The Secretary of Energy
Washington, DC 20585

June 30, 1995

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 Department's Implementation Plan for Recommendation 94-3, Rocky Flats Seismic and Systems Safety. The enclosed plan utilizes the approach identified in a letter to you dated April 12, 1995, from the Assistant Secretary for Environmental Management. This approach was developed in close coordination with your staff. At the completion of the planned review of seismic safety and storage options, we will inform you of the decision regarding interim storage of the plutonium at Rocky Flats.

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

Sincerely,

Hazel R. O'Leary

Enclosure

IMPLEMENTATION PLAN (PHASE 1)

FOR

DEFENSE NUCLEAR FACILITIES SAFETY BOARD
RECOMMENDATION 94-3

EVALUATION OF SUITABILITY OF ROCKY FLATS
BUILDING 371 FOR INTERIM STORAGE
OF SPECIAL NUCLEAR MATERIAL

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EXECUTIVE SUMMARY

The Defense Nuclear Facilities Safety Board (Board) issued Recommendation 94-3 on September 26, 1994. The Department of Energy (Department) accepted the Board's Recommendation on November 18, 1994, and hereby submits its Implementation Plan (IP).

The Department will employ a two phase approach to resolve all the issues listed in Recommendation 94-3. This IP represents the first phase. In this phase, all aspects of Recommendation 94-3 will be considered, though not all will be resolved. The purpose is to efficiently reach conclusions which will not be invalidated by the subsequent work.

The objective of this plan is to determine whether the structure, systems and components (SSCs) for the proposed mission of Building 371 have sufficient (seismic) capability to justify going forward with more detailed evaluation, and to ensure that any upgrades required are commensurate with the hazard posed by the facility's mission.

In Phase I the Department is committed to providing the necessary resources and funding to evaluate the suitability of Building 371 for housing the Rocky Flats Environmental Technology Site's (Site) inventory of Special Nuclear Material (SNM) for an interim (15+ years) storage and management mission. Concurrently, alternative solutions for interim storage will be studied such that, by the end of this first phase, the Department will have sufficient basis for a technical decision regarding the best option for interim storage.

Phase I relies on the knowledge of expert structural and SSC assessment teams to evaluate the adequacy of Building 371 to support the proposed mission while identifying vulnerabilities and uncertainties. At the end of Phase I, the Department will make its decision relative to interim storage and will identify what resources are needed to execute that decision. Concurrently, an Integrated Program Plan (IPP), will be prepared which will be implemented in Phase II to fully resolve the issues listed in Board Recommendation 94-3.

Summary Of Commitments

There are two external commitments listed in this Implementation Plan:

10-1 The Department's decision relative to the interim storage mission will be formally transmitted to the Board by October 24, 1995. (Task 10)

11-2 An Integrated Program Plan (IPP) implementing the Department's decision will be formally transmitted to the Board for review by October 24, 1995. (Task 11)

Evaluation Of Project Cost And Schedule

There are two uncertainties that may affect completion of the IP activities by October 24, 1995. Specifically, the level of effort required to complete the structural push-over analysis in Task 6, and the scope of the systems to be walked down and evaluated in Tasks 7 and 8. A project status review will be completed by July 26, 1995, to determine any impact of these uncertainties on the October 24 planned completion date. Plan revisions, if necessary, will be developed in accordance with the Change Control process detailed later in this IP.

INTRODUCTION/STRATEGY

The Department proposed in the summer of 1993 to move the major part of the Site's inventory of plutonium and enriched uranium into Building 371 for interim storage until final disposition. This building was selected because it is the newest of the plutonium buildings and is considered the most structurally capable building at the Site. As a result, Building 371 would assume a new role as the storehouse that contains the single largest accumulation of plutonium in the weapons complex. In preparing for this unique role, the Department recognizes that studies currently underway are not logically structured, not sufficiently encompassing, and not well integrated into other activities supporting the mission of Building 371. An integrated systems approach is needed to evaluate Building 371's capability to protect the workers, the general public and the environment from the hazard posed by the proposed future mission of the facility.

The systems engineering process provides a disciplined approach for the evaluation of the Department's alternatives to safely store SNM at the Site until final disposition. The formal process requires the Department to test and validate its proposed alternatives. The capability of Building 371 to resist seismic loads will establish the first validation point in the analysis of the system. This may lead to the realization that an alternative solution, such as a new facility, more robust packaging, or a less dispersible material form, provides a more appropriate interim storage solution than Building 371 alone.

During preparation of the IP for Recommendation 94-3, internal and external reviewers began to question the value of expending significant amounts of time and money on detailed seismic ground motion studies and building structural analysis before understanding the gross response of the building to reasonable inputs. Clearly, if major structural damage occurs at reasonable inputs, then the proposed alternative to use Building 371 for the interim storage mission may be inappropriate. Similarly, a major flaw identified in a safety system might also cause the Department to reconsider storing all material in Building 371. Therefore, a simpler, more cost effective approach was needed which would allow the Department to make a timely, informed decision concerning the suitability of Building 371 for interim storage of SNM. This change in

philosophy prompted the Department to favor a two phase approach for implementing the Board's Recommendation.

Phase I relies on the knowledge of expert structural and SSC assessment teams to evaluate the adequacy of Building 371 to support the proposed mission while identifying vulnerabilities and uncertainties. In parallel, an effort to review potential alternative solutions will be undertaken. At the end of Phase I, the Department will make its decision relative to interim storage and commit the necessary funding and resources to execute that decision. Phase II, represented by an Integrated Program Plan (IPP), will be used to manage the implementation of the decision and to fully resolve the issues listed in Board Recommendation 94-3.

Meanwhile, the Department has proposed the consolidation of SNM in Building 371 as the best near-term means to reduce Site risk and operating costs. An analysis of this proposal is contained in the SNM Storage Environmental Assessment (Ref. 1). A decision whether to proceed with consolidation will occur only after completion of the Department's review of the proposal under the National Environmental Policy Act.

Background

Special Nuclear Material (SNM) has been stored for several years in various plutonium buildings at the Site. The Department is proposing a new mission for Building 371 to serve as the central repository for all Category I and II SNM. Under this proposal, Building 371 would serve in this capacity until the Department can develop and fully implement a long-term storage strategy. Initially, residues and wastes would also be stored in the building until such time that they can be removed. The building would contain requisite processes to support SNM management and storage.

There are several considerations which have formed the basis for proposing Building 371 as the best candidate for this consolidation and interim storage mission. These same considerations support the Department's desire to continue with consolidation efforts in Building 371 as an immediate risk reduction and cost savings measure.

- Building 371 is the most structurally capable facility at the Site. It is the newest plutonium processing building and was designed and constructed to higher standards than other plutonium processing buildings.

- Risk to the public from Rocky Flats is dominated by earthquake accident scenarios. Consolidation of SNM into Building 371, the most structurally sound building on Site, is estimated to reduce overall accident risk to the public by 80% (Ref. 2).

- Consolidation of SNM into one location will simplify emergency response for the postulated accident scenarios or other common mode failure events.

- Consolidation of the SNM into one building will simplify safeguards and security requirements and improve security for the material at risk.

- Consolidation of the SNM will result in hard dollar savings that can be redirected to other Site activities.

- Consolidation will reduce the risk associated with support functions such as the movement and transfer of SNM between Site facilities.

- Consolidation into Building 371 will reduce risks identified in the Plutonium Vulnerability Assessment Report (Ref. 3).

In terms of the immediate Site mission, the SNM consolidation into Building 371 represents a positive step to reduce the overall Site risk for the reasons stated above. However, for interim (15+ years) storage considerations, it must be demonstrated that Building 371 and the required safety related SSCs are adequate, commensurate with the hazard of the facility, to protect the public and workers from the consequences of Natural Phenomena Hazard (NPH) events and a range of other postulated accident scenarios.

The Department's planning for implementation of Recommendation 94-1 has proposed limited use of Building 371 for solid residue processing. Process concept and design are not sufficiently mature to include in Phase 1. Because the building was designed for plutonium recovery operations, we do not expect the candidate processes and locations to require additional building level support systems, add significant concentrated loads, or significantly increase the source terms from accidents considered in Phase 1. Provision will be made in the IPP for addressing safety implications of any solid residue processing to be conducted in Building 371.

Task Logic

This plan involves 11 Tasks whose objective is to determine whether the structure, systems and components of Building 371 have sufficient capability to justify going forward with more detailed evaluation, and to ensure that any required upgrades are commensurate with the hazard posed by the facility's mission. Figure 1 is a summary flow diagram detailing the relationship of Tasks to the plan objective.

