96-0002738

The Under Secretary of Energy
Washington, DC 20585

July 11, 1996

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W.
Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

This letter provides the final deliverable required under the Implementation Plan for Recommendation 94-3 about plutonium storage at Rocky Flats. The Integrated Program Plan for this recommendation is enclosed. It implements decisions addressed in our letters to you dated April 2, 1996, and April 23, 1996. The Integrated Program Plan describes how each sub-recommendation under Recommendation 94-3 has been addressed, what actions are planned to execute the resulting program, and what upgrades have been authorized for Building 371 in support of its temporary processing and storage of plutonium materials. We intend to proceed quickly with these upgrades as suggested by your letter of March 13, 1996.

The Department will not make a final decision whether to use Building 371, a new storage vault or some other option for storage of site's plutonium until a review under the National Environmental Policy Act has been completed. This review is expected to be completed by May 1997.

This information is unclassified and suitable for placement in the public reading room.

Sincerely,

Thomas P. Grumbly

Enclosure

Rocky Flats Environmental Technology Site

Defense Nuclear Facilities Safety Board Recommendation 94-3

INTEGRATED PROGRAM PLAN

July 1996
Revision G

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EXECUTIVE SUMMARY

The Defense Nuclear Facilities Safety Board (Board) issued Recommendation 94-3 to address potential deficiencies in the capability of the Rocky Flats Environmental Technology Site's (Site's) Building 371 to perform its new plutonium consolidation mission. The Recommendation was based upon the Department of Energy (Department) position at the time that Building 371 would be the Site's plutonium storage facility until offsite shipment (estimated as 2010 - 2015). The Board had particular interest in the capacity of Building 371 to provide reasonable assurance of protection of public and worker health and safety should it be subjected to external forces from natural phenomena, especially earthquakes. The Department accepted the Board's Recommendation and committed to a phased approach to respond to the eight sub-recommendations. The Department submitted an Implementation Plan (IP) for Phase I to the Board in June 1995 with a commitment to develop an Integrated Program Plan (IPP).

The purpose of Phase I (June through November 1995) was to determine whether Building 371 was suited for the plutonium storage mission, and what actions, would be necessary to make it suitable. The studies concluded that, with upgrades identified during Phase I, Building 371 would be satisfactory for the storage mission. However, a new storage vault, which could be available by 2002, emerged as a superior alternative in terms of reliability and cost. The new ISV would also provide increased safety and security margin since the ISV would be constructed using later, more stringent requirements. In November 1995, the Department decided to defer the Phase II IPP and to analyze further both a new Interim Storage Vault (ISV) and an upgraded Building 371 in order to identify a preferred interim storage approach by March 1996. The Department also recognized the need to ensure the safety of Building 371 for its mission regardless of the interim storage facility decision. Further, it became apparent through the Phase I risk analyses that there was a need to ensure safe storage of the Site's more dispersible plutonium residues. Thus, these two objectives became a part of the Recommendation 94-3 response program at the end of Phase I.

To assure that Building 371 will adequately perform its mission, the Department will implement the following actions:

- Immediately proceed with priority upgrades to Building 371 which the Department believes are needed to ensure protection of public and worker safety.
- Expedite development of an updated Authorization Basis for safe operation of Building 371. The Authorization Basis is to be based on a facility hazards analysis supplemented by process hazards analyses.
- Based on the Authorization Basis, identify those structures, systems, components (SSCs) and programs which provide a safety function. These SSCs and programs will be evaluated to ensure functional adequacy for performance of the building mission. Upgrades needed to provide functional adequacy will be identified and scheduled for near-term completion.

In January 1996, further studies were defined and initiated to support the selection of a preferred approach for the interim storage facility (i.e., ISV versus an upgraded Building 371 for the period estimated from 2002 through no later than 2015). To support the life-cycle comparison of the two alternatives, these studies identified priority upgrades for Building 371 to be implemented promptly and unconditionally and reaffirmed the suitability of an upgraded Building 371 to provide safe interim storage. These studies also confirmed advantages for a new passive vault with respect to cost, safety and security margins, and ease of implementation. Based on the results of these studies, the Department decided on March 18, 1996 to: proceed immediately with the priority upgrades to support the near-term Building 371 consolidation mission through 2002; proceed with a formal decision process to analyze the interim storage

alternatives;[1] and move forward on the predecisional design for a new ISV for the interim storage mission. These studies, however, did not establish a new plan to manage the more dispersible residues safely.

The post-March 18, 1996, actions described in this IPP provide the basis for the Department's formal, Phase II Recommendation 94-3 response to the Board.[2]

While the Department is considering an ISV for the interim storage mission many factors outside the Department's control may influence construction of an ISV. Accordingly, this IPP commits to implementation of necessary upgrades on a phased schedule to be deferred only if an ISV (or offsite shipment) is confirmed to support the IPP goals below.

This IPP has two major goals that the Department established to affirm the Board's statement in its' March 13, 1996, letter to Acting Under Secretary Grumbly, "The fundamental tenet of Recommendation 94-3 was to ensure safe storage of SNM at RFETS":

Goal 1: **Establish safe operation of Building 371 in conformance with an updated Authorization Basis (AB); and**

Goal 2: **Reduce the incremental Site risk from interim storage of SNM to a level that is a small fraction of that due to current plutonium holdup in the Site's buildings (See Figure 1)**

This IPP has the following objectives to ensure that these goals are realized:

Goal 1 Objectives

- *Fully address the eight sub-recommendations contained in Recommendation 94-3 for the mission of Building 371. For completeness, the applicability of the eight sub-recommendations to the design, construction and operation of a new ISV is also addressed (the ISV is part of Goal 2) (Section 2).*

- *Provide an updated Building 371 AB, complete definition and implementation of necessary safety upgrades in Building 371, and establish building operations in conformance with the updated AB (Section 3).*

Goal 2 Objectives

- *Ensure an integrated Site plan for safe plutonium management and storage based on systems engineering principles. The insights gained on the overall Site risk from residues and the effects of the decision to proceed with the priority Building 371 upgrades and predecisional design for a new ISV are to be integrated with the actions previously committed*

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[1] As part of this process, the Department is required to analyze the interim storage alternatives in accordance with the National Environmental Policy Act (NEPA).

[2] Per the June 1995 Implementation Plan (IP), the Department committed to the Board to formally transmit an Integrated Program Plan (IPP) that implements the Department's decision on interim storage (deliverable 11-2). This document is intended to fulfill that commitment.

by the Department in response to Recommendation 94-1. Systems engineering principles will be applied to provide safe residue storage and shipment that incorporates contingencies, such as possible delays in the Waste Isolation Pilot Plant (WIPP) opening (Section 4).

- *Prepare Building 371 for safe interim storage of the Site's plutonium metal and oxide or provide an acceptable alternative by 2002. Either off-site shipment or construction of the ISV in time to allow storage of SNM by 2002 could be acceptable alternatives to a completely upgraded Building 371 (Section 5).*

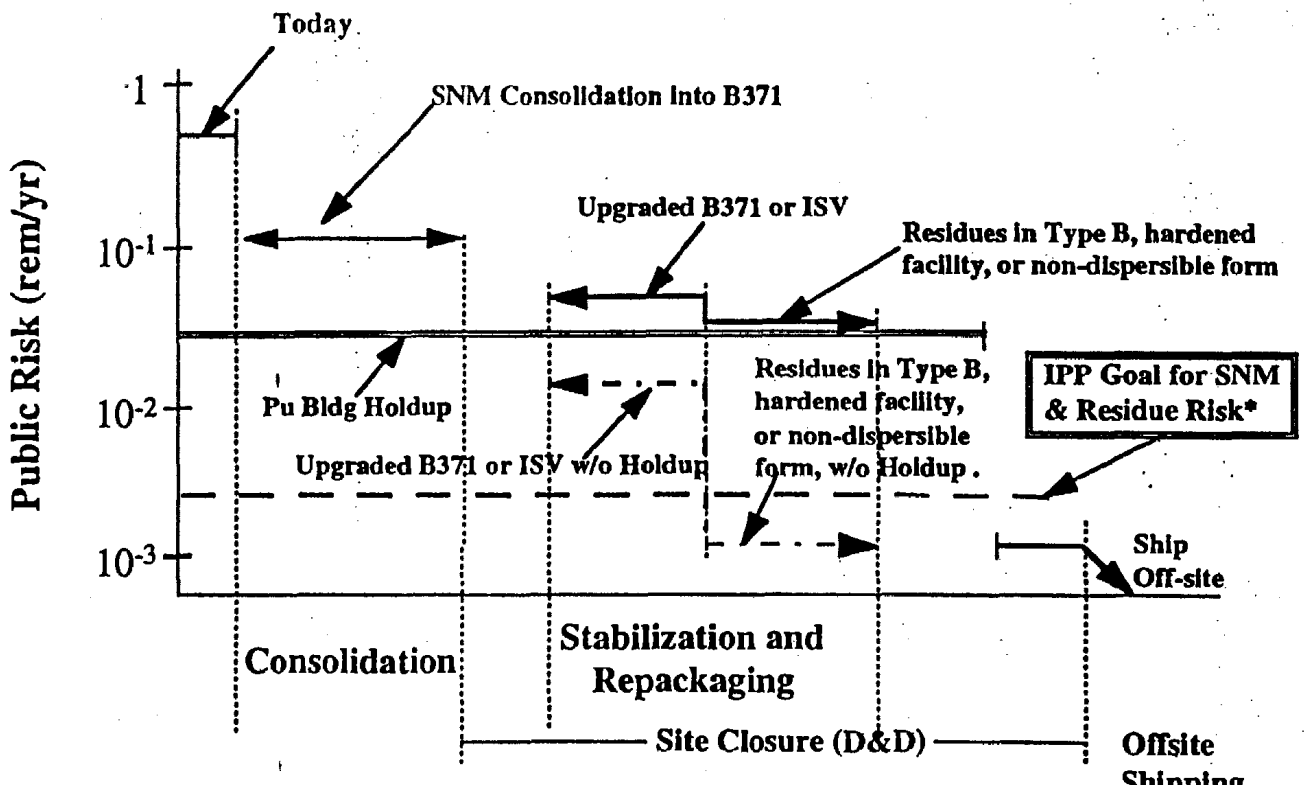
Broadly, the Department has elected to use this IPP both as a strategic planning tool to ensure safe interim storage of the Site's plutonium and as the vehicle to drive implementation of those aspects of the strategy not appropriate for inclusion in the Recommendation 94-1 response plan (Site Integrated Stabilization Management Plan [SISMP]). This election reflects the experience to date with the application of systems engineering principles to the selection of a preferred alternative for the interim storage facility.

