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November 1994

DOE STANDARD

GUIDANCE FOR PREPARATION OF DOE 5480.22 (TSR) AND DOE 5480.23 (SAR) IMPLEMENTATION PLANS

U.S. Department of Energy
Washington, DC 20585

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FOREWORD

1. This Standard has been prepared by a working group of Secretarial Officer (SO) representatives, including Kamiar Jamali (DP-31), Betsy Connell (DP-33), Rick Khan (EM-23), F.L. (Ray) Schwartz (ER-8.1), Ed Tourigny (NE-44), and Barry Sullivan (LM-1).

2. Beneficial comments (recommendations, additions, and deletions) and any pertinent data that may improve this document should be sent to: Dr. Kamiar Jamali, Office of Engineering, Operations, Security and Transition Support (DP-31, GTN), U.S. Department of Energy, Washington, DC 20585.

3. DOE 5480.22, TECHNICAL SAFETY REQUIREMENTS (TSRs), and DOE 5480.23, NUCLEAR SAFETY ANALYSIS REPORTS (SARs), impose requirements for the submittal of implementation plans (IPs). Guidance for the development, submittal, and maintenance of these plans is provided.

4. This Standard provides guidance on the contents of IPs, including plans for managing the upgrade process; the submittal, review, approval, and revision of IPs; and the basis for interim operation (BIO) during the upgrade process. Additionally, guidance is provided on techniques of preliminary hazards analysis (PHA) and on the development of site-wide and activity-specific safety documentation.

5. Although this Standard is written to address DOE 5480.22 and DOE 5480.23, no conflicts are expected to exist between the Orders and the impending Rules (10 CFR 830.320 and 10 CFR 830.110). Should conflicts exist between the Orders and the final Rules, a letter to all addressees on the Standard will promulgate the conflicting areas expeditiously. It is noted that, in any event, the Rules will govern.

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CONCLUDING MATERIAL

1. SCOPE

1.1 Scope. This Standard provides additional guidance for the preparation of implementation plans (IPs) for DOE 5480.22, TECHNICAL SAFETY REQUIREMENTS (TSRs), and for DOE 5480.23, NUCLEAR SAFETY ANALYSIS REPORTS (SARs). The TSR and SAR IPs serve as the transition plan for achieving compliance with DOE 5480.22 and DOE 5480.23 requirements, respectively.

1.2 Applicability. IPs are required for Hazard Category 1, 2, or 3 nuclear facilities (as defined in DOE 5480.23 and formalized in DOE-STD-1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE 5480.23) that do not fully comply with the requirements in DOE 5480.22 and DOE 5480.23. IP requirements apply to both reactor facilities and nonreactor nuclear facilities. Facilities and operations that fall below the Hazard Category 3 threshold are considered outside the scope of DOE 5480.23 requirements for a DOE-approved nuclear SAR and, as such, are not to be addressed within the DOE 5480.23 IP.

1.3 Background. This guidance has been prepared by a working group of Secretarial Officer (SO) representatives based on an understanding of the Orders and their accompanying guidance. It is structured to address elements that are required in the IPs:

- Overall plan and schedule for the SAR and TSR upgrades, including prioritization factors affecting plans and schedules;
- Cost for the upgrades;
- Major assumptions;

- Need for upgrades and level of effort expected;

- Preliminary assessment of hazards; and

- Bases for interim operation, including restrictions placed on operation during the upgrade process, and administrative controls in effect during the upgrades.

That part of the IP documenting and referencing the preliminary assessment of facility hazards and the bases for interim operation, including restrictions placed on operation during the upgrade process and administrative controls in effect during the upgrades, is referred to as the Basis for Interim Operation (BIO). As described in section 4.2.4 and appendix A, the DOE 5480.23 requirement for the bases for restrictions on operations and administrative controls during the upgrade process necessitates the performance of a safety analysis capable of identifying these restrictions and controls. The minimum level of analysis considered sufficient to meet this requirement is Preliminary Hazards Analysis (PHA). Appropriate application of PHA techniques for the purpose of the BIO is discussed in appendix B for facilities whose existing safety analyses are not current and complete.

The BIO establishes the interim safety basis for the facility; i.e., the information upon which DOE depends for its conclusion that operations at a facility can be conducted safely on an interim basis until SAR and TSR documents complying with the requirements of DOE 5480.22 and DOE 5480.23 have been approved. In this capacity, the BIO, including the supporting controlled referenced documentation, assumes the role of the safety basis during the upgrade process. An existing SAR or Operational Safety Requirements (OSR) document is a key part of the BIO to the degree it is current and correct. Due to the wide variety of facilities within the DOE complex, and the broad spectrum of existing safety documentation among the facilities, it is expected that the contents of BIOs and the effort required to prepare them will vary. Therefore, the

guidance presented herein should be applied judiciously on a facility-by-facility basis. General examples of appropriate application are given in section 4.2.4.2.

Section 4 provides guidance on the programmatic aspects (i.e., non-BIO) of the IPs, which pertain to the scheduling, costing, and overall plan for upgrading the safety documentation, as well as general guidance on the preparation of BIOs. Section 5 addresses internal review and approval of the IPs, periodic updating of IPs, and the process to be applied by the various SOs in reviewing and approving the various IPs. Appendix A provides specific guidance relative to the preparation of BIOs for nonreactor nuclear facilities. Appendix B contains guidance on techniques of PHA. Contractors operating reactors will receive guidance for BIOs from their SOs. Appendix C provides guidance on the use of site-wide and activity-specific safety documentation.

It is anticipated that this guidance may be augmented by additional guidance from the respective Operations Offices, but that such guidance will not conflict with the guidance herein.

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2. APPLICABLE DOCUMENTS

Unless otherwise specified by contract, solicitation, or purchase order, the current issue of the following documents form a part of this document to the extent specified herein. References are made for the purpose of guidance only, and should not be interpreted as imposing requirements contained in the referenced material.

2.1 Government documents.

2.1.1 DOE standards, handbooks, technical standards lists (TSLs), and specifications. The following DOE standards, handbooks, TSLs, and specifications form a part of this document to the extent specified herein.

DOE-STD-1027-92 - *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE 5480.23, Nuclear Safety Analysis Reports*

DOE-STD-3009-94 - *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*

DOE-HDBK-3010-94 - *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein.

DOE Order 5480.21 - *Unreviewed Safety Questions*

DOE Order 5480.22 - *Technical Safety Requirements*

DOE Order 5480.23 - *Nuclear Safety Analysis Reports*

DOE Order 5480.28 - *Natural Phenomena Hazards Mitigation*

(Copies of DOE publications are available from: DOE, Secondary Distribution, 1000 Independence Avenue SW, Washington, DC 20585.)

2.2 Non-Government publications. The following document forms a part of this document to the extent specified herein.

Guidelines for Hazard Evaluation Procedures, Second Edition with Worked Examples, Center for Chemical Process Safety, American Institute of Chemical Engineers, 1992

3. ACRONYMS

The following are key terms used in this Standard:

a.	AIChE	-	American Institute of Chemical Engineers
b.	BIO	-	Basis for Interim Operation
c.	D&D	-	Decontamination and Decommissioning
d.	DOE	-	Department of Energy
e.	DP	-	Defense Programs
f.	EM	-	Office of Environmental Management
g.	ER	-	Office of Energy Research
h.	ERPG	-	Emergency Response Planning Guideline
i.	HQ	-	Headquarters
j.	IP	-	Implementation Plan
k.	LCO	