Plan execution will lead to one of three possible decisions:

1. Building 371 is suitable (as is) for the interim storage mission.
   or

2. Building 371 would be suitable for the interim storage mission following completion of specified upgrades to structures, systems and components or in combination with implementation of other, more cost effective alternatives, or

3 Building 371 is not viable for the interim storage mission and, hence, other alternatives should be developed.

The NPH event considered most significant to the structural adequacy of Building 371 is a seismic occurrence. It is the intent of this IP to reach an early decision on the suitability of the building for the proposed interim storage mission in order to direct funds to the most cost effective alternative. To support an early decision, the structural evaluation will be divided into two stages as outlined in Task 6.

Stage 1 of Task 6 will evaluate the overall structural capability in terms of seismic capacity. The input for this evaluation will be a ground motion level and spectral shape provided by Task 4. The capacity will be evaluated in terms of the existing building configuration supplemented by the structural design bases and construction records reviewed during Task 5. If necessary, cost effective modifications which would increase the structural capacity will be proposed for later evaluation. If the results of Stage 1 are that the structure, even with modifications, is not viable (i.e., the cost of modifications exceeds the cost of alternatives) to justify proceeding with detailed structural and SSC evaluations, the structural evaluation effort will stop. The interim storage mission would then best be served by concentrating on developing alternatives to the use of Building 371 alone. Formal NEPA action to review alternatives would be initiated as appropriate.

If the proposed use of Building 371 is viable, Stage 2 of the structural evaluation will continue with a more detailed evaluation of the structure and seismic verification of SSCs. Stage 2 will also include an estimate of the capability of the building and SSCs under greater seismic demands. The results of Stage 2 structural and SSC evaluation (Tasks 6 & 7), together with the SSC configuration and performance assessment (Task 8) and alternative study (Task 3), will be used to perform a cost evaluation of proposed upgrades and alternatives and to make recommendations to the Department (Task 9) to facilitate a decision regarding interim SNM management (Task 10). Acceptance criteria for evaluation of upgrades and alternatives (Task 10) will be provided in Task 9.

Phase I of the IP for Recommendation 94-3 will rely on the technical knowledge and experience of professionals in the field of structural and equipment assessments to supplement the detailed analyses. Execution of this IP will provide a fundamental understanding of the structural behavior, capability, and failure modes of Building 371, as well as the capability of safety related SSCs. Further analysis of the building, if needed, would be undertaken in Phase II. These additional analyses would provide quantitative evaluations for the instances where assumptions were used. For example, soil structure interaction analyses that account quantitatively for caissons and site topography may be necessary to fully resolve the issues listed in the Board's recommendation.

IMPLEMENTATION PLAN LOGIC

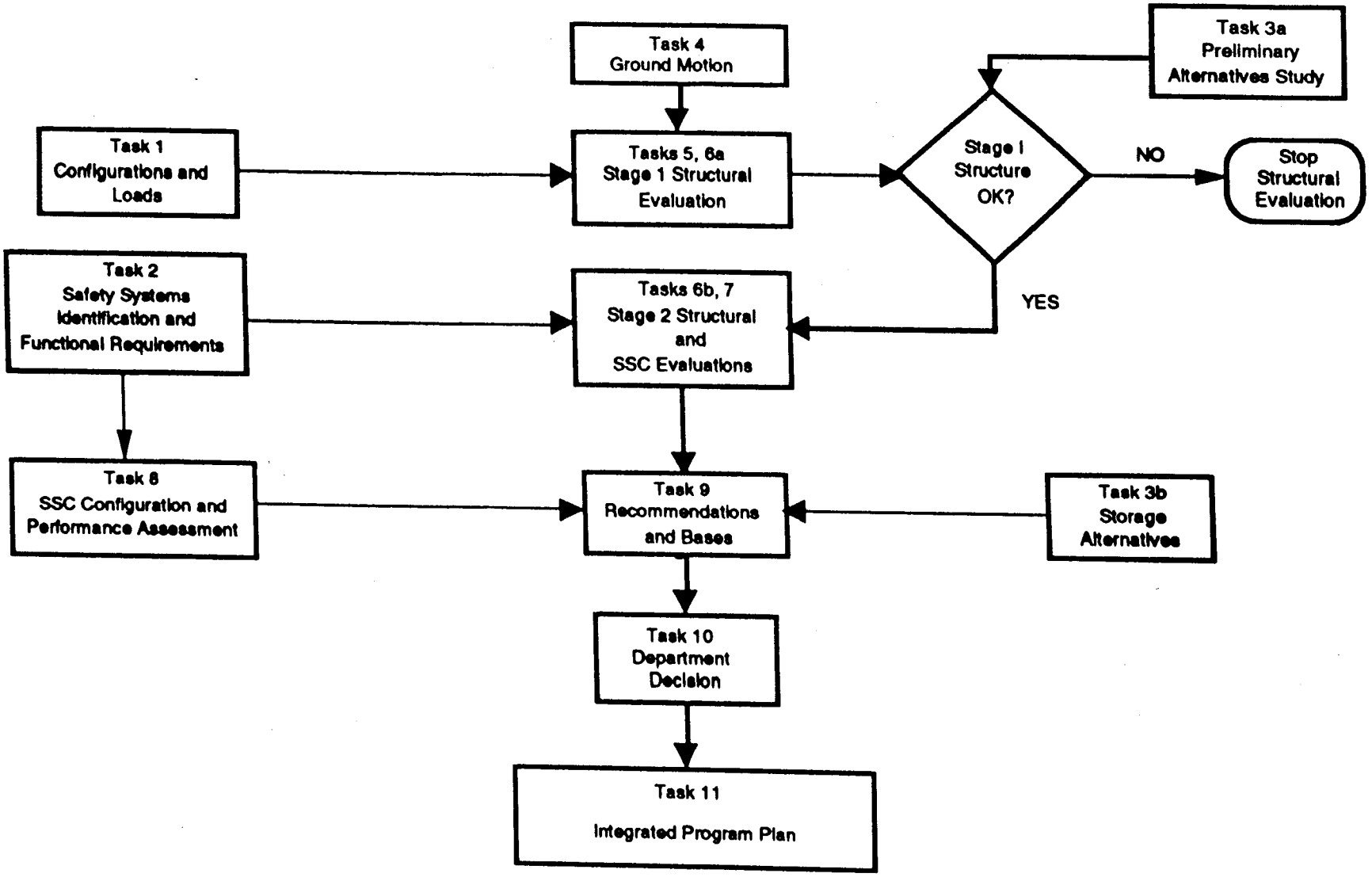


Figure 1

Project Organization

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

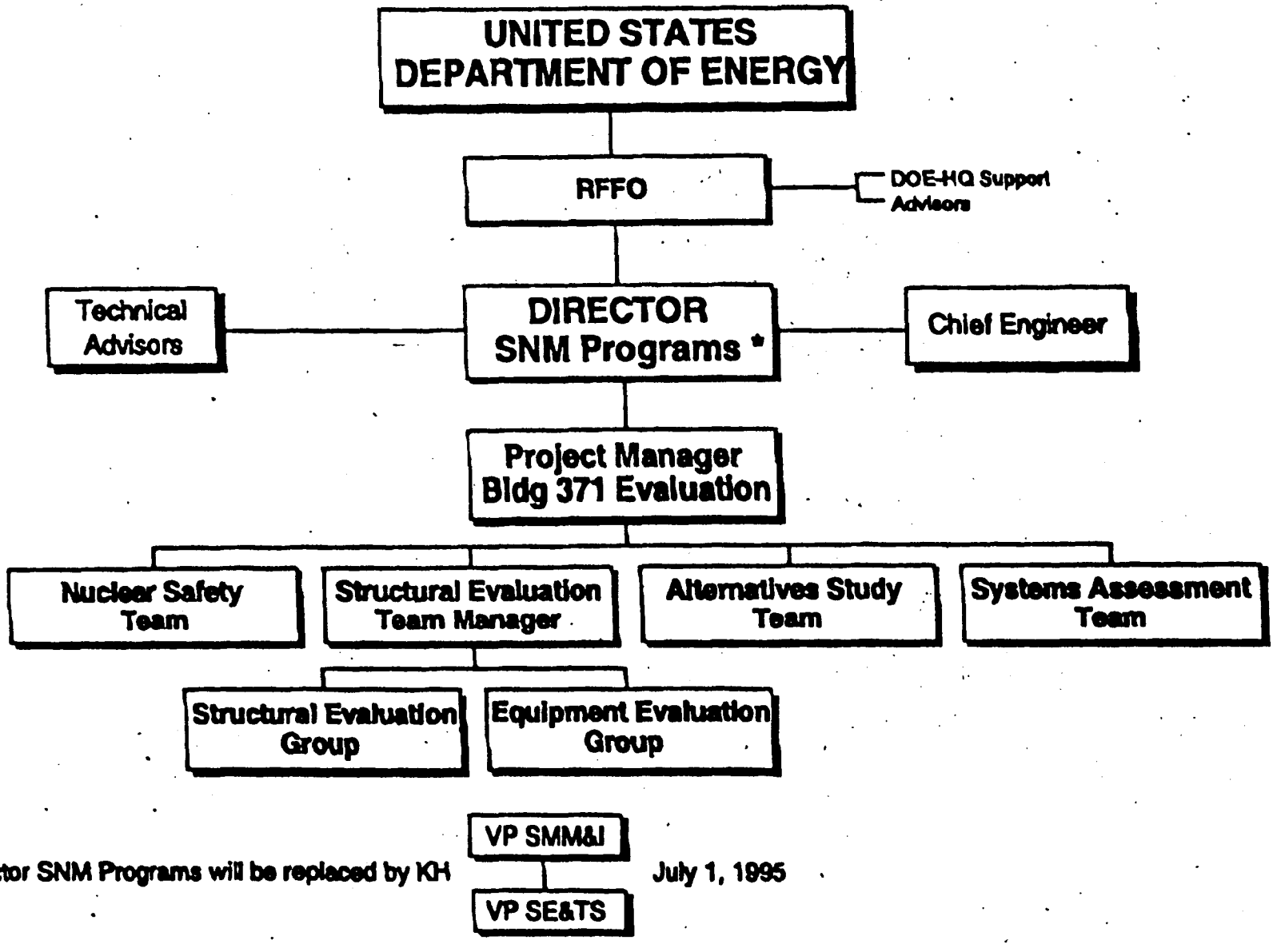
The Department commitment to the 94-3 IP will be coordinated through the Office of the Principal Deputy Assistant Secretary for Environmental Management. The Rocky Flats Field Office (RFFO) will direct the Phase I study and develop local policy. RFFO will provide overall technical direction of the contractor and external assistance in execution of the project. Technical assistance and direction of individual task efforts will be provided by Defense Programs technical support, DP-31. The EG&G Director of SNM Programs currently serves as the primary contact with RFFO on development and implementation of the recommendation at RFETS.