This IPP establishes clear missions related to each objective listed above, establishes functional requirements to implement these missions, and then selects and pursues a preferred alternative for achievement. Also, this IPP identifies and will monitor contingent circumstances that may jeopardize the prospects for the preferred alternative to successfully fulfill those missions. The Department's assessment of current circumstances at the Site is that only such a flexible approach can maximize the likelihood of success, since all promising alternatives depend upon external or otherwise difficult to control factors.

Overall, this plan will ensure the safe operation of Building 371 originally sought by Recommendation 94-3 and, more broadly, the safe interim storage of the Site's plutonium inventory.

Figure 1

Site Strategies to Reduce Life Cycle Risk (Dominated by Large Earthquakes)



*The goal of the IPP commitments is to reduce Pu interim storage risk to a level that is a small fraction of that from current Pu holdup.

INTRODUCTION

This IPP is divided into four sections to implement the goals and objectives stated in the Executive Summary. Section 1 provides the program organization as well as addressing change control and the formal transmittal of the IPP deliverables to the Board. Section 2 demonstrates how the eight sub-recommendations contained in Recommendation 94-3 are addressed for both Building 371 and a new ISV. Section 3 addresses the activities necessary to update the Building 371 AB and to complete the priority and other upgrades identified in the studies following Phase I. Section 4 provides the actions required to integrate the overall Site risk insights on residues with the actions being taken under Recommendation 94-1. The interim storage mission is discussed in Section 5.

1. Program Organization

The organizational structure to achieve the successful execution of the IPP activities is depicted in Figure 2. A brief description of responsibilities follows.

The Department's commitment to the Board Recommendation 94-3 IPP will be coordinated through the Office of the Principal Deputy Assistant Secretary for Environmental Management. The Rocky Flats Field Office (RFFO) will direct the Phase II activities and develop local policy. RFFO will provide overall technical direction of the contractor and external assistance in execution of the project. The RFFO Assistant Manager for Mission Advocacy (MA) has the responsibility for the execution of this IPP, with matrixed technical support from the Strategy, Integration and Guidance (SIG) and Environment, Safety and Health and Program Assessment (ESHPA) organizations. Technical assistance and direction of individual task efforts will be provided by Defense Programs (DP-31), Environmental Management (EM-1) and the Office of Safeguards and Security (NN-51), as appropriate.

The Kaiser-Hill Vice President for Safety Engineering and Technical Services (SETS) is the primary contact with RFFO on IPP implementation. The Kaiser-Hill Vice President for Special Materials Management and Integration (SMM&I) ensures coordination of Recommendations 94-1 and 94-3 and is the funding authority for the IPP.

The IPP Program Manager reports to the Kaiser-Hill Vice Presidents for SETS and SMM&I for cost, schedule and budget, and provides programmatic and technical direction for the implementation of all activities of the IPP. The Program Manager is responsible for integrating the assigned teams.

The Kaiser-Hill Project Engineering Manager reports to the Kaiser-Hill Vice President of SETS and is responsible for completing capital construction projects as defined by the IPP within cost, schedule and budget.

Four teams consisting of personnel matrixed from Site organizations will report to the IPP Program Manager and the Project Engineering Manager. Team responsibilities and composition are:

- *Building 371 Improvement Team:* This Kaiser-Hill team is responsible for development of the new Building 371 Authorization Bases and implementation of upgrades to Building 371.

  This team will consist of matrixed personnel supporting each task. The IPP/AB development task team will consist of matrixed personnel from Hazard Assessment and Risk Management, Nuclear Safety, Building 371 Operations, RFFO staff and consultants, and experienced personnel from the ongoing AB development. The Recommendation 94-3 Program Manager will be responsible for the AB program and will be supported by a project manager from Nuclear Safety. To implement the upgrades, the task teams will consist of matrixed personnel from Project Management, Engineering, Hazard Assessment and Risk Management, Fire Protection Engineering, Operations and site-support engineering and construction contractors.

A project manager from Kaiser-Hill Project Engineering will be responsible for each set of upgrades to be implemented. Other personnel will supplement each team as required to perform assigned IPP tasks. Additional staff supporting specific tasks is expected to include Residue Programs, Waste Management, Security, Special Nuclear Material (SNM) Programs, and Building 371/374 Risk Reduction Department.

- *Sub-Recommendation Closure Team:* The responsibility of this Kaiser-Hill team is to monitor, coordinate and document closure of the DNFSB 94-3 sub-recommendations.

  This team consists of personnel from Hazard Assessment and Risk Management. Other personnel will supplement the team as required to perform assigned IPP tasks. Additional staff supporting specific tasks is expected to include Nuclear Safety, Engineering, Fire Protection Engineering, and Building 371/374 Operations Department.

- *Special Nuclear Materials Management Coordination Team*: This Safe Sites of Colorado (SSOC) and Kaiser-Hill team ensures coordination of Recommendation 94-3 decisions with the SISMP responding to Recommendation 94-1. This team will integrate critical program needs such as Building 371 mission activity plans, schedules, costs and potential conflicts with other building operational requirements. The team will address, for example, residue risk reduction actions, potential offsite pit shipments, and transfer of plutonium metal and oxide to a new ISV.

  This team will consist of personnel from Operations, Residue Programs, SNM Programs, and the Building 371/374 Risk Reduction Department. SSOC remains responsible for all Building 371 operations. Other personnel will supplement the team as required to perform assigned IPP tasks. Additional staff supporting specific tasks is expected to include Nuclear Safety, Hazard Assessment and Risk Management, Waste Management and Engineering.

- *Interim Storage Vault Engineering Team:* The Kaiser-Hill engineering team is responsible for tasks relating to construction of the new interim storage vault including design, construction, cost and schedule. The team is also responsible for project management, definition of all funded construction projects and the implementation of the DOE Standard 3013 plutonium surveillance requirements.

  This team consists of matrixed personnel from the Engineering, Construction Projects, and Project Management Departments. The team will be supported by three groups consisting of Geotechnical Engineering, Instrumentation and Control Engineering, and Design Engineering. Additional staff supporting specific tasks is expected to include Nuclear Safety, Hazard Assessment and Risk Management, Wackenhut Security Services, and Westinghouse Savannah River Company (WSRC) personnel.

This organization structure will provide the relevant technical expertise to implement a systems engineering approach through completion of the tasks defined in this IPP. The IPP organization may be revised only as necessary to reflect changes in the RFFO or Kaiser-Hill organizational structure and to support completion of the IPP.

