creation of new treatability groups or new preferred treatment options. The annual generation of 2 m^3 (528 gal) of liquid and 0.3 m^3 (0.4 yd^3) of solid mixed wastes would have a negligible impact on the available storage capacity of the main areas for future mixed waste storage in RCRA-permitted hazardous waste management units. Minimal impacts would result from the 2 m^3 (528 gal) of liquid hazardous waste and 8 m^3 (10 yd^3) of solid hazardous waste, which would be staged in the onsite hazardous waste accumulation area and shipped to offsite commercial RCRA-permitted treatment, storage, and disposal facilities. Additional sanitary wastewater treatment capacity may be required to accommodate the 17,900 m^3 (4.72 million gal) of liquid nonhazardous sanitary waste that would be routed to sanitary wastewater treatment facilities prior to discharge to existing municipal sanitary wastewater systems. Minimal impacts would result from the 6,050 m3 (7,910 yd^3) of solid nonhazardous sanitary waste that would be disposed of in offsite industrial and sanitary landfills after volume reduction.

Site 300

Proposed Contained Firing Facility . The proposed CFF would not generate any TRU waste. CFF would reduce the annual generation of solid LLW from the No Action alternative by 16 m^3 (21 yd^3). The 90 m^3 (117 yd^3) of solid LLW from CFF would be packaged in approved waste containers and staged, pending shipment directly to NTS for disposal. Six LLW shipments per year to NTS and 0.016 ha/yr (0.04 acres/yr) of LLW disposal area at NTS would be required.

The LLNL Site Treatment Plan for mixed waste was developed to comply with the Federal *Facility Compliance Act.* The mixed waste streams identified at LLNL have been combined into 10 treatability groups, each with a preferred treatment option. The type of mixed wastes generated by CFF would fit into one of the established 10 treatability groups and would not require the creation of new treatability groups or new preferred treatment options. The 10 m^3 (14 yd^3) annual generation of solid mixed waste would have a negligible impact on the available storage capacity of the main areas for future mixed waste storage in RCRA-permitted hazardous waste management units.

CFF would reduce the generation of solid hazardous wastes by 4 m^3 (5 yd^3) from the No Action alternative. The 6-m3 (1,560-gal) increase in the generation of liquid hazardous wastes would have a minimal impact. Hazardous wastes would be stored in the onsite hazardous waste accumulation area and shipped to offsite commercial RCRA-permitted treatment, storage, and disposal facilities. The additional 284 m^3 (75,000 gal) of liquid sanitary wastes would have a negligible impact on the existing sanitary wastewater system. Negligible impacts would also result from the 13 m3 (17 yd^3) of additional solid sanitary wastes.

Combined Program Impacts

Livermore Site. If all the stockpile stewardship and management alternatives listed in table 4.7.3.10-3 were located at the Livermore Site, the impacts from LLW, mixed LLW, and hazardous wastes would be similar to those discussed for the secondary and case fabrication alternative. The 126,000 m3 (33.2 million gal) of liquid sanitary wastes would not be expected to impact the sanitary wastewater treatment system, as adequate capacity exists to handle this increase. After volume reduction, approximately 10,400 m3 (13,600 yd3) of solid sanitary waste would require disposal. This increase could require the construction of a new sanitary landfill sooner than currently planned.

Site 300. If all the stockpile stewardship and management alternatives listed in table 4.7.3.10-4 were located at Site 300, the impacts from LLW, and mixed LLW would be identical to those identified for the CFF alternative. The impacts from hazardous and nonhazardous wastes would be similar to the HE fabrication alternative.

Potential Mitigation Measures . Waste quantities or waste forms could undergo additional reductions by utilizing emerging technologies, thereby further reducing or mitigating waste and waste management impacts. Pollution prevention and waste minimization would be considered in determining the final actions of the Stockpile Stewardship and Management Program at the Livermore Site and Site 300.