The Project Manager will report to the Director, SNM Programs for cost, schedule and budget, and will provide technical direction for the implementation of recommendation 94-3. The Project Manager will integrate the efforts of the assigned teams. He will receive matrix support from the EG&G Chief Engineer. The Manager, Structural Evaluation Team, is responsible for assembling and directing the requisite subcontracted structural and equipment assessment teams. He will be assisted as necessary by matrixed engineers. The Alternatives Study team will be assembled and chartered by the Director, SNM Programs. Nuclear Safety support will be provided by matrixed engineers. The Systems Assessment team will be staffed by matrixed engineers. Technical advisors from the existing Building 371 Structural Assessment Peer Review Panel will be retained in an advisory capacity to the Project Manager and Structural Evaluation Team Manager.

Transition and turnover to the new Integrating Management Contractor (IMC) on July 1, 1995, will be seamless. Kaiser-Hill (K-H) Vice President (VP) for Safety Engineering and Technical Services will be technically responsible for the IP, and for the cost, schedule and technical performance of the team. The K-H VP for Special Materials Management and Integration will be the funding authority.

Appendix I is a summary schedule of IP deliverables. Copies of deliverables of each task will be provided informally to the DNFSB staff as soon as they are available.

Project Organization



* Director SNM Programs will be replaced by KH July 1, 1995

Figure 2

TASK 1 - DEFINE BUILDING LAYOUT AND STRUCTURAL LOADING

The purpose of Task 1 is to provide the Structural Evaluation Team with a report documenting the intended location and weights of equipment and commodities for the proposed mission of Building 371.

The report will provide locations and weights of equipment and commodities including SNM and drum storage. Descriptions and drawings showing the equipment and their approximate centers of mass will be provided. The floor live loads, both as design load and concurrent with earthquake loading, will be specified. Equipment having a weight greater than 1000 lbs. will be specified. Loads from piping 6 inches and greater, cable trays 24 inch and greater stacked three or more levels, and HVAC duct with a perimeter 72 inches and greater will be specified as point, line or uniform loads. Drums in their storage locations will be treated as dead loads. For equipment and commodities not specified, a 20 psf dead load will be assumed.

The report will also include information on the groundwater conditions beneath Building 371. Specifically, the report will either address the drainage system and its current functional capability or will give a conservative range of lateral soil pressures and buoyancy effects to be considered in the structural evaluation.

This information, combined with structural and SSC walkdowns, will be used by the team to determine the location of mass contributions for the dynamic structural response and the interaction of the storage configuration with safety systems.

Work during the equipment evaluation in Task 7 and the SSC performance assessment in Task 8 could result in recommendations to change the storage configuration or process layouts in order to improve the seismic safety margin. Any identified changes will be provided to the Structural Evaluation Team Manager for consideration of the potential effects on the Task 6 structural evaluation.

Control of future changes to the building layout which could impact the structural loading will be addressed in the IPP.

Assumptions:

1. The proposed configuration of the building is representative of the ultimate storage and processing layout.

Summary of Deliverables and Responsibilities:

1-1 Engineering will submit a report to the Structural Evaluation Team which provides the intended location and weights of equipment and commodities including SNM and drum storage for the proposed mission of Building 371. Any changes to the configuration or loading discovered during the evaluation period will be communicated to the Structural Evaluation Team. The report will include other details as described above.

TASK 2 - IDENTIFY SAFETY SYSTEMS AND FUNCTIONAL REQUIREMENTS

The purpose of Task 2 is to identify a subset of safety-related SSCs in Building 371 that, because of their high cost, could significantly affect the decision of whether Building 371 is suitable for the interim storage mission.

DNFSB Recommendation 94-3, sub-recommendations 5 and 6 address development of Hazard Classification and the classification of safety systems. This Task will not disposition the classification issue. Rather the Preliminary Hazard Assessment (PHA) will identify all safety-related SSCs for the proposed mission, regardless of category. From this a subset list will be developed based on those that are high cost if fixes would be required. Therefore, sub-recommendations 5 and 6 are discussed in Task 11.

The PHA of the proposed Building 371 mission is currently underway. The PHA will identify all facility hazards which have the potential for radioactive or toxic releases, potential accident initiators and potential accident scenarios involving these hazards. The PHA will also identify those structures and systems that are qualitatively shown to prevent or mitigate potential accidents. The Nuclear Safety team will issue a list of all Building 371 safety structures and systems (regardless of category) and the functional requirements for those structures and systems based on the results of the PHA. The System Assessment team will identify the components of those structures and systems needed to achieve the defined functional requirements. The components will be developed from existing drawings and specifications, comparisons to the Building 371 Controlled Documents List, reports from the Systematic Evaluation Program, walkdowns, and experience. An experienced team from Nuclear Safety, Engineering, the Structural Evaluation Team, Operations and Cost Estimating will review the SSCs to identify any SSC whose repair, modification or replacement could involve significant cost. These high-cost SSCs will be evaluated in Task 7 to determine their ability to survive NPH events and in Task 8 to determine their ability to meet functional requirements in preventing or mitigating potential accidents.

Assumptions:

1. The proposed mission for Building 371 listed in the Introduction to this Implementation Plan will not change significantly.

Summary of Deliverables and Responsibilities:

2-1 An experienced-based team from Nuclear Safety, Engineering, the Structural Evaluation Team, Operations and Cost Estimating will issue a list of Building 371 high-cost, safety-related SSCs and their functional requirements for evaluation in Task 7 and 8

TASK 3 - STUDY SITE STORAGE ALTERNATIVES

The primary purpose of Task 3 is to study alternatives to the use of Building 371 for the proposed storage mission in the event the building is deemed to be structurally inadequate for this purpose. This task will also evaluate the use of one or more alternatives in conjunction with a Building 371 storage mission

The alternatives study will consist of two stages to support and coincide with the two stages in the Task 6 structural evaluation. The first stage will be a preliminary investigation of alternatives, including cost estimates, to support the Stage 1 structural evaluation in Task 6. Viability of the use of Building 371 for the storage mission will be determined by comparison of the cost of modifications to the cost of the alternatives. Since major structural modifications are extremely costly, a comparison with alternatives at this stage will provide a good indication whether further structural evaluation is justified. The second stage of this Task will be to continue the alternatives study and to more thoroughly evaluate feasibility and costs. The results of this second stage will provide input for developing recommendations in Task 9. If the results of the Task 6, Stage 1 structural evaluation are that the use of Building 371 is not viable, additional resources will be concentrated in the alternatives study so that a decision on the best course of action for the Site can be reached expeditiously.

Minimizing material at risk and controlling the release of plutonium in a respirable form is the objective of the alternatives study. Several alternatives provide mechanisms that potentially reduce the material available for release or provide an enhanced confinement barrier. The consolidation objective must also be considered in evaluating options since the size and shape of containers can significantly impact the ultimate storage configuration. Hence, all planning for consolidation activities should be done with end results in mind. Other environmental effects such as worker risk, air and water emissions, waste generation and disturbance of land must be considered with respect to options.