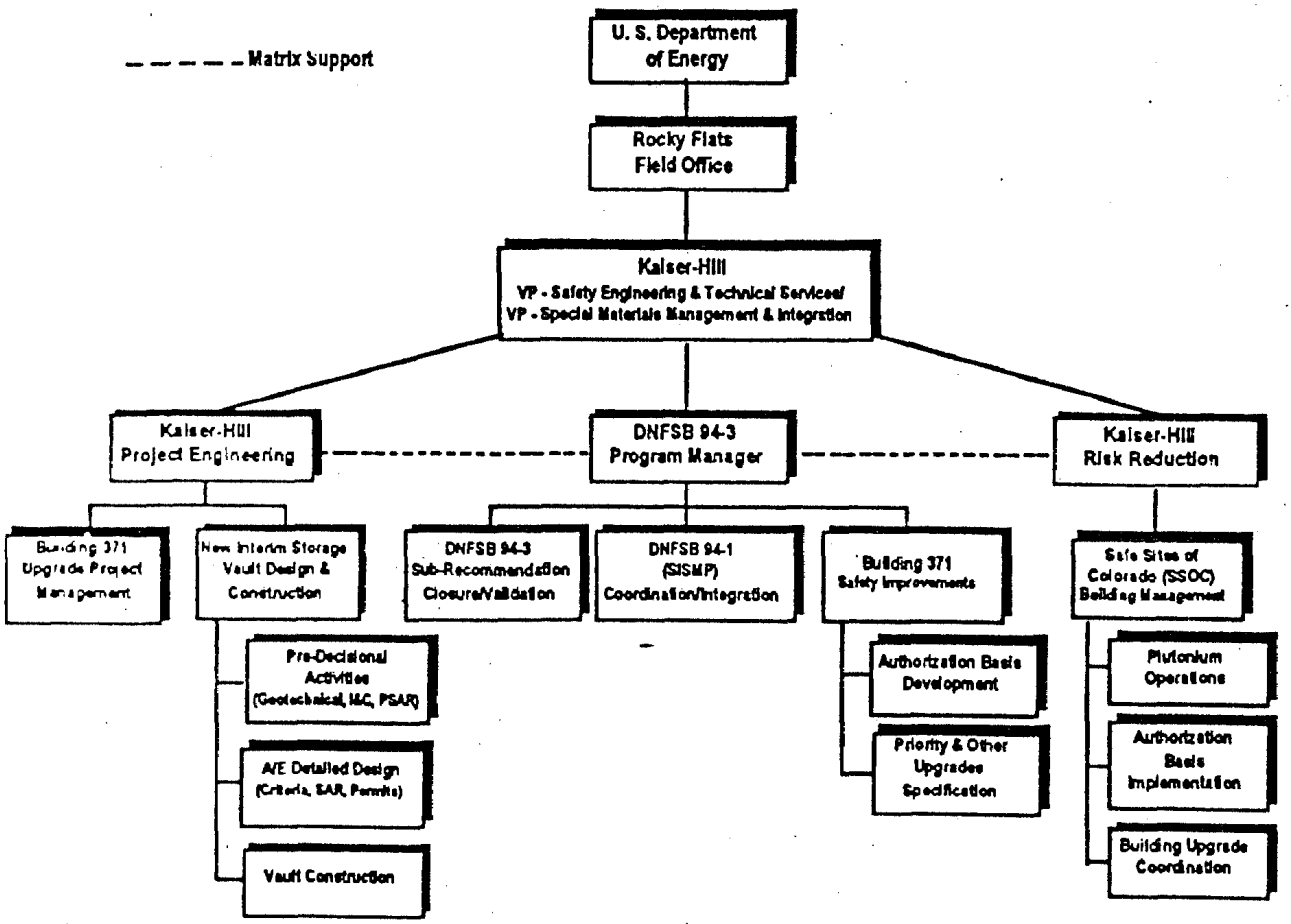
1.1 Change Control

The IPP will be implemented on the schedule shown at the end of the IPP. The current schedule covers the activities to implement the interim storage mission including design and construction of an interim storage vault, upgrades to Building 371 and closure of 94-3 sub-recommendations. The Department will implement the schedule as described herein and will report quarterly as specified below and otherwise, by exception only. The Board will be notified promptly of any changes that affect commitments to them. The plan may require mid-course corrections as key issues are resolved.

1.2 DNFSB Deliverables

The Department will provide a quarterly status report for the 94-3 IPP beginning in January 1997. The quarterly status report will provide the formal transmittal of the IPP deliverables to the Board and status the Site's progress on IPP activities, such as Building 371 upgrades and authorization basis, 94-1 coordination, and ISV pre-decisional studies (or acquisition if the decision is made to proceed); in addition, any changes in contingencies will be discussed.

Figure 2
Recommendation 94-3 Phase II Organization



2. Closure of DNFSB 94-3 Sub-Recommendations

Recommendation 94-3 contains eight sub-recommendations with specific issues that the Board asked the Department to address with respect to the plans for storage of the Site's plutonium in Building 371. This section demonstrates how the 94-3 sub-recommendations will be addressed for both the near-term mission of Building 371 and for the design, construction and operation of a new ISV, including consideration of the unresolved technical issues communicated by the Board's March 13, 1996, letter to Acting Under Secretary Grumbly.

2.1 Building 371

Sub-Recommendation 1:

That an Integrated Program Plan be formulated to address the civil-structural-seismic safety issues and evaluations related to the planned use of Building 371 for storage of plutonium and related functions. This plan needs to be founded on the principles of systems engineering and realistic schedules. Several studies, pertinent to such a plan, are geologic fault investigation, ground motion studies, dynamic building analysis, and soil-structure interaction analysis. These studies and other elements need to be combined with the building mission and other functional criteria using systems engineering principles to develop the Integrated Program Plan.

Several studies (References 1 through 6) were completed during Phase I to address the civil-structural-seismic safety issues and evaluations. As a result, an EBE (characterized by a 0.25 g peak ground acceleration (PGA) at the ground surface and by a return period of about 2000 years) and a Collapse Prevention Earthquake (CPE, approximated by a 0.54 g PGA at the ground surface with a return period of about 10,000 years) have been established. The building and its components required for its missions have been shown, with upgrades, to be structurally adequate for the EBE. The CPE was used to demonstrate that the building possesses a reasonable margin of safety.

The Phase I studies addressed possible building missions including: stabilization and repackaging of the majority of the Site's plutonium metal and oxide inventory; consolidated interim (~15 year) storage for the metal and oxide inventory until offsite shipment occurs; solution stabilization; and storage, stabilization, and repackaging of portions of the residue inventory. The possible missions not explicitly considered (residue storage and future decommissioning and decontamination (D&D) activities in Building 371) are not expected to introduce additional civil-structural-seismic safety issues.

The Department has completed the actions identified under this sub-recommendation for Building 371, including formulating and providing this IPP, and proposes closure of the sub-recommendation.

Sub-Recommendation 2:

That the plan address and explain any requirements for changes to the current Safety Analysis Report and how such changes will be accomplished. This includes effects from earthquakes, extreme winds, and floods.

The current Building 371 Final Safety Analysis Report (FSAR) is outdated and will be replaced by an AB that addresses mission appropriate requirements of DOE Order 5480.23 (Reference 7) (or 10 CFR 830.110 [Reference 8] nuclear safety rules when promulgated). A two-step AB development process is planned with the initial AB in a BIO format and the final in either a SAR or Basis for Operations (BFO) format (Reference 9). Both will afford rigorous hazard analyses for the current missions and develop appropriate control sets. The initial AB is expected to utilize more conservatism and compensatory measures, pending building upgrades, than the final AB.

The Authorization Bases will address: (1) current and future missions of the facility for material consolidation, stabilization, repackaging, storage and other planned risk reduction activities, and any storage tube loading operations to support a new ISV; (2) changes to site characteristics and design or

evaluation criteria for natural phenomena hazards due to the Seismic Hazard Analysis and the Wind and Tornado Study (References 10 and 11); (3) physical upgrades as a result of the studies following Phase I and AB development; (4) a new hazard and accident analysis; (5) derivation of Technical Safety Requirements (TSRs) based on the hazard and accident analysis results and the requirements of DOE Order 5480.22 (Reference 12) (or the pending 10 CFR 830.320 [Reference 13] nuclear safety rules); and (6) any other necessary changes due to resolution of other sub-recommendations. Major D&D of Building 371 will not be included in the new Authorization Bases and will be addressed by separate AB documents when D&D plans are developed.

The Department has identified and committed to an approach to complete the actions identified under this sub-recommendation for Building 371 and proposes closure of the sub-recommendation.

Sub-Recommendation 3:

That a comprehensive document be completed describing in detail the structural analysis methodology and standards for the building analysis. This includes explaining analytical methods used and their applicability to the configuration of Building 371.

The Phase I Task 6 report (Reference 5) is a comprehensive document describing the standards and methods used for the structural analysis of the Building 371. No further analytical work relating to the facility structural capability is required.

The Phase I Task 7 report (Reference 6) defined standards and methods used for seismic analysis of Building 371 safety systems credited in the safety strategy (see sub-recommendation 1 for Building 371, above). The Task 7 analysis applied the Seismic Qualification Utility Group (SQUG) process for seismic qualification of structures, systems and components (SSCs).

These analytical methods will be used where applicable to design Building 371 upgrades.

The Department has completed the actions identified under this sub-recommendation for Building 371 and proposes closure of the sub-recommendation.

Sub-Recommendation 4:

That the Integrated Program Plan use both deterministic and probabilistic methods to establish the vibratory ground motion criteria that will be used in the structural evaluation of Building 371. This includes a rationale for reconciling differences between the two methods. Moreover, these criteria should incorporate the results of a carefully planned and executed site geological faulting investigations.

The vibratory ground motion for Building 371 was first determined using probabilistic methods in the Seismic Hazard Analysis. A deterministic estimate of ground motion (Reference 1) was then undertaken for comparison to the probabilistic study. The two methods along with the site faulting investigation were both presented in the 94-3 Phase I Task 4 study (Reference 3).

This sub-recommendation is addressed by the Phase I Task 4 study. The report evaluated the results of the Site and local geotechnical investigations in terms of both the probabilistic and a deterministic seismic hazard approach. Based on the report, a consensus was reached on the appropriate EBE.

The Department has completed the actions identified under this sub-recommendation for Building 371 and proposes closure of the sub-recommendation.

Sub-Recommendation 5:

That a hazard classification be selected for Building 371 which is supported by rational analysis. This requires consideration of the mission, period of intended use, and importance of the building.

In Phase I, the risk and accident consequences were identified, and practical steps to prevent or mitigate them were pursued, regardless of hazard classification, thereby obviating the need for formal classification. What resulted was an understanding that, with some improvement, Building 371 affords substantial seismic capacity and could meet PC-3 seismic standards. The Phase I evaluation and conclusions imply a hazard categorization indeterminate between 1 and 2.

The Department has completed the actions identified under this sub-recommendation for Building 371 and proposes closure of the sub-recommendation.