4.7.3.11 Environmental Justice

As discussed in section 4.14, any impacts to surrounding communities would most likely result from toxic or hazardous air pollutants and radiological emissions. Section 4.7.3.9, which describes public and occupational health impacts from normal operation, shows that potential chemical air emissions and releases narrowly exceed the generally accepted threshold of regulatory concern. This information is based on the conservative programmatic assumptions and modeling detailed in appendix E. Any adverse human health or environmental impacts that may occur would affect people living within communities located near LLNL. The analysis of the demographic data presented in appendix D for the communities surrounding LLNL indicates that if there were any adverse health impacts to these communities, they would not appear to disproportionately affect minority or low-income populations.

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1 Federal standard.

2 State standard or guideline.

3 No monitoring data available, concentration assumed less than applicable standard/threshold value.

4 San Francisco Bay Area Quality Management District ambient concentration guide.

5 No standard. Source: 40 CFR 50; CA EPA 1993a; LLNL 1995e; LLNL 1995f; LLNL 1995i:1; appendix I.

6 CFF air emissions are addressed in appendix J.

7 Federal standard.

8 State standard or guideline.

9 No monitoring data available, concentration assumed less than applicable standard/threshold value.

10 San Francisco Bay Area Air Quality Management District ambient concentration guide.

11 No standard. Source: 40 CFR 50, CA EPA 1993a; LLNL 1995i:1; LLNL 1995j; appendix J.

12 Total water requirements for construction at the Livermore Site are based on a 3-year period for secondary and case fabrication, a 5-year period for nonnuclear fabrications, and a 5-year period for NIF.

13 No construction water would be used or construction wastewater generated. Total site water use and wastewater discharged would be the same as No Action operation.

14 NPDES permit is required for stormwater discharges. NA - not applicable; MLY - million liters per year Source: .LLNL 1995e; LLNL 1995f; LLNL 1995i:1; appendix I.

15 Total water requirements for construction at Site 300 are based on a 1-year time period for HE fabrication and a 2-year time period for CFF.

16 No construction water would be used or construction wastewater generated. Total site water use and wastewater discharged would be the same as No Action operation.

17 NPDES permit is required for stormwater. NA - not applicable; MLY - million liters per year. Source: LLNL 1995i:1; LLNL 1995j; appendix J.

18 Conservative assumption poses existence of maximally exposed individual at multiple locations simultaneously.

19 Includes impacts from No Action.

20 The applicable radiological limits for an individual member of the public from total site operations are 10 mrem/yr from the air pathways, 4 mrem/yr from the drinking water pathway, and 100 mrem/yr from all pathways combined (DOE Order 5400.5).

21 Natural background radiation levels to average individual is 300 mrem/yr; to the population within 80 km (50 mi) in 2030 it is 2,353,000 person-rem. Source: LLNL 1994a; LLNL 1995c; appendix I.

22 Conservative assumption poses existence of maximally exposed individual at multiple locales simultaneously.

23 Includes impacts from No Action.

24 The applicable radiological limits for an individual member of the public from total site operations are 10 mrem/yr from the air pathways, 4 mrem/yr from the drinking water pathway, and 100 mrem/yr from all pathways combined (DOE Order 5400.5).

25 Natural background radiation levels: to average individual is 300 mrem/yr; to the population within 80 km (50 mi) in 2030 it is 2,353,000 person-rem. Source: LLNL 1994a; appendix J.

26 The involved worker is a worker associated with operation of the secondary and case fabrication or NIF. The dose presented for the involved workforce is only that incremental dose received from the secondary and case fabrication mission or NIF. The total dose received by the involved workforce would be higher than that received by the noninvolved workforce from these operations. The estimated number of involved workers is 250 for secondary and case fabrication and 267 for NIF.

27 The radiological limit for an individual worker is 5,000 mrem/yr (10 CFR 835).

28 The noninvolved worker is an onsite worker onsite but not associated with operation of the secondary and case fabrication or NIF facilities. The estimated number of noninvolved workers at the Livermore Site is 8,200 for secondary and case fabrication, and for NIF.