Alternatives to be studied are briefly discussed below:

1. Construction of a new storage facility. A cost benefit analysis will be completed to determine the feasibility of designing and constructing a new, interim SNM storage facility at RFETS. The evaluation of this alternative will include a review of current and planned storage facilities in the DOE complex.

2. New Container Development. A variety of more robust storage containers will be studied. Container design could have a significant impact on proposed storage configurations in Building 371; therefore, a cost benefit analysis involving the various designs will be conducted.

3. Material Form. The benefits of processing plutonium oxide to a less dispersible form will be investigated. Selection of this option would require modification to product packaging lines installed to support Board Recommendation 94-1 (Improved Schedule for Remediation in the DOE Complex).

Additional approaches may be considered during the evaluation process and if considered would be included in the report for preparation of the Task 9 recommendations. For example: the Oak Ridge concrete hive concept; change of material distribution within the facility; and redistribution of commodity load within the facility. Task 9 recommendations will evaluate the use of alternatives in conjunction with the use of Building 371 if Building 371 is determined not viable, or if a significant safety benefit can be achieved.

Assumptions:

1. Offsite shipment of SNM is not considered a viable alternative for this study. However, the Department is considering the ultimate disposition of SNM as part of the ongoing Programmatic Environmental Impact Statement which may decide that offsite storage is the best option.

Summary of Deliverables and Responsibilities:

3-1 The Alternatives Study team will prepare a preliminary report of alternatives, including cost estimates, for use by the Structural Evaluation Team during the Task 6, Stage 1 structural evaluation.

3-2 The Alternatives Study team will prepare a final report listing the alternatives, the pros and cons of each, the estimated costs, and a recommended course of action. The report will be submitted to the Project Manager for use in preparation of the Task 9 recommendations.

TASK 4 - DEFINE SEISMIC GROUND MOTION

Task 4 contains two objectives. The first is to specify the spectral shape and ground motion level to be used in the Task 6 and Task 7 structural evaluation of Building 371. The second objective is to develop an Evaluation Basis Earthquake (EBE) and its associated ground motion. This work to develop the EBE will be concurrent with the Phase I structural evaluation.

Establish the Analysis Earthquake:

The analysis earthquake will provide a reasonable challenge to structural capability for the evaluation of load paths and failure limits and will facilitate scaling of results up or down.

The free field response spectra shape was developed using the Site Seismic Hazard Study (Ref. 4) 2000 year recurrence rock outcrop motion. Rock is generally defined to be 100 feet below grade at Rocky Flats. The spectral shape was generated at the free field by using SHAKE and convolving upward through three soil column models: lower bound, best estimate, and upper bound. Two independent time history records were used for the generation of the free field response spectra. The free field response spectra were enveloped and broadened. The spectra were further broadened to account for potential topographic effects. The structural evaluation will use this spectral shape for the structural analysis scaled to a 0.25g PGA free field analysis earthquake. Both horizontal and vertical free field spectra were generated for the building evaluation. The Analysis Earthquake spectra are shown in Appendix 2.

The ground motion level and spectral shape used in the Phase 1 evaluation will be provided to and concurred in by the Structural Evaluation Team during the initiation of the evaluation process.

Establish the Evaluation Basis Earthquake (EBE):

During the Phase 1 evaluation period, resolution of outstanding ground motion issues will be undertaken and the findings from Site ground motion studies will be consolidated and reconciled. The studies to be consolidated and reconciled include:

1. Seismic Hazard Study by Risk Engineering
2. Geotechnical Investigation of Inferred Faulting by Geomatrix
3. Correction to Seismic Hazard Study by Pacific Engineering
4. Deterministic Ground Motion Assessment by Geomatrix

Deterministic estimates of vibratory ground motion developed following the procedures of 10 CFR Part 100, Appendix A, will be compared and reconciled with the results of the probabilistic Site Seismic Hazard Study.

Actions are also underway to address the generic issues related t assessment of seismic ground motion. The methodology for the appr considered will be factored into resolution of the ground motion i for Building 371.

It is expected that significant differences will exist between probabilistically and deterministically generated ground motions, particularly when close-in faults or seismogenic regions are known generate characteristic earthquakes. These differences will be explained, since both the deterministic and probabalistic ground m stem from the same basic site geology and seismology. Having expl and reconciled the different results, the EBE will be specified ba the specific geologic and geotechnical facts.

The findings for the site will be consolidated into a report which provide an EBE. The ground motion will be specified at a rock outc datum point. Rock is generally at a depth of 100 ft at Rocky Flats

After the establishment of the EBE, ground motion at the free field be generated for the appropriate range of soil column properties. response effects including topography, caissons and local soil amplification will be quantified by the Structural Evaluation Team. adjusted EBE will be compared and reconciled with the Analysis Eart at the completion of the Phase 1 structural evaluation effort.

Assumptions:

1. None

Summary of Deliverables and Responsibilities:

4-1 The analysis earthquake ground motion level and spectral shape be provided to and concurred by the Structural Evaluation Team start of the structural evaluation.

4-2 A report consolidating and reconciling the Site ground motion st will be prepared by the Systematic Evaluation Program supplement qualified experts to address ground motion issues 1 through 4 at This report will recommend an EBE at a rock outcrop. Earthquake levels for various recurrence intervals will be provided and reconciled with deterministic estimates.

4-3 A report which will reconcile the ground motion generated from t EBE to the structural analysis ground motion input will be prepa by the Structural Evaluation Team.

TASK 5 - REVIEW EXISTING STRUCTURAL DOCUMENTATION

The purpose of Task 5 is to conduct a comprehensive structural design basis and construction record review of Building 371.

Design and construction documentation will be assembled by Systematic Evaluation Program personnel at the site and will be made available to the Structural Evaluation Team. The Structural Evaluation Team will review original design and construction records and include the results of the review in the Task 6 report. The review will encompass available records including, but not limited to, material strengths as tested; original design criteria; records of caisson construction, including any testing that may have been performed; records of building modifications; and other construction records such as inspection reports and nonconformance reports. Interviews with personnel involved in the original design and construction will be conducted in order to gain understanding of construction techniques and problems encountered. All references, including interviews, will be documented.

A thorough review of construction drawings, followed by structural walkdowns, will be performed by the structural evaluation group to identify major structural elements and the locations of major mass contributions. Departures from original design and major modifications will be identified. The walkdowns will assist in understanding load paths, validate the applicability of previous analyses and point out problems with the assumptions concerning the building load and stiffness configuration.

Assumptions:

1. None.

Summary of Deliverables and Responsibilities:

5-1 The Systematic Evaluation Program will provide existing structural documentation to the Structural Evaluation Team Manager.

5-2 The Structural Evaluation Team will review and document structural design and construction references, including interviews, in order to better understand load paths, previous analyses and assumptions regarding building load and stiffness configuration. The Structural Evaluation Team will use the results of this review in the Task 6 structural evaluation.

TASK 6 - EVALUATE STRUCTURAL CAPACITY

The purpose of Task 6 is to evaluate the Building 371 structure for seismic loading relative to the specified ground motion. The strategy inherent in this Task is to reach an early decision regarding the capability of the structure to accommodate the proposed mission. The execution of this Task is in two stages. Stage 1 will establish, as early as possible, the capability of the building considering both gross structural stability and maintenance of functional requirements.

A determination that the building is not structurally viable for the proposed storage mission (i.e., not cost effective) would halt the structural evaluation and redirect the effort to focus on the development of alternatives. The decision on viability at the completion of Stage 1 will be made by the Department and will be based on scaling the evaluation results to determine the performance of the building in terms of structural capacity and maintaining functional requirements. If it is decided that Building 371 is a viable alternative for SNM storage, then Stage 2 would be initiated. In Stage 2 the structural evaluation would continue and the evaluation of SSCs would be initiated. If, at any later point in these evaluations, there is indication that the mission is not viable, the evaluation will be suspended.

This Task will provide the level of performance of the existing structure for the specified seismic motion. Margins to failure limits will be determined that will provide indications of the failure modes and seismic capability of the structure. Failure modes are defined as failure of the facility to perform its confinement function, and are not necessarily, nor likely, to be a total structural collapse. If modifications are proposed to increase the structural confinement capability, then the resulting additional capacity will be quantified and costs of modifications will be estimated.

Stage 1 Activities (Task 6a):

6.1 Using the analysis ground motion, the Structural Evaluation Team will calculate the seismic demands to be resisted by the building structure. The methodology proposed for modeling the structure to calculate the seismic demands is as follows:

- Building 371 will be evaluated for seismic loads using a 3-dimensional linear elastic static finite element model. This approach is appropriate since the seismic free-field response spectra acceleration is maximum and constant (flat) between 4 and 10 Hz and the fundamental mode of the structure is in this range.

- The static model will be sufficiently detailed to include the primary and secondary shear walls, floor slabs and girders, columns and the supporting caissons.