Sub-Recommendation 6:

That the Integrated Program Plan, consistent with the hazard classification, include the plan for classification of safety systems on a rational basis consistent with the mission, life, and importance of Building 371. Issues associated with hazard classification and classification of safety systems are discussed in the Board's April 29, 1994 letter to Under Secretary Curtis.

The Building 371 Authorization Bases will identify safety related SSCs. One means of safety SSC designation will be based on accident consequences exceeding Evaluation Guidelines. Since no accident Evaluation Guidelines have been issued by the Department for implementation of DOE Order 5480.23 (Reference 7), a criterion of 5 rem CEDE (50 year commitment) to a hypothetical individual located at or beyond the current Site boundary will be used. This 5 rem Evaluation Guideline is suggested for classification in DOE Standard 3011 (Reference 14) and also used in 10 CFR 72.106 (Reference 15). The 10 CFR 72.106 value was applied to designate SSCs "important to safety" for the Fort St. Vrain Independent Spent Fuel Storage Installation. In designating safety systems required to protect workers, consideration will be given to systems that prevent or mitigate accidents involving radiological or toxicological hazards that would result in consequences less severe than the "immediately life-threatening or permanently disabling injuries" criterion of DOE Standard 3009 (Reference 16); a process hazard assessment methodology will be used.

The practice of defense-in-depth will be used to develop safety SSCs or administrative controls since typically, no single barrier is relied upon for preventing or mitigating release of hazardous materials that would result in consequences exceeding Evaluation Guidelines. Multiple barriers typically include at least one safety SSC that is seismically qualified and a combination of other safety SSCs and/or administrative control programs. In Phase I and the follow-on studies, a determination was made that facility primary containment and confinement SSCs (e.g., pipes, tanks, gloveboxes, and interior HVAC ducts) are not qualified to EBE criteria and could not be practically upgraded. Following an EBE level event, the Building 371 structure and HVAC exhaust plenums will provide the seismically qualified safety barrier. Other SSCs completing the simple active confinement functions (e.g., HVAC fans, standby power) are separately planned for "safety margin" upgrades to EBE criteria.

The safety SSCs will be differentiated so that those with the most important hazard mitigation functions are subject to the most stringent requirements (e.g., design requirements, quality requirements, control of maintenance, safety evaluations of proposed changes, etc.). The remaining safety SSCs will be subject to requirements somewhat less rigorous, but still sufficient to ensure their safety function.

The Department has identified and committed to an approach to complete the actions identified under this sub-recommendation for Building 371 and proposes closure of the sub-recommendation.

Sub-Recommendation 7:

That any standards used in evaluating hazards from natural and man-made phenomena be comparable to those used in commercial nuclear practice.

The standards used for the structural evaluation of Building 371 in Tasks 6 and 7 are comparable to commercial nuclear standards. American Concrete Institute (ACI) Standard 349 (Reference 17), a nuclear plant concrete standard was used for calculation of concrete capacities and American Institute Steel Construction (AISC) N690 (Reference 18), a nuclear plant steel standard, was used for calculation of steel member capacities. Soil structure interaction analysis and structural dynamic analysis were comparable to the analysis used for commercial nuclear power plant structures. Similarly, dynamic soil pressures were calculated using American Society of Civil Engineers (ASCE) Standard 4 (Reference 19) methods, as would be done for nuclear power plants. The techniques used for seismic verification of equipment originated in the SQUG. The analysis report for 94-3 Task 6 (Reference 5) formally documents the methods and standards used.

As part of the final AB development, current Department guidance will be supplemented by applicable Nuclear Regulatory Commission (NRC) nonreactor nuclear facility guidance for the evaluation of man-made phenomena hazards. For example, NUREG-0800 Standard Review Plan (Reference 20) will be used to evaluate aircraft crash hazards. Other external events (e.g., adjacent facility hazards, transportation accidents, etc.) will also be evaluated for their impact on Building 371.

The Department has completed the actions identified under this sub-recommendation for Building 371 and proposes closure of the sub-recommendation.

Sub-Recommendation 8:

That the Program Plan and results of its activities be used to specify building upgrade and improvements consistent with the mission of Building 371.

Phase I studies identified representative upgrades to Building 371, focusing on "high cost" systems, to ensure safe interim storage of the consolidated plutonium metal and oxide through about 2015. The studies following Phase I (Reference 21) validated a subset of those upgrades as priority upgrades warranting prompt implementation even if the Building 371 consolidated plutonium storage mission was to end by 2002. The Department is proceeding with the implementation of these upgrades.

Development of the Building 371 Authorization Bases (interim BIO and final AB) or future changes to the Building 371 mission could result in additional upgrades being identified, including, for example, additional upgrades to low cost systems. Any additional upgrades arising during Authorization Bases development that warrant "priority" designation will be scheduled for prompt implementation.

Finally, the other upgrades, including safety margin upgrades, will also be validated and implemented to ensure safe interim storage through 2015. Based on firm evidence that interim storage will not be a Building 371 mission, these other upgrades will be deferred or canceled as discussed in Section 3.

The Department has completed the actions identified under this sub-recommendation for Building 371 and proposes closure of the sub-recommendation.

2.2 New Interim Storage Vault

The 94-3 sub-recommendations 1 through 7 will be addressed during ISV predecisional design, and any subsequent detailed design construction, and commissioning. Sub-recommendation 8 is specific to Building 371 upgrades and, as such, is not directly applicable to the design and construction of an ISV. The specific actions to be taken with respect to Recommendation 94-3 for a new ISV are shown in the order in which the activities would be initiated if the Department decides to proceed with an ISV after completing its formal review process.

- Geotechnical and seismic studies are planned for an ISV (see Section 5.3) to determine soil properties, environmental contamination, depth of bedrock, and location of bedrock faults. Based on these investigations, the Seismic Hazard Analysis for the protected area will be adapted and revised as necessary for a nearby site. The geotechnical and seismic studies will define design criteria for a new ISV (e.g., seismic hazard curves and time histories, shear wave velocity profiles, strain dependency relationships, and foundation design parameters). The revised probabilistic Seismic Hazard Analysis will then be compared with an updated deterministic ground motion assessment. Based on this comparison, a consensus design earthquake will be adopted. Necessary revisions to the current studies will be documented as a part of the design criteria for an ISV. (Sub-recommendations 1 and 4).

- Standards used to design and to evaluate natural and man-made phenomena hazards for the ISV will be comparable to those used in commercial nuclear practice. These standards include, but are not limited to: ACI 349 (Reference 17); AISC N690 (Reference 18); and ASCE Standard 4-86 (Reference 19); and Standard 7-96 (Reference 22). In addition, NUREG-0800 Standard Review Plan (Reference 20) will be used to evaluate hazards from aircraft crash, for example. The full set of required standards will be identified in the predecisional design report and Design Criteria Document and methodologies will be documented during final design. (Sub-recommendations 3 and 7).

- A new ISV would be conservatively designed for the hazards due to plutonium storage and management. The ISV would be designed for the greatest hazards, i.e., PC-4. Given this approach, hazard categorization is deemed unnecessary. (Sub-recommendation 5)

- A Preliminary Safety Analysis Report (PSAR) would be developed during the design phase and approved by the Department prior to the start of construction. The ISV PSAR would classify SSCs based on the hazard and accident analysis results. The safety system determination will be based on accident consequences exceeding Evaluation Guidelines. A criterion of 5 rem CEDE (50-year commitment) to a hypothetical individual located at or beyond a minimum 100 meter site boundary will be used. This 5 rem Evaluation Guideline and a minimum 100 meter site boundary are based on the NRC requirement for licensing independent storage of spent nuclear fuel in 10 CFR 72.106 (Reference 15). Systems required to ensure worker safety and environmental protection will also be identified. (Sub-recommendation 6)

- An ISV would require a Safety Analysis Report (SAR) per DOE Order 5480.23 (Reference 7) and TSRs per DOE Order 5480.22 (Reference 12) (or the pending 10 CFR 830.110 and 830.320 nuclear safety rules [References 8 and 13]). A PSAR and a detailed design criteria document would be developed early in the design phase and approved by the Department prior to design completion or the start of construction; the FSAR and final TSRs would be approved by the Department prior to storage of plutonium. The SAR would incorporate relevant natural phenomena hazard design criteria that result from the site characterization studies described earlier. (Sub-recommendation 2)

2.3 Summary

Based on the work performed to date and the commitments made in this IPP, sub-recommendations 1 through 8 are proposed for closure for Building 371. For a new ISV, sub-recommendations 1 through 7 will be submitted for closure with the approval of the PSAR and design criteria document, if the Department decides to proceed with an ISV after completing its NEPA review. Sub-recommendation 8 does not apply to a new ISV.

3. Building 371

As a result of the Recommendation 94-3 studies, physical upgrades and an updated AB for Building 371, consistent with its mission, will be accomplished. Building upgrades were identified during the Phase I studies as representative of those appropriate to reduce the risk in Building 371 should it be selected for the interim storage mission. The ensuing studies evaluated and selected a subset of those upgrades warranting priority and unconditional implementation to support the Building 371 mission; selection was based on their risk reduction effectiveness, schedule, cost, constraints on implementation, and adequacy of the resulting Building 371 capability to ensure successful performance of anticipated safety functions. New Building 371 Authorization Bases are being developed and will be implemented, with the initial update completed by December 1996. The safety programs and SSCs which have a safety function in the new AB will be evaluated to assure they are adequate. Appropriate upgrades and compensatory measures will be identified. This evaluation will validate and test the completeness of the set of priority upgrades. Any additional action needed to support the new AB with either additional upgrades or compensatory measures will be implemented. In addition, other upgrades will also be validated and implemented unless firm evidence that interim storage will not be a Building 371 mission justifies deferral or cancellation (see Section 3.8). These activities are the cornerstones for the plan to ensure safe operation of Building 371 for its assigned mission, including plutonium consolidation.