29 The total site workforce is the sum of the number of involved and noninvolved workers. The estimated number of badged workers in the total site workforce at the Livermore Site is 8,200 for No Action, 8,467 for NIF, and 8,450 for secondary and case fabrication. NA - not applicable. DOE 1993n:7; LLNL 1995c; appendix I.

30 The involved worker is a worker associated with operation of CFF. The estimated number of involved workers is three for the proposed CFF.

31 The radiological limit for an individual worker is 5,000 mrem/yr (10 CFR 835). The average worker is assumed to receive the same dose at Site 300 as at the Livermore Site complex.

32 The noninvolved worker is an onsite worker not associated with operation of CFF. The estimated number of noninvolved workers at Site 300 is 200.

33 The total site workforce is the sum of the number of involved and noninvolved workers. The estimated number of badged workers in the total site workforce at Site 300 is 203. NA - not applicable. DOE 1993n:7; appendix J.

34 Probability (increased likelihood) of cancer fatality to hypothetical member of the public located at the site boundary or to a noninvolved worker if the accident occurred as a result of exposure to the indicated dose.

35 For the offsite population of 7,843,061, the average probability of cancer fatality/risk of cancer fatality (per year) for the combined EBA and BEBA is 8.0×10^{-9} /4.8×10^{-13} for the listed alternative.

36 Number of cancer fatalities in the population out to 80 km (50 mi) as a result of exposure to the indicated dose if the accident occurs. All values are mean values; BEBA - beyond evaluation basis accidents; EBA - evaluation basis accidents. Results shown are derived from model accident analyses.

37 From facility (downwind); exceedance begins at facility, 0 meters, unless indicated otherwise.

38 Offsite individuals exposed to concentration exceeding limit. IDLH - immediately dangerous to life or health; TLV - threshold limit value; STEL - short-term exposure limit; TWA - time-weighted average. Derived from accident analyses (see appendix F).

39 NIOSH 1990a.

40 From facility (downwind); exceedance begins at facility, 0 meters, unless indicated otherwise.

41 Offsite individual exposed to concentration exceeding limit.

42 Individual at 560 meters from boundary (individual at boundary is exposed to concentrations of roughly 3 times lower). TLV - threshold limit value; TWA - time-weighted average; TATB - triaminotrinitrobenzene; TNT - trinitrotoluene. Derived from accident analyses (see appendix F).

43 Data not available. Source: Appendix J.

44 Reported as 7,082 U.S. short tons. For analysis, 1,500 kg/m3 was assumed. NA - not applicable. Source: LLNL 1995i:1.

45 HE wastes only. Up to a total of 340 kg (750 lb) of HE pieces, parts, and powders or 340 kg (750 lb) of sludge from HE-contaminated rinsewaters settling tanks or 907 kg (2,000 lb) of HE-contaminated materials such as kimwipes. NA - not applicable. LLNL 1995i:1; LLNL 1996i:2.

46 No Action volumes are from table 4.7.3.10-1.

47 Volumes for secondary and case fabrication are from table 3.4.4.4-3 and are based on surge operations (three shifts).

48 Volumes for nonnuclear fabrication are from table 3.4.2.4-3 are based on surge operations (three shifts).

49 Volumes for NIF are from table 3.3.2.2-3 and are based on the Conceptual Design.

50 Medical wastes.

51 Includes recyclable and medical wastes. Note: Waste generation volumes were rounded to three significant figures. Waste effluent volumes are found in sections 3.3 and 3.4.

52 No Action volumes are from table 4.7.3.10-2 and are based on 50 tests per year at the current B801 Complex.

53 Volumes for HE fabrication are from table 3.4.5.4-3 and are based on surge operations (three shifts).

54 Volumes for CFF are from table 3.3.1.2-3 and are based on 100 tests per year. Wastes generated from the B801 Complex, appendix table J.5.2.2-1, were subtracted since this facility would not operate if CFF was constructed.

55 Medical waste. Waste generation volumes were rounded to three significant figures. Waste effluent volumes are found in sections 3.3 and 3.4.