- The static model will include the effects of wall and floor openings, expansion joints and reinforcing details that are judged to influence the structural response.

- The static model will be used to establish the lateral and vertical load paths of the structure.

- The static model will be used to determine the load distribution and the structural demands on the building elements.

- An equivalent static lateral load, with a base shear equal to V=AW will be used, where A is the peak acceleration from the free field response spectra. The base shear will be distributed vertically over the height of the building using Uniform Building Code (UBC) equation 12-8. The loads will be applied statically to the analysis model using the following cases:

$$\underline{H}_1+0.4\underline{H}_2+0.4\underline{V}$$
$$0.4\underline{H}_1+\underline{H}_2+0.4V$$
$$0.4\underline{H}_1+0.4\underline{H}_2+\underline{V}$$

  In the above load cases the signs of the seismic load will be alternated to assure that the maximum combinations are achieved. Vertical loads will be based on the vertical spectra provided in Task 4. The seismic loads will be combined with dead load, live load and other concurrent loads in accordance with the load combinations specified in ACI-349. Soil pressure loading on the foundation walls will be considered. Saturated soil conditions will be assumed unless there is assurance that the foundation drainage system is operable at all times. The provisions in ASCE 4-86 will be followed to establish lateral earth pressures.

- The static model will include evaluation of load distribution for cracked and uncracked cases.

- The static model will be used to establish stiffness and structural mass distribution for a three dimensional dynamic stick model of the structure to be used for developing floor response spectra. The stick model will be used initially to develop the floor response spectra for the qualification of SSCs. Second, the stick model will be used in stage two to verify the UBC seismic forces to be applied to the 3-dimensional static model. Allowance for accidental torsion will be considered in the stick model, and the methodology and basis will be provided in the evaluation report.

6.2 Codes, standards, and criteria to be used:

- The building structural capacity of concrete will be based on ACI-349 with the following exceptions:

Minimum steel requirements for walls and slabs will be from ACI-318.

If splice lengths of reinforcing steel do not meet the criteria of ACI-318, then they will be determined using a procedure based on the research by Orangun, Jirsa and Breen, published in the ACI Journal in 1977. This procedure has been used for the requalification of the K-reactor building at the Savannah River Site.

- The capacity of structural steel will be in accordance with AISI-AISC N690.

- The structural criteria for both storage and confinement will be per ACI-349 and the exceptions as specified above. This is appropriate since ACI-359 is primarily for design of pressure retaining structures and requires reinforcing patterns for that purpose which were not designed into Building 371. Breach of confinement (leak area) will be postulated when a concrete structural element that provides a confinement barrier exceeds code acceptance criteria after applying ductility factors from DOE Standard 1020 when calculating the demand to capacity ratio of the element. Breach of confinement may also occur when there is a partial collapse of a portion of the building structure. The criteria established are to demonstrate the capability of the building structure to maintain a confinement function.

- When the commodity mass exceeds 5% of the supporting mass, coupling will be accounted for by following rules in ASCE 4-86 . This procedure is only applicable to the dynamic model that will be used for floor response spectra.

6.3 The Structural Evaluation Team will assess the existing calculations and design data and provide additional calculations that are needed to correct and amend previous analyses. The Team will evaluate the structural capacity and functional capacity of Building 371. The basis for this evaluation will be:

a. the original design data and calculations;
b. subsequent calculations performed by others involving studies of structural capability;
c. structural walkdowns;
d. preliminary calculations performed by the Systematic Evaluation Program; and
e. calculations performed by the Structural Evaluation Team as required to correct and amend previous analyses.

6.4 The Team will compare the structural capacity and functional limits to the seismic load combination demands.

6.5 The Team will provide the location of the breach of confinement areas to the Nuclear Safety team.

6.6 The Team will issue its conclusions on the capability of Building 371 to perform its mission. If code acceptance limits are exceeded, structural remediation solutions or justification for acceptance beyond the code criteria limits will be prepared. If the structure is considered capable, then Stage 2 of this Task and Task 7 will commence. Preliminary recommendations for modifications to the structure will be proposed for comparison to the cost estimates of alternatives in Task 3a.

Stage 2 Activities (Task 6b):

6.7 The static model will be used as a starting point in Task 6b to evaluate the effects of an earthquake greater than the analysis earthquake by applying a push-over approach. Site response effects will be incorporated including topography and caissons and local soil amplification.

6.8 The Structural Evaluation Team will initiate additional structural analysis or refinements to the structural analyses to assure the results from Stage 1 are acceptable.

6.9 Based on the Team's understanding of the structural capability of Building 371, the Team will consider other NPH effects provided those NPH loads are judged to impose damage that would violate the confinement capability of the building. These will include other NPH loads (wind and tornado). Loads due to man-made or other hazards will not be included in this report, but will be included in the follow-on IPP. Specific vulnerabilities to these extreme events will be identified. The wind/tornado hazard to the Site is currently being re-evaluated and that work will be used for this evaluation.

6.10 The Team will provide floor response spectra for the evaluation of safety related SSCs.

6.11 After the capacity evaluation, the Team will recommend modifications/upgrades that will provide additional structural resistance to prevent local or gross structural failure or functional failure of the building. The approximate cost and increased structural capability will be identified for each upgrade. This effort will consist of performing walkdowns for feasibility, calculations as required, and approximate cost estimates.

6.12 An estimate will be made of the capability of the building to withstand an earthquake greater than the analysis earthquake. This estimate will be based on extrapolating the capacity to demand ratios calculated for the present structure in Task 6.4 and for the modified structure in Task 6.11. The same criteria used in those Tasks will form the acceptance basis for the extrapolated (greater than analysis earthquake) seismic level.

6.13 The torsional effects from topographical variations will not be available for the IP Phase I evaluations. However, parametric evaluations will be made that include the effects of torsional input. These studies will be based on varying the offset of the ground motion from the center of rigidity of the base of the building structure up to 5% of the building width. The loads induced from the torsional input will be compared with other seismic loads to evaluate the significance of this potential phenomenon. This comparison will be used to determine the importance of including topographical studies for torsional loading in the follow-on IPP.

Assumptions:

1. The use of simplifying assumptions is anticipated for this Task. These may include:

   a. Use of static models to establish load paths, weak links, and structural properties for dynamic models.

   b. Use of simplified dynamic models.

   c. Use of foundation impedances.

Summary of Deliverables and Responsibilities:

6-1 The Systematic Evaluation Program will provide the updated wind and tornado hazard study to the Structural Evaluation Team.

6-2 A report will be prepared by the Structural Evaluation Team that summarizes the conclusion of the Stage 1 effort. Specifically, capability of the existing structure to resist gross structural failure for specified ground motions will be provided. The documented structural design and construction references and reviews conducted during Task 5 will be used to support the conclusions in this report. If modifications can be shown to be cost effective when compared to the estimate for alternatives developed In Task 3a, then they will be described in the report. The report will be submitted to the Project Manager.

6-3 If the results of Stage 1 justify proceeding, a report will be prepared by the Structural Evaluation Team at the conclusion of the Stage 2 effort. This report will list the criteria, including specification of the seismic motion, used to establish the structural demands and will specifically identify the use of engineering experience or engineering judgment in the determination of member capacities. The report will list the capacity to demand ratios for the structural elements. Structural elements that do not meet evaluation criteria will be highlighted and their significance to the capability of the building to maintain a safe storage configuration will be discussed. The report will include the response spectra to be used for the

qualification of safety class equipment. The point of onset of major structural damage to the facility will be identified, along with proposed upgrades/costs which increase structural capability. Appendices will discuss the qualification of the special features of Building 371 such as the attic floor support system, the vault walls, and the caisson foundation. The report will be provided to the Project Manager for use in compiling the Task 9 recommendations.

TASK 7 - EVALUATE STRUCTURES, SYSTEMS & COMPONENTS FOR NATURAL PHENOMENA HAZARDS

The purpose of Task 7 is to evaluate the structural and operational adequacy of high cost, safety-related systems and components for the effects of NPH.

After the initial evaluation of the building structural capacity and the generation of analysis floor response spectra (Task 6), the equipment evaluation group will evaluate high cost safety-related systems and components identified in Task 2.

The evaluation, using the analysis floor response spectra, will be performed in accordance with the Seismic Qualification Utilities Group (SQUG) Generic Implementation Procedure (GIP), by qualified Seismic Capability Engineers. The screening of safety-related piping systems will be in accordance with the Piping Screening Criteria developed for the Department Steering Group on NPH, including the results of peer review completed in September 1994.

In accordance with the GIP (Section 4.2 "Seismic Capacity compared to Seismic Demand"), if the free field spectra exceeds the GIP bounding spectrum, the alternatives of Table 4-1 of the GIP may be applied.