3.1 Mission Need

The goal of the upgrade and AB development programs for Building 371 is to ensure the safe fulfillment of assigned building missions through 2015. Safety is to be assured in the context of integrated safety management by developing a current AB for the building, by defining and completing any necessary hardware upgrades or compensatory measures to address safety system requirements, and by implementing an Authorization Agreement ensuring conformance with the AB. The missions of the building include baseline activities such as storage of the Site's consolidated plutonium metal and oxide inventories and mission program activities such as operation of the Caustic Waste Treatment System or residue stabilization and repackaging. A complete list of Building 371 activities reflecting assigned missions for planning purposes is provided by the Master Activity List (MAL). The AB will provide a comprehensive listing of authorized activities.

3.2 Functional Requirements

During the Phase I SSC review, an initial set of safety functional requirements was identified based in part on a draft Preliminary Hazard Analysis (PHA). The draft PHA was developed using existing inventories and hazards in Building 371, but did not address all currently proposed mission activities. Safety strategies and additional hazard analyses were then developed to mitigate postulated accidents for plutonium metal and oxide storage configurations proposed for the interim mission (that is, plutonium metal and oxide storage in DOE Standard 3013 (Reference 23) compliant containers). A "simple active" strategy was adopted. This "simple active" strategy assumes that exhaust fans with HEPA filters (and associated support systems) perform the principal active safety functions (i.e., maintaining negative building pressure). The planned upgrades to SSCs will assure this safety function is met.

The Authorization Bases may identify additional safety functional requirements as the hazards and accident analyses are further developed. The impact of insights from the AB effort (either hazard analysis or control set development) on the safety functions will be addressed in the context of ensuring sufficiency of the identified upgrades as discussed in the following section.

3.3 Synthesis and Analysis

In studies subsequent to Phase I, the equipment upgrades recommended in Phase I as part of the "simple active" safety strategy for the interim storage were reviewed and assessed for possible prompt, unconditional implementation in support of the building mission. The assessment focused particular attention on anticipated near-term mission activities that would benefit from prompt implementation. Upgrades determined to be practical and effective in reducing risk to support these activities were subjected to further evaluation for collective adequacy based on review of the resulting capability to ensure the affected safety functions. Based on the evaluation of safety functions, the selections were confirmed as priority upgrades for prompt implementation. The Laboratory Integration and Prioritization System (LIPS) developed by Los Alamos National Laboratory (LANL) was applied in the initial screening for practicality and effectiveness. Upgrades that were not shown to be effective in reducing near-term mission risk, primarily because prompt implementation was impractical were assigned a lower priority, but nevertheless, scheduled for implementation in time to support the interim storage mission for plutonium metal and oxide in Building 371.[1]

The post-Phase I decision approved seventeen priority upgrades for prompt unconditional implementation (see Table 3-1). These upgrades improve existing safety functional capabilities in areas of fire protection, confinement (HVAC), criticality prevention, and worker protection, and are being implemented promptly to reduce risk even for the near-term missions. The AB development processes discussed below will validate and test the completeness of this set of upgrades and supplement it as necessary with either additional upgrades or compensatory measures.

To provide a valid, updated AB as quickly as possible, the new Authorization Basis for Building 371 will be developed in two steps. The first will be developed from the existing draft BIO to facilitate and ensure prompt completion. It will afford sufficient detail to supersede the current AB and to conservatively maintain safe operation of the building. The hazard analyses will be developed supplemented by separate process hazards analyses to provide a complete AB for the authorized activities, with particular emphasis on near-term mission program activities to commence prior to development of the second AB. Safety systems required to protect the public, worker and environment will be identified as discussed in the response to sub-recommendation 6 (Section 2.1). System design descriptions for these safety systems will be developed to support this AB by December 1996. The system descriptions will delineate the safety boundaries and document the basis for concluding that the required function can be performed notwithstanding the incomplete design basis for the facility. Any additional upgrades needed to ensure the required functional performance will be identified and scheduled for implementation (with interim compensatory measures).

The second Building 371 AB will address an upgraded Building 371, will reduce unnecessary conservatisms in the initial AB where practical, and will incorporate any new missions not included in the initial AB. The second AB may identify additional upgrades or compensatory measures not previously identified. The implementation plan for the second AB will establish an appropriate schedule for the balance of the required upgrades. The form of the second AB will be determined following completion of the initial AB and evaluation of the suitability of the BFO methodology, being developed at the Site and tested on Building 771. The second AB will use either this BFO process or the SAR process per DOE Order 5480.23 (Reference 7). Consistent with the Board's of March 13, 1996, to the Department, either methodology will provide a safety analysis which will be consistent with the present and anticipated mission of the building; either will contain: the identification of facility hazards; required

[1] A residue consolidation and storage mission could also result from the IPP activities in Section 4, but is not expected to entail hazards warranting upgrades beyond those identified for priority implementation; both the Authorization Basis and the upgrades for Building 371 would be assessed for impacts, if and when such a mission is defined.

preventative/mitigative measures to protect the public, facility workers, collocated workers, the mission of the facility, and the environment; and TSRs.

The other upgrades which are required to support the AB (i.e. those not in Table 3-1 -- see Appendix C for a tentative list) will be implemented in time to support the storage mission. These upgrades can be sorted into three classes:

1. those that enhance safety margins (e.g., seismically qualified plenum deluge makeup or seismically qualified remote exhaust fan control stations with dedicated emergency power supplies), with implementation planned for FY 98 and FY 99;

2. those required to relocate the plutonium oxides to the sub-basement for interim storage (e.g., prepare additional vault capacity to support inventory reconfiguration, modify sub-basement vaults for oxide storage, and reinforce vault ceilings), with implementation to be completed by September 2001; and

3. those required for Building 371 safeguards and security as the inventory is removed from the balance of the Protected Area (e.g., Perimeter Intrusion Detection and Alarm System [PIDAS] reconfiguration), with implementation to be completed by September 2002 as Building 707 inventory reduction permits.

The need to complete these other upgrades will be reassessed (and they may be deferred or canceled) based on firm evidence of progress toward timely implementation of an alternative approach for the interim storage mission (i.e. an ISV or shipment off-site) as outlined in Section 3.8. Environmental impacts of these upgrades are to be considered with the Building 371 alternative for interim storage.

3.4 Execution

The identified construction upgrades will be implemented and managed using Site project management procedures. Non-construction upgrades (e.g., implementation of a combustible loading control program and relocation of residues stored in Room 3189) will be implemented using Site processes, such as facility procedures and the Integrated Work Control Program (IWCP).

Detailed design and construction of the physical upgrades will be accomplished based on the system functional requirements. Testing and acceptance plans will be performed as required to ensure functionality.

The Authorization Bases will be developed by multi-disciplined teams and implemented by building operations to establish effective Integrated Safety Management. Authorization Agreements will ensure conformance with the Authorization Bases.

During Phase I, a new seismic analysis of record for Building 371 SSCs (specifically the facility structure, HVAC equipment providing confinement and the main storage racks) was performed and implemented. The analyses developed during Phase I will be added to the Building 371 Controlled Document List (CDL) to ensure that the facility seismic capability is maintained through the existing Site Configuration Change Control Program (CCCP). Documents defining the EBE, main storage rack load limits, and equipment/ structures credited in the seismic analysis will be included in the CDL.

3.5 Operation

The procedure modifications and training required as a result of upgrades and any other system functional requirements defined by the Authorization Bases will be implemented using Site procedures.

Table 3-1. Building 371 Priority Upgrades	
Project Description	**Safety Upgrade**
• Repair of Construction Line "T" Joint Repair joint and upgrade HVAC seismic supports near HVAC Systems 1 & 2 Bypass Valves	Yes
• Filter Plenum Demister Analysis and Inspections	Yes
• Penetrations for Room 3206 Fire Wall (DOE Standard 3013 Repackaging Room)	Yes
• Combustible Loading Control Program (CLCP)	Yes
• Seismic HVAC Upgrades Plenum and Fan Seismic Structural Support Upgrades	Yes
• Fire Doors Repair and/or Replace Facility Fire Doors	Yes
• Subsurface Drain System Develop inspection procedures, perform drain inspections, and engineered plan defining actions on loss of drain system	Yes
• HVAC Isolation Valves Valve Repair and testing, Installation of new PSRDs, Installation of backup nitrogen bottles	Yes
• Plenum Deluge System Modifications Temperature indicators, backup N2 supply and valve redesign	Yes
• Egress Route Upgrades Remove stairwell crash bars, signs, etc.	Yes
• Life Safety Code Exemption Prepare exemption for egress routes not in compliance to the Life Safety Code	Yes
• Basement Level Fire Walls Upgrade basement walls to NFPA criteria for protection of HEPA filters	Yes
• Seismic Bracing for Attic Water Pipes	Yes
• Relocate high risk residues in Room 3189	Yes
• Implement S/R Load Limits	Yes
• Replace Cooling Tower	No
• Material Transfer Dumbwaiter Ground Floor to Subbasement Levels	No

3.6 Closure

Facility deactivation will be addressed by an update to the AB prior to implementing deactivation activities. The deactivation will be coordinated with site programs such as the Accelerated Site Action Project (ASAP).