Resolution of outliers will be in accordance with the SQUG-GIP, and includes:

- detailed analysis,
- testing of similar equipment,
- application of ASME-QME (similarity rules),
- For the purpose of initial screening a search of the earthquake database may be used in accordance with the latest consensus available from the on-going special ASME-QME/IEEE-344 working group. The use of the database search will only be sanctioned for qualification purposes if the process is in accordance with a published working group standard or guidelines; however, if the standard is not published, appropriate independent peer review will be required.
- Recommendation for equipment upgrades or replacements for inclusion into Task 9.

The effects of other NPH events (wind and tornado) on systems and components will also be evaluated. This includes loss of essential services to Building 371.

Assumptions:

1. None

Summary of Deliverables and Responsibilities:

7-1 The Structural Evaluation Team will submit a report that assesses the capability of the high cost safety related SSCs subject to the postulated seismic and other NPH (wind and tornado) loads. Loads due to man-made or other external events will not be included in this report, but will be included in the IPP. The report will specify the criteria, including the target floor response spectra, used to establish the structural capacities. The report will list systems and equipment evaluated, walkdown results, comparison with screening and evaluation levels, and bases for judgments. Potential upgrades for outliers will be identified along with estimated cost and increase in capacity. The report will be submitted to the Project Manager for preparation of the Task 9 recommendations.

TASK 8 - ASSESS CONFIGURATION AND PERFORMANCE OF SSCs

The purpose of Task 8 is to evaluate safety-related SSC for the effects of vulnerabilities (i.e., inability to meet functional requirements or major known equipment availability problems) not related to NPH effects, not including station blackout or power distribution failures. High cost SSCs identified in Task 2 will be evaluated by the System Assessment team. The evaluation will include review of the PHA, existing drawings, FSAR, the Draft Programmatic Environmental Impact Statement (PEIS) (Refs. 5-8), previously completed Systematic Evaluation Program (SEP) reports (Refs. 9-19), the building maintenance history, Occurrence Reports for Building 371, non-conformance reports as well as interviews and extensive walkdowns.

A report will be prepared by the System Assessment team that assesses the capability of the safety related SSCs subject to the non-NPH vulnerabilities. The report will list systems and components evaluated and the bases for judgments made. The report will recommend cost effective upgrades such as material upgrades or programmatic improvements to eliminate or reduce the identified vulnerabilities. Potential impacts from recommended upgrades and/or improvements on either proposed storage configurations and/or future processing layouts will be identified.

Assumptions:

1. None

Summary of Deliverables and Responsibilities:

8-1 The System Assessment team will complete a report documenting SSC vulnerabilities including recommended material and/or programmatic upgrades and estimated costs. The report will be submitted to the Project Manager for preparation of the Task 9 recommendations.

TASK 9 - PROVIDE RECOMMENDATIONS AND BASES FOR INTERIM SNM MANAGEMENT

The purpose of Task 9 is to assemble and evaluate the results of previous tasks in order to develop recommendations relative to the interim SNM storage mission. The intent is to recommend a course of action that ensures protection commensurate with the known hazards posed by the mission.

Tasks 6, 7 and 8 developed baseline information regarding the structural capacity of Building 371 and the ability of SSCs to withstand NPH and to perform their intended function during accident conditions.

Potential upgrades to Building 371 and various other alternatives to the use of Building 371 for the proposed storage mission, will be identified in Task 3 and 6. The Nuclear Safety team will evaluate each upgrade and alternative, both individually and in combination with other upgrades and alternatives. The costs and schedule for alternatives and upgrades will be provided on a dollar and duration basis. Benefits will be provided in terms of relative risk reductions and dollars as appropriate.

The Project Manager will compile the information and evaluate proposed upgrades, alternatives and combinations against a number of criteria to be developed by the Department by September 1995. Acceptance criteria which considers such issues as defense in depth, graded approach and regulatory acceptance will be developed for use in the cost benefit analysis. Cost benefit evaluation criteria will be formalized and will include such elements as estimated risk reduction, costs, schedule, difficulty of implementation, potential public acceptance, etc. Cost benefit analysis will be included as deemed appropriate. Criteria will be provided to the Board staff during the development process. The Project Manager will issue a comprehensive report, including results of all evaluations, and recommend a course of action. This report will clearly document the strengths and weaknesses of the existing Building 371 and the costs and safety improvements associated with each upgrade and alternative considered. The report will also identify any further evaluations needed to support the implementation of alternative actions. Any needed follow on evaluations will be incorporated into the IPP. The report will provide data and analysis to support an informed decision by the Department as described in Task 10.

Assumptions:

1. None

Summary of Deliverables and Responsibilities:

9-1 The Nuclear Safety team will provide a report to the Project Manager to document the evaluation of the Building 371 baseline condition and the risk reduction associated with individual and combinations of proposed upgrades and alternatives.

9-2 The Department will develop criteria to evaluate proposed upgrades and alternatives. The criteria will include elements as described

above. The criteria will be provided to the Project Manager for use in compiling a recommended course of action.

9-3 The Project Manager will compile the relevant information from each task and will evaluate the combinations of proposed upgrades and alternatives using criteria described above. The Project Manager will develop a comprehensive report which recommends a course of action. The report will be submitted to the Department.

TASK 10 - DETERMINE COURSE OF ACTION FOR INTERIM SNM MANAGEMENT

The purpose of Task 10 is to select the best interim storage alternative.

The Assistant Secretary for Environmental Management will consider the information and options provided and will decide upon a path forward for interim storage of SNM already at Rocky Flats. Consideration will be given to interim storage and other possible uses of Building 371 in evaluating options. The decision will be made formally and communicated to the Board. The necessary funding and resources to implement the decision will be identified in the Task 11 IPP.

Assumptions:

1. None

Summary of Deliverables and Responsibilities:

10-1 The Department decision relative to the interim storage mission will be formally transmitted to the Board no later than October 24, 1995.

TASK 11 - DEVELOP INTEGRATED PROGRAM PLAN

The purpose of Task 11 is to fully address Board Recommendation 94-3, implementing the Department's course forward relative to the interim storage mission in the form of an Integrated Program Plan (IPP).

The IPP will constitute Phase II of the Department's response to Board Recommendation 94-3 and will resolve all remaining issues not fully addressed during this Phase I Implementation Plan, including any outstanding reporting requirements or issues related to implementing Board Recommendation 90-5 (Systematic Evaluation Program). It is intended that the IPP developed in this Task will subsume any remaining tasks to close Recommendation 90-5. Appropriate Systematic Evaluation Program activities relative to Building 371 will be included in the IPP. This will include resolution and disposition of the recommendations in Section 7.0 of the SEP reports (Refs. 9-19).

The DNFSB 94-3 sub-recommendations 2-8 have been considered in development of this IP. All actions in this IP will support the continuation of the work required to fully disposition the sub-recommendations and will not negate, contradict or require rework, and more importantly, due to the approach of this IP to tasks affected by the sub-recommendations the conclusions reached in 6 months will not be impacted. The data collected and decisions made in Phase I will be incorporated into Phase II and the IPP. The Department has structured Phase I evaluations to bound the potential for categorization of the facility as high hazard. The NPH accident analysis supporting the Safety Analysis Report for Building 371 will incorporate the results of completed Phase I work and evaluate the protection systems required to support the mission of the facility in response to sub-recommendation 2.

Task 2 represents the beginning of the response to sub-recommendations 5 and 6. Hazard classification requires the identification and characterization of hazards, followed by comparison of those hazards to specified criteria to determine a hazard category. Classification of safety systems requires the identification of safety systems and their purpose, followed by comparison of those systems to specified criteria to determine a safety category. Preliminary criteria for hazard categorization and safety classification and other generic issues raised in Recommendation 94-3 are being developed and will be reviewed with the Board and its staff during the execution of this IP. The development of final criteria will be a part of the IPP and will consider such issues as defense in depth, consequences of safeguards failures and the adequacy of measures to render failure suitably unlikely.

Similarly, the Department acknowledges that the orders and standards related to facility design and natural and man-made phenomena hazards contain certain generic deficiencies which complicate execution of this plan. These deficiencies were summarized in the Board's April 29, 1994, letter to the Department (Ref. 20) and further detailed in DNFSB 94-3 sub-recommendation 7. The Department's response to the April 29 letter committed to improve applicable orders and standards (Ref. 21). The

Department will continue to pursue this course of action in parallel with execution of this IP. Rocky Flats specific policy will be developed for this IP. Rocky Flats will obtain Departmental authorization for Implementation of this policy as appropriate.

Assumptions

1. None

Summary of Deliverables and Responsibilities:

11-1 The Department will develop preliminary hazard category and safety classification criteria for Rocky Flats.

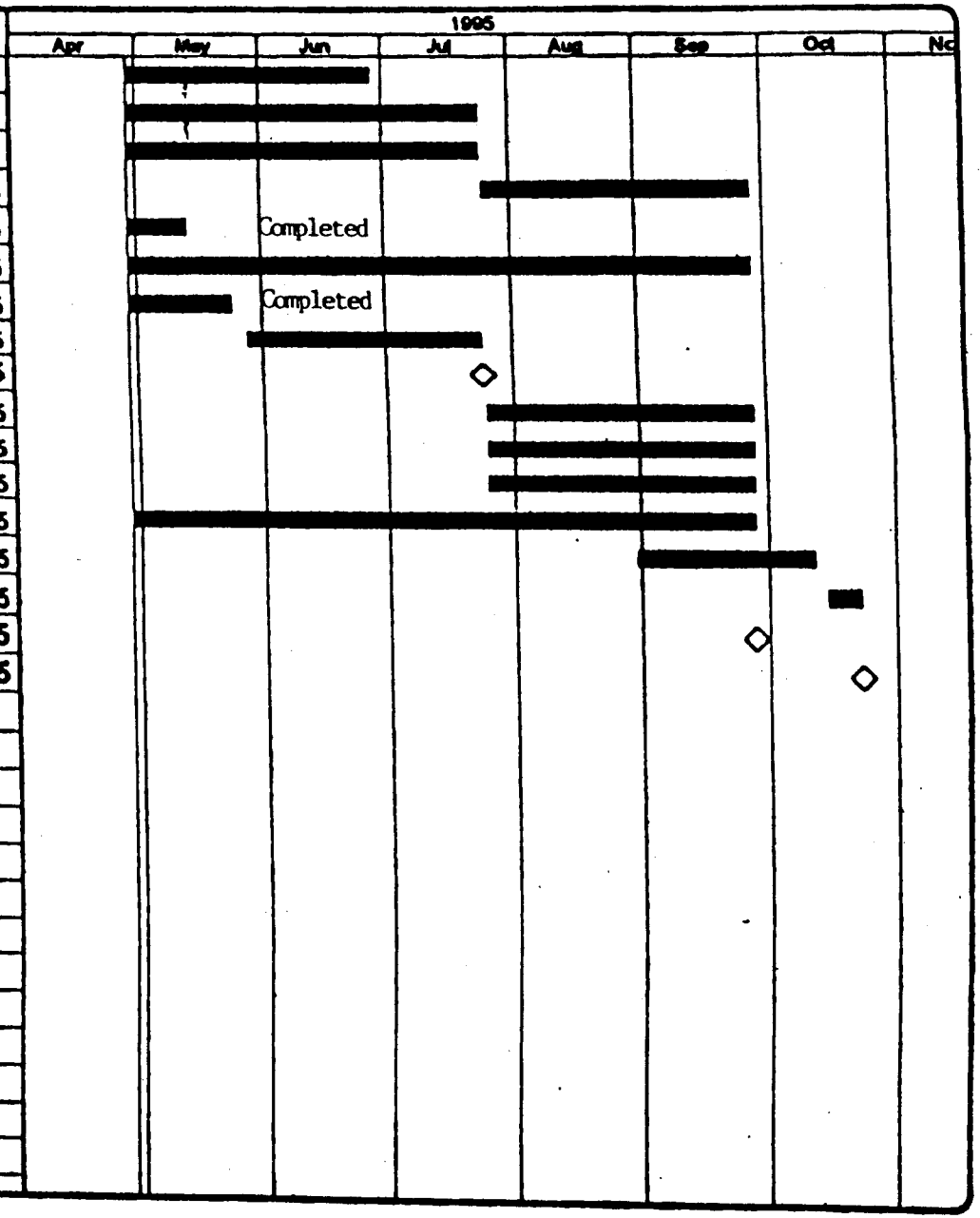
11-2 An Integrated Program Plan (IPP) implementing the Department's decision will be formally transmitted to the Board for review and approval no later than October 24, 1995.

CHANGE CONTROL AND REPORTING

Phase I of this IP will be implemented in accordance with the schedule provided in Appendix 1. The Department will implement this plan as described herein and report by exception only. Changes to the schedule of internal deliverables will not be reported to the Board unless the change impacts the commitments made to the Board. The Board will be notified of any changes that may affect commitments to the Board upon discovery. For example, the scope of the safety-related SSCs which will be identified in Task 2 and the level of effort needed to complete the Task 6 push-over analyses are unknown at this time and could impact the overall schedule. This plan will then be revised to address recovery plans and will be submitted to the Board as a revision.

Appendix 1

Task Name	Start	End
Task 1 B371 Config. and Loads	01/May/95	30/Jun/95
Task 2 Safety Systems and Function	01/May/95	26/Jul/95
Task 3A Storage Alternatives	01/May/95	26/Jul/95
Task 3B Storage Alternatives	27/Jul/95	29/Sep/95
Task 4A Ground Motion Definition	01/May/95	15/May/95
Task 4B Ground Motion Report	01/May/95	29/Sep/95
Task 5 Review Records	01/May/95	26/May/95
Task 6A Stage 1 Evaluation	30/May/95	26/Jul/95
Project Status Review	26/Jul/95	26/Jul/95
Task 6B Stage 2 Evaluation	27/Jul/95	29/Sep/95
Task 7 SSC Evaluation	27/Jul/95	29/Sep/95
Task 8 Config. and Performance	27/Jul/95	29/Sep/95
Task 9 Evaluation Criteria	01/May/95	29/Sep/95
Task 9 Recommendations	01/Sep/95	13/Oct/95
Task 10 Department Decision	16/Oct/95	24/Oct/95
Task 11 Preliminary Hazard Criteria	29/Sep/95	29/Sep/95
Task 11 Submit IPP	24/Oct/95	24/Oct/95



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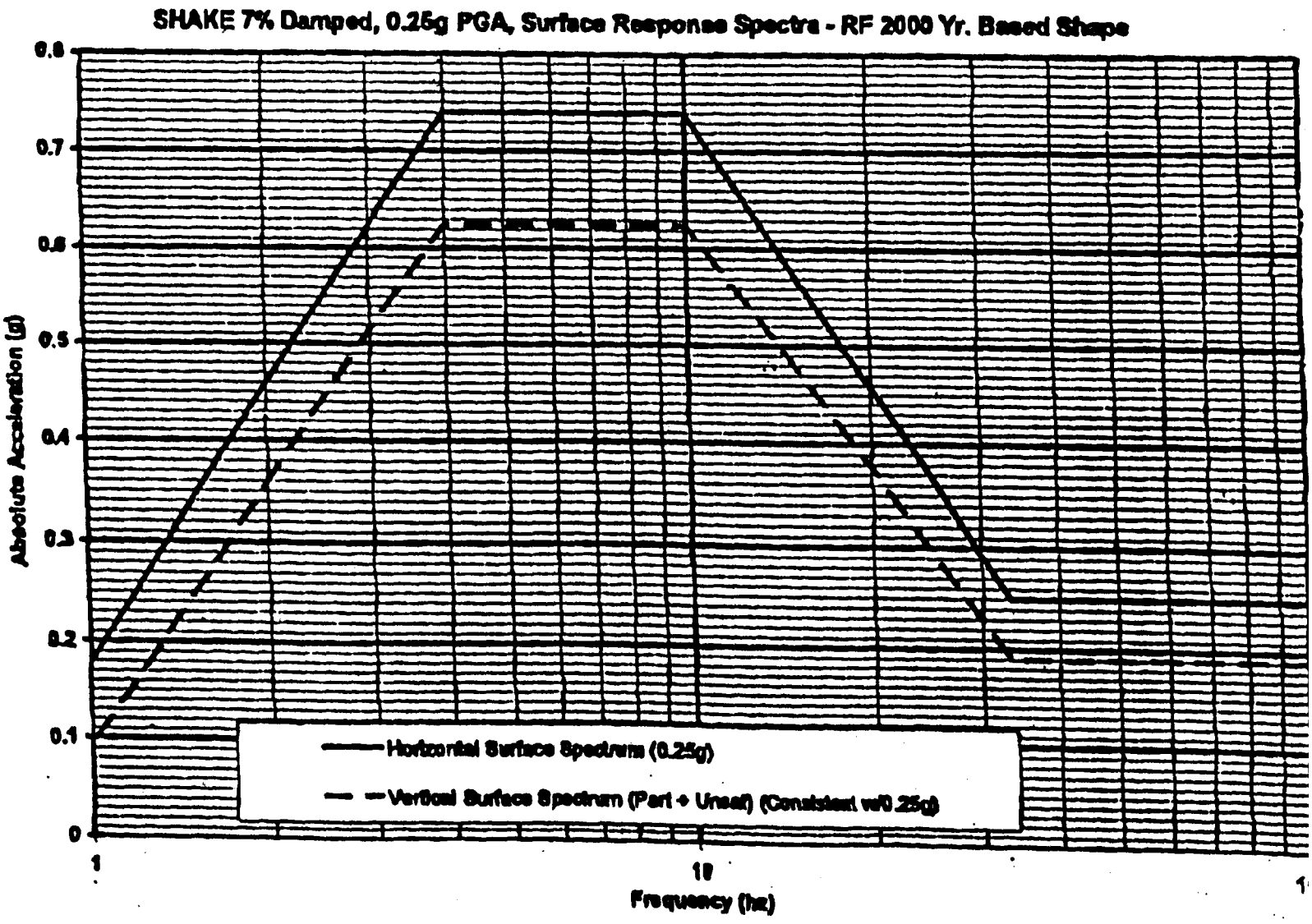