3.7 Contingencies

A continuing, longer-term residue storage mission is not anticipated for Building 371, but cannot be precluded pending resolution of the residue management issues discussed in Section 4.7 of this IPP. Residue storage in near-Type B containers would not be likely to require additional upgrades to Building 371. Storage in convenience cans, if selected, would probably require use of the sub-basement and hence, additional upgrades. Such a decision will be made in time to begin upgrades in FY 2000.

3.8 Deliverable Summary

3-1 Report completion of modifications in FY 96 of the column line "T" construction joint to increase the seismic capability of Building 371 and of the HVAC bypass valve supports to complete qualification of the passive confinement boundary for the new Building 371 EBE. Report completion of a final fire hazard analysis in FY 96.

3-2 Report completion of priority safety upgrades specified in Table 3-1 by the end of 1997.

3-3 Establish and document operation of Building 371 in conformance with an updated Authorization Basis by December 1996.

3-4 Issue schedule (implementation plan) for further Building 371 upgrades identified during the initial AB development by November 1996.

3-5 Report completion of other Building 371 upgrades on the following schedule:

a) Upgrades to increase safety margin by September 1999.[1]

b) Upgrades to permit oxide relocation by September 2001.

c) Upgrades for safeguards and security by September 2002.

3-6 Reassess the need to complete the other upgrades and inform the Board by September 1998.

4. Integrated Pu Consolidation and Management

The insights gained on the overall Site risk from residues and the effects of the decision to proceed with the priority Building 371 upgrades and a new ISV are to be integrated with the actions committed to the Board under Recommendation 94-1 to ensure an integrated Site plan for safe plutonium management and storage. Systems engineering principles will be applied to develop a strategic plan for residue storage and shipment that incorporates timely consideration of contingencies, such as possible delays in WIPP opening.

4.1 Mission Need

A Site mission is to stabilize, store and ultimately ship offsite its plutonium inventory. Safe achievement of this mission requires, pending shipment, the reduction of plutonium interim storage risk to a small fraction of the risk from plutonium holdup. This mission entails:

[1] However, safety margin upgrades may be postponed by one year (to September 2000) provided the following are completed by September 1997: 1) design activity in FY 97 confirms the safety and cost-suitability of an ISV when evaluated by the Department; 2) a NEPA Record of Decision (ROD) has been issued which allows the ISV construction to proceed; and 3) allocated funding for safe storage of SNM including the ISV has been received.

- preparing plutonium metals and oxides for and placing them into interim storage; and
- consolidation and/or stabilization and repackaging of plutonium residues for storage pending offsite shipment.

An existing framework for plutonium consolidation and management is currently in place under the SISMP. The SISMP reflects the plans for accomplishing the Recommendation 94-1 Implementation Plan objectives. In addition, the ASAP is being developed to accelerate the closure of the Site and envisions reducing the total cost of reaching an acceptable end state for the Site by accelerating work. The insights and decisions from the Recommendation 94-3 Phase I and subsequent studies impact both SISMP and ASAP program activities. As such, accomplishing the actions from Recommendation 94-3 requires integration with and must occur within the constraints of these other major programs.

The effectiveness of these programs and the integration of the Recommendation 94-3 actions will be measured by completing the necessary actions to decrease the incremental Site risk from interim storage to a small fraction of the risk due to plutonium holdup in the Site's buildings by the end of FY 2002. To attain the desired risk reduction for the plutonium metal and oxides, the Department is proceeding to make appropriate upgrades to Building 371, establish a valid AB, and continue planning for a new ISV as an alternative for an interim storage facility as described in Section 5. The current timeline for plutonium metal and oxide consolidation, stabilization and estimated transfer to a new ISV is shown in Appendix A. This timeline is provided for information only and is subject to change as the plans evolve. These changes will be documented through revisions to SISMP.

4.2 Functional Requirements

The objective of the program outlined in the following sections is to incorporate the insights from the Recommendation 94-3 Phase I studies and the decisions regarding priority Building 371 upgrades and a new ISV into the existing framework of programs for material consolidation, stabilization, repackaging and interim storage. In particular, a strategy for interim residue storage pending offsite shipment is required that addresses the risk identified in Phase I from dispersible residue forms. The strategy can be implemented through the primary Plan that captures the scope of current plutonium management activities in progress, SISMP.

Important programmatic elements of planning which link Recommendation 94-1 and 94-3 implementation are shown in Table 4-1. Plans for interim storage and shipment of material are preliminary. Further evaluation and decision on options are required to identify facilities.

Table 4-1

Function	Programmatic Elements
Consolidation	◊ Reduce public risk from oxides and from the more dispersible residues ◊ Minimize worker dose from multiple material movements ◊ Relocate inventory in Rm. 3189, Building 371 (required near-term upgrade to Building 371) ◊ Implement Building 371 Stacker-Retriever loading limits (required near-term upgrade to Building 371)
Stabilization	◊ Reduce worker risk from unstable material ◊ Meet Interim Safe Storage Criteria for residues ◊ Meet DOE Standard 3013 stabilization requirements for oxides and metals
Packaging	◊ Meet DOE Standard 3013 packaging requirements for oxides and metals ◊ Meet Interim Safe Storage Criteria (ISSC) for residues ◊ Reduce public risk from the more dispersible residues
Storage	◊ Move pit inventory, in an acceptable storage configuration, to a facility to be approved for interim storage ◊ Move metal and oxide inventory in DOE Standard 3013 containers to a facility to be approved for interim storage ◊ Establish safe residue storage; reduce public risk from the more dispersible residues via interim storage if not already addressed via stabilization and packaging
Shipment	◊ Ship residues to a facility to be approved for disposition ◊ Ship oxides, metals, and pits offsite to a facility to be approved

4.3 Synthesis and Analysis

Initially the alternatives for the residues considered both pre- and post stabilization actions to reduce the risk from the more dispersible residues. Consolidation of the more dispersible residues into Building 371 prior to stabilization/ repackaging is not currently envisioned unless it can be accommodated as part of either the material moves necessary to accomplish the stabilization and repackaging activities or the transfer of all material from a building to reduce operating costs. The reasons for this are threefold: (1) until the oxide inventory is consolidated in Building 371, the risk reduction gained from removing the more dispersible residues from the same buildings is less significant (i.e. oxide would always warrant a higher priority); (2) re-arrangement of the residue inventory solely to consolidate the more dispersible residues in Building 371 would compete with or divert resources needed to perform the stabilization activities planned in the SISMP and could thereby delay other risk reduction activities; and (3) the worker dose received during the inventory movement is not justified based on the risk reduction achieved by consolidation alone, and would result in multiple moves of the same material to accomplish the stabilization and repackaging for those residues planned for treatment in Building 707.

A review of the residue inventory was recently performed to determine the most dispersible residues, both pre- and post stabilization and repackaging to meet Recommendation 94-1

(Reference 24). Those residues that fall into the "high dispersibility" category account for about 40 - 45% of the plutonium in the residue inventory (and < 25% by bulk). The current stabilization plans do result in some movement of certain residue Item Description Codes (IDC) between the high, medium and low categories, but overall, has little net effect of the amount of plutonium in the "high dispersiblity" category. Shipment of these residues to a receiver Site (WIPP is scheduled to be opened in 1998) would obtain the required risk reduction and could be accomplished by 2002, assuming WIPP opens as scheduled.

The alternatives for reducing the risk from the residues after stabilization and repackaging that are being considered to be selected as a preferred contingency in case a receiver Site is not available to meet the risk reduction goal are:

3. Packaging (i.e., pipe component in a 55-gallon drum qualified to selected Type B impact, crush, and fire test criteria) that achieves the necessary risk reduction for the more dispersible residues. Approximately 7500 "high dispersiblity" category drums are projected, based on the drum estimates provided in SISMP for the baseline stabilization processes.[1]
4. Immobilization, such as cementation or vitrification to achieve the necessary risk reduction for the more dispersible residues. Immobilization would also address the proposed safeguards termination policy.
5. Storage in Building 371 or a storage location that achieves similar risk reduction for the more dispersible residues. This facility would be seismically robust such that credible accidents do not damage the storage containers.

The alternatives developed will be evaluated against the mission objectives and the specific requirements shown in Section 4.2, and a path forward will be selected that addresses the Recommendation 94-3 issues.

For the entire plutonium inventory, existing Site plans for material management must include actions to prepare for shipment to the extent practicable during stabilization and repackaging, and to complete preparation once a receiver is identified. Shipping provisions for plutonium metal and oxide in DOE Standard 3013 packages are largely being standardized for any of the potential receivers considered in the Material Disposition Programmatic EIS.

4.4 Execution

Based on the mission, the functional requirements and the alternatives developed and evaluated, the actions to be taken to address Recommendation 94-3 insights and decisions will be incorporated by revision of SISMP and/or ASAP programs for execution.

4.5 Operation

The procedure modifications and training required as a result of Recommendation 94-3 issues will be done using Site procedures for integrated operations activities defined in the implementing programs.

4.6 Closure

Closure will occur upon completion of the activities that reduce the Site risk from residues, either by shipment to WIPP or by implementation of the selected alternative and, for oxides, metal and pits, either by offsite shipment, by placement in a new ISV for interim storage, or continued interim storage in the upgraded Building 371.

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[1] The "high dispersibility" drums account for ~12% of the WIPP transportation capacity during the 1998 through 2002 timeframe.

4.7 Contingencies

The surveillance requirements to meet the ISSC for residues may make nested storage of the pipe component in a 55 gallon drum impractical, depending upon vent inspection frequency and methodology. Resolution of this uncertainty will permit or constrain the overpack option for reducing the storage volume required for residues awaiting shipment to WIPP. Overpacking reduces storage capacity requirements but requires handling and repackaging before shipment.

The impact of the various residue trade studies and the proposed safeguards termination policy on the various residue categories has yet to be determined. The material management alternative selection study will establish need dates to prevent significant impacts from any contingencies still open when it is issued.

4.8 Deliverable Summary

4-1 Evaluate and select material management alternatives for "high dispersibility" residues by February 28, 1997

4-2 Incorporate selected residue alternatives into existing Site programs by April 15, 1997.

4-3 Establish and document interim storage for the Site's Pu inventory, including residues, by the end of FY 2002 in a configuration that reduces Site risk due to plutonium (metal, oxides and residues) to a level that is a small fraction of the risk from current plutonium holdup.

5. Interim Storage Mission

The Recommendation 94-3 studies conducted to date and a possible subsequent decision to move forward with a new facility for the interim storage of the Site's plutonium metal and oxide inventory provide the basis for the activities described in Section 5. A new ISV will be further analyzed in an Environmental Impact Statement (EIS). Only predecisional activities will be performed prior to the Record of Decision (to be completed by May 1997) consistent with NEPA requirements.

5.1 Mission Need

The mission need is to provide safe and secure interim storage of the Site's plutonium metal and oxide inventory, including pits (if still onsite) and any oxide generated due to residue and solution stabilization activities. The interim storage mission is to begin upon completion of the May 2002 commitment for plutonium metal and oxide repackaging to DOE Standard 3013 and continue until the inventory is shipped offsite (goal is no later than 2015).

Accomplishing the actions to design, construct and commission a new ISV would require integration with the constraints of two major programs. The Recommendation 94-1 processing of plutonium metal and oxide to meet DOE Standard 3013 impacts the timing and schedule for ISV construction, startup and vault loading. Close coordination between these two activities is also required to anticipate and eliminate bottlenecks and accomplish the inventory transfer safely and efficiently. In addition, the ISV design, construction and operation would occur as the Site infrastructure is being reduced under the ASAP program and the impacts from ASAP need to be considered throughout the life of a new ISV.

The effectiveness of a new ISV as an option for the site's interim storage facility will be measured by an ISV design that incorporates required safety and security engineered features, minimizes operating and maintenance costs, and is completed on schedule, with an ISV ready to accept the plutonium inventory no later than May 2001.

5.2 Functional Requirements

The objective of a new pre-conceptual ISV project is to commence with predecisional design work, and if the decision is made to proceed, to design, construct and operate a new interim storage

vault that would provide safe, stable and secure storage of the Site's plutonium inventory until removal from the Site. The essential functions and requirements identified for a new ISV project include, but are not limited to those shown in Table 5-1. The functional requirements will form the nucleus of the ISV Design Criteria Document and will be further developed during Phase II implementation in the predecisional design report, and by final design drawings and specifications.

5.3 Synthesis and Analysis

Nine alternatives for an interim plutonium storage facility were considered during Phase I, with a passive storage vault design identified as the best alternative over an upgraded Building 371. Studies conducted subsequent to Phase I confirmed advantages of a passive vault over an upgraded Building 371. Further alternative evaluations need to be considered to meet the mission and functional requirements and to address the following:

- Instrumentation to meet domestic and IAEA requirements for inventory control and DOE Standard 3013 surveillances, without requiring intrusive sampling or removal of the inventory from the tubes, needs further definition.
- The pit storage configuration in a new ISV needs to be finalized.
- Vault storage capacity requirements need to be finalized, pending decisions on removing the pits from the Site and better estimates of the amount of oxide expected from residue stabilization activities.
- The preconceptual ISV design evaluated in the studies following Phase I assumed that operators manually insert storage tubes into the storage vault floor, or charge face, using a dolly type fixture. Very preliminary shielding evaluations were performed during the Phase I and follow-on studies to confirm the feasibility of this approach or the shielding needed for loading, unloading, or storage tube handling (dolly or crane) to reduce or minimize worker dose. A mockup facility planned to support instrumentation and tube design will also be used to address the shielding, occupational safety, ergonomics and criticality safety aspects of the tube handling activities.
- The tube loading station design in Building 371 needs further definition, including final determination of the equipment and space needed for loading and handling the storage tubes and the costs for clearing out an area in 371. The mockup facility discussed above will also be used to support the Building 371 tube loading equipment design and operation, including the worker safety aspects.
- The ISV location needs to be finalized. The location specified for an ISV in the Phase I follow-on studies was based on the designers' best judgment. An ISV would be located at a site with the best combination of: no soil or groundwater contamination; no faults; depth to bedrock; satisfactory soil properties; transportation; and access to site utilities.

Based on the functional requirements and alternatives evaluation, a Design Criteria Document and a predecisional design report will be produced. Both documents will also address codes and standards to be used and the quality assurance requirements.

Table 5-1

Function	Requirement
Protect the worker, public and environment from impacts of man-made and natural phenomena hazards (NPH) on the storage of plutonium metal and oxide inventory	• Design shall provide tertiary confinement • Heat removal for the storage containers shall be based on natural convection • Design is based on geotechnical and NPH investigations • Storage configuration shall be subcritical, even under flood conditions • ISV design shall be to PC-4 • Worker dose rate shall be less than 2 mrem/hr in routinely occupied areas • 5 rem CEDE (50-year commitment) to a hypothetical individual located at or beyond a minimum 100 meter site boundary will be used for safety class determination based on accident consequences. • ISV shall be designed and operated to remain free of radioactive contamination
Safeguard the plutonium inventory from theft or sabotage	• Security is based on a denial strategy • Inventory controls for metals and oxides will meet International Atomic Energy Agency (IAEA) and Department requirements • Inventory controls for pits will meet Department requirements
Packaging and transfer of the inventory from Building 371	• Storage tube loading activities shall be authorized by the Building 371 final AB • Inventory transportation shall be authorized by the Site's Onsite Transportation Manual and by the corresponding AB. • Pit storage, if required, in an acceptable configuration.
Storage, monitoring, inspection and shipping and receiving operations	• Monitoring techniques and surveillance frequencies shall meet DOE Standard 3013 for metal and oxides • Space shall be provided in the vault that would allow the handling, inspection and overpacking of a potentially failed container in an exhausted, HEPA-filtered confinement structure • Space shall be provided in the vault that would allow for a future DOE Standard 3013 packaging installation.
Safe deactivation, decontamination and decommissioning at end of life	• Design shall incorporate methods to facilitate demolition • ISV shall be designed and operated to remain free of radioactive contamination

In conjunction with the predecisional design efforts, three major tasks need to be started:

1. The geotechnical and NPH (Principally seismic) studies to locate a site for the ISV and to gather soils and other hazard data (either NPH or man induced) for input to the predecisional design need to be started so that preliminary information for costing purposes is available for the predecisional design, with final information ready for final design.

2. Instrumentation package development is needed to support the predecisional design work. Instrumentation to meet DOE Standard 3013 and provide an acceptable basis for IAEA surveillance without requiring intrusive sampling presents the greatest uncertainty for resolution. A mock-up facility will be built to help develop the instrumentation and to prove its feasibility.
3. A vulnerability assessment (VA) is needed to support the safeguards and security design aspects of the predecisional design. The major O&M cost associated with total life-cycle cost for the ISV is the security, and costs could increase substantially if the design layout introduces vulnerabilities; thus, early involvement of security personnel in the design is essential.

The predecisional design report will describe the mission of an ISV, provide functional requirements, and integrate results from the preliminary safety analysis report, the VA, the instrumentation development, and the geotechnical and seismic studies. As alternatives such as those described earlier for the ISV design are considered, meeting the mission and functional requirements will be of primary concern. Minimizing total life cycle costs is also a key factor. More detailed design drawings and outline specifications will be developed, so that a more accurate cost estimate can be made.

Technical and construction reviews by the Contractor will be done on the design criteria, and the functional and operational requirements at designated progress points (e.g. 30%, 60%, 90%) during production of the predecisional design. An independent peer review of the design, cost and schedule will be done during predecisional design and followed by a DOE Headquarters review.

5.4 Execution

Execution of the ISV predecisional design, and any subsequent final design, construction, and commissioning will employ a combination of Site resources and expertise contracted for specific tasks. Resource decisions will be based on the task, schedule, and the contractual vehicles that are available.

5.5 Operation

Vault staffing and operations would meet the identified functional requirements and codes and standards from the Design Criteria Document and FSAR. The operations activities would be comprised of the initial vault loading, steady state operations, handling a suspect or failed container, and inventory removal at the end of the interim storage mission. The initial vault loading would involve storage tube loading in Building 371 (the tube would provide an effective confinement barrier at all times in the ISV), transport to a new ISV and tube placement into the storage position. Steady state operations would consist primarily of monitoring of the tube contents and maintenance of the safety systems determined by the FSAR. Handling a suspect or failed container would require tube removal from the storage location into a temporary, exhausted and HEPA-filtered confinement structure. Final inventory removal from the vault is expected to require repackaging into Type B shipping containers for offsite shipment.

5.6 Closure

The ISV would be designed and operated to be free of radioactive contamination. Therefore, decontamination of the facility at end of its life would be limited and demolition should be clean. During the design phase, the functional requirements will require the A/E to incorporate into the design methods to facilitate demolition at the end of facility life.

5.7 Contingencies

The current plan assumes a standard Department procurement process, but is not meant to preclude privatization or collaboration with the vault designs being developed by the Department for the long term plutonium storage facility. Collaboration may afford design standardization advantages but will not be permitted to prevent timely completion of an ISV.

Offsite shipment of the plutonium inventory is contingent upon the identification of an appropriate receiver for all or part of the current inventory. Thus, shipment to a receiver site cannot be reliably planned or scheduled. However, should receiver site(s) emerge early enough to significantly reduce the ISV inventory, a smaller vault would be constructed. Removal of the oxide inventory from the Site and a firm commitment to ship the metal by 2002 would obviate the need for a new vault entirely.

5.8 Deliverable Summary

5-1 Complete NEPA evaluation of alternatives for interim storage by May 1997.

5-2 Provide ISV design documents, including design criteria, as they are developed and no later than prior to the start of detailed design, including: functional design requirements; and predecisional design reports and drawings. Provide detailed design plans, calculations, drawings and specifications when developed, if a decision is made to proceed.

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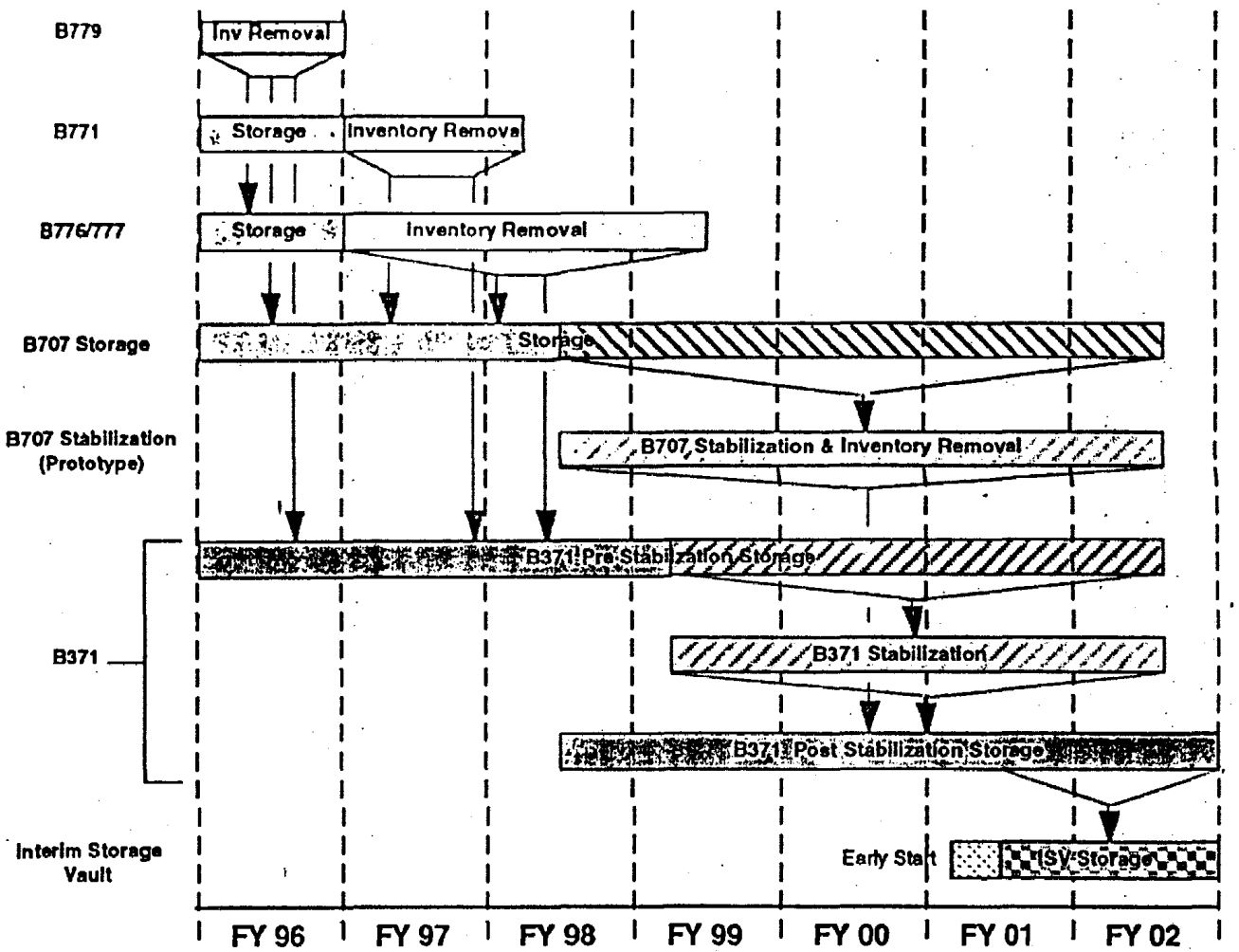
Appendix C. Building 371 Upgrades

Project Description	Upgrade Group
• Repair of Construction Line "T" Joint -- Repair joint and upgrade HVAC seismic supports near HVAC Systems 1 & 2 Bypass Valves	Priority - Safety
• Filter Plenum Demister Analysis and Inspections	Priority - Safety
• Penetrations for Room 3206 Fire Wall -- (DOE Standard 3013 Repackaging Room)	Priority - Safety
• Combustible Loading Control Program (CLCP)	Priority - Safety
• Seismic HVAC Upgrades -- Plenum and Fan Seismic Structural Support Upgrades	Priority - Safety
• Fire Doors -- Repair and/or Replace Facility Fire Doors	Priority - Safety
• Subsurface Drain System -- Develop inspection procedures, perform drain inspections, and engineered plan defining actions on loss of drain system	Priority - Safety
• HVAC Isolation Valves -- Valve Repair and testing, Installation of new PSRDs, Installation of backup nitrogen bottles	Priority - Safety
• Plenum Deluge System Modifications --Temperature indicators, backup N2 supply and valve redesign	Priority - Safety
• Egress Route Upgrades -- Remove stairwell crash bars, signs, etc.	Priority - Safety
• Life Safety Code Exemption -- Prepare exemption for egress routes not in compliance to the Life Safety Code	Priority - Safety
• Basement Level Fire Walls --Upgrade basement walls to NFPA criteria for protection of HEPA filters	Priority - Safety
• Seismic Bracing for Attic Water Pipes	Priority - Safety
• Relocate high risk residues in Room 3189	Priority - Safety
• Implement S/R Load Limits	Priority - Safety
• Replace Cooling Tower	Priority - Non-Safety
• Material Transfer Dumbwaiter -- Ground Floor to Subbasement Levels	Priority - Non-Safety
• Structure - - Upgrade ceiling for new sub-basement storage vaults (Rooms 1101 & 1208)	Material Relocation
• Fire Suppression - - Install 60K Gallon Seismic Water Tank	Safety Margin
• Program - - Upgrade Emergency Plan and Emergency Operating Procedures	Safety Margin
• Fire Suppression - - Install seismically qualified plenum deluge system recharge piping	Safety Margin
• Control - - Install two remote control stations for primary fans and standby generators	Safety Margin
• Fire Suppression - - Install seismically qualified dry standpipes	Safety Margin
• Power - - Install 300 kW standby electric generation for primary HVAC fans	Safety Margin
• HVAC 1 & 2 - - Install standby supply air fans to cool ground floor vaults	Material Relocation
• Structure - - Install security cages on roof doors	Security
• Structure - - Reconfigure sub-basement SNM storage vaults; include localized security upgrades	Material Relocation
• Security - - Reduce Perimeter Intrusion Detection and Alarm System to Building 371 only	Security
• Structure - - Convert Rooms 3559 and 3561 to SNM storage vaults	Material Relocation
• Structure - - Upgrade Room 3606 Roof	Security

Appendix A. Plutonium Metal and Oxide Consolidation and Stabilization Timeline



Appendix B Recommendation 94-3 Phase II Schedule

(Dates Are Calendar Years)

	Activity Description
Near Term Consolidation In Building 371	
3-1a	Repair Col. Line T Const. Joint & Bypass
3-1b	Complete Fire Hazard Analysis
3-2	Construction of Priority Safety Upgrades
3-3	Building 371 Basis for Interim Operation
Further Upgrades ID'd In AB Development	
3-4	Issue Schedule for Further Upgrades
3-5a	Complete Upgrades to Increase Safety Margin
3-5b	Complete Upgrades to Permit Oxide Relocation
3-5c	Complete Safeguards and Security Upgrades
3-6	Reassess Need for Other Upgrades
Integrated Pu Management	
4-1	Evaluate and Select Alternatives
4-2	Incorporate Residue Alts. into Site Programs
4-3	Establish Safe Interim Storage of SNM
Interim Storage Mission	
5-1	Complete NEPA Evaluation of Interim Storage
5-2a	Provide ISV Design Documents
5-2b	Provide Title I and II Dwgs. and Specs.