APPENDIX 3:GLOSSARY, ACRONYMS AND ABBREVIATIONS

ACI - AMERICAN CONCRETE INSTITUTE
AISC - AMERICAN INSTITUTE OF STEEL CONSTRUCTION
ALARA - AS LOW AS REASONABLY ACHIEVABLE
ASCE - AMERICAN SOCIETY OF CIVIL ENGINEERS
ASME - AMERICAN SOCIETY OF MECHANICAL ENGINEERS
BOARD - DEFENSE NUCLEAR FACILITIES SAFETY BOARD
CCCP - CONFIGURATION CHANGE CONTROL PROGRAM
D&D - DECONTAMINATION AND DECOMMISSIONING
DNFSB - DEFENSE NUCLEAR FACILITIES SAFETY BOARD
DOE UNITED STATES DEPARTMENT OF ENERGY
DOE/RFFO - DEPARTMENT OF ENERGY-ROCKY FLATS FIELD OFFICE
DOE/HQ - DEPARTMENT OF ENERGY/HEADQUARTERS
EA - ENVIRONMENTAL ASSESSMENT
EBE - EVALUATION BASIS EARTHQUAKE
EPRI - ELECTRIC POWER RESEARCH INSTITUTE
FSAR - FINAL SAFETY ANALYSIS REPORT
FY - FISCAL YEAR
HCLPF - HIGH CONFIDENCE LOW PROBABILITY OF FAILURE
IEEE - INSTITUTE OF ELECTRICAL ELECTRONIC ENGINEERS
IMC - INTEGRATING MANAGEMENT CONTRACTOR
IP - IMPLEMENTATION PLAN
IPP - INTEGRATED PROGRAM PLAN
LRA - LIABILITY REDUCTION ACTIVITY
M&O - MANAGEMENT AND OPERATING CONTRACTOR
NEPA - NATIONAL ENVIRONMENTAL POLICY ACT
NPH - NATURAL PHENOMENA HAZARDS
OSRs - OPERATIONAL SAFETY REQUIREMENTS
PEIS - PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT
PHA - PRELIMINARY HAZARDS ASSESSMENT
RFETS - ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
SAR - SAFETY ANALYSIS REPORT
SEP - SYSTEMATIC EVALUATION PROGRAM
SET - STRUCTURAL EVALUATION TEAM
SITE - ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
SMA - SEISMIC MARGIN ASSESSMENT
SNM - SPECIAL NUCLEAR MATERIAL
SQUG/GIP - SEISMIC QUALIFICATION UTILITIES GROUP/
GENERIC IMPLEMENTATION PROCEDURE
SSCs - STRUCTURES, SYSTEMS AND COMPONENTS
TSRs - TECHNICAL SAFETY REQUIREMENTS
UBC - UNIFORM BUILDING CODE
USQ - UNREVIEWED SAFETY QUESTION DETERMINATION

APPENDIX 4: REFERENCES

1) DRAFT ENVIRONMENTAL ASSESSMENT FOR THE CONSOLIDATION AND INTERIM STORAGE OF SPECIAL NUCLEAR MATERIAL AT ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE, DOE/EA-1060, U.S. DEPARTMENT OF ENERGY, ROCKY FLATS FIELD OFFICE, Golden, CO, dated April 1995.

2) SAFETY ANALYSIS IN SUPPORT OF THE ENVIRONMENTAL ASSESSMENT FOR CONSOLIDATION AND INTERIM STORAGE OF SPECIAL NUCLEAR MATERIAL IN BUILDING 371, NUCLEAR SAFETY TECHNICAL REPORT NSTR-001-95, EG&G Rocky Flats Inc., Golden CO, March 1995.

3) DEPARTMENT OF ENERGY PLUTONIUM E S & H VULNERABILITY ASSESSMENT SITE ASSESSMENT TEAM REPORT, RFETS, July 29, 1994 and Department of Energy Plutonium ES&H Vulnerability Assessment Working Group Assessment Team Report, Rocky Flats Plant, August 18, 1994.

4) SEISMIC HAZARD ANALYSIS FOR THE ROCKY FLATS PLANT, prepared for EG&G Rocky Flats Inc. by Risk Engineering, Inc., dated September 29, 1994.

5) PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT: UPGRADE DATA REPORT ON NEW SNM STORAGE FACILITY OPTION AT ROCKY FLATS PLANT, Data in support of the Upgrade Alternative for the United States Department of Energy Nuclear Weapons Reconfiguration Program, Programmatic Environmental Impact Statement, EG&G Rocky Flats Inc., Draft-Revision 1, dated August 15, 1994.

6) PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT: FINAL COST ESTIMATE REPORT FOR THE NEW SNM STORAGE FACILITY OPTION, EG&G Rocky Flats Inc., dated August 15, 1994.

7) PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT: FINAL COST ESTIMATE REPORT FOR THE UPGRADE BUILDING 371 OPTION, EG&G Rocky Flats Inc., dated August 1, 1994.

8) PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT: UPGRADE DATA REPORT ON PLUTONIUM STORAGE IN BUILDING 371 AT ROCKY FLATS PLANT SITE, Data in support of the Upgrade Alternative for the United States Department of Energy Nuclear Weapons Reconfiguration Program, Programmatic Environmental Impact Statement, EG&G Rocky Flats Inc., Draft revision 3, dated August 1, 1994.

9) BUILDING 371 COMPARISON OF SYSTEMS AND COMPONENTS WITH CURRENT DESIGN REQUIREMENTS FOR THE INSTRUMENT AIR SYSTEM, Report SPSD-37, January, 1995.

10) BUILDING 371 COMPARISON OF SYSTEMS AND COMPONENTS WITH CURRENT DESIGN REQUIREMENTS FOR THE TOWER WATER SYSTEM, Report SPSD-38, January, 1995.

11) BUILDING 371 COMPARISON OF SYSTEMS AND COMPONENTS WITH CURRENT DESIGN REQUIREMENTS FOR THE COOLING WATER SYSTEM, Report SPSD-39, January, 1995.

12) BUILDING 371 COMPARISON OF SYSTEMS AND COMPONENTS WITH CURRENT DESIGN REQUIREMENTS FOR THE UNINTERRUPTIBLE POWER SUPPLY SYSTEM, Report SPSD-40, January, 1995.

13) BUILDING 371 COMPARISON OF SYSTEMS AND COMPONENTS WITH CURRENT DESIGN REQUIREMENTS FOR THE EMERGENCY POWER SUPPLY SYSTEM, Report SPSD-42, January, 1995.

14) BUILDING 371 COMPARISON OF SYSTEMS AND COMPONENTS WITH CURRENT DESIGN REQUIREMENTS FOR CONFINEMENT BARRIER SYSTEMS, Report SPSD-45, January, 1995.

15) BUILDING 371 COMPARISON OF SYSTEMS AND COMPONENTS WITH CURRENT DESIGN REQUIREMENTS FOR THE EMERGENCY POWER SYSTEM - MECHANICAL SUPPORT SUBSYSTEMS, Report SPSD-46, January, 1995.

16) BUILDING 371 COMPARISON OF SYSTEMS AND COMPONENTS WITH CURRENT DESIGN REQUIREMENTS FOR FIRE SUPPRESSION SYSTEMS, Report SPSD-47, January, 1995.

17) BUILDING 371 COMPARISON OF SYSTEMS AND COMPONENTS WITH CURRENT DESIGN REQUIREMENTS FOR FIRE DETECTION AND ALARM SYSTEMS, Report SPSD-48, January, 1995.

18) BUILDING 371 COMPARISON OF SYSTEMS AND COMPONENTS WITH CURRENT DESIGN REQUIREMENTS FOR FIRE BARRIER SYSTEMS, Report SPSD-49, January, 1995.

19) BUILDING 371 COMPARISON OF SYSTEMS AND COMPONENTS WITH CURRENT DESIGN REQUIREMENTS FOR HVAC SYSTEMS 1 AND 2 PRESSURE CONTROL AND FILTRATION EXHAUST AND RECIRCULATION SYSTEMS, Report SPSD-32, January, 1995.

20) JOHN T. CONWAY LTR. TO THE HONORABLE CHARLES B. CURTIS dated April 29, 1994.

21) CHARLES B. CURTIS LTR. TO THE CHAIRMAN, DEFENSE NUCLEAR FACILITIES SAFETY BOARD, dated September 2, 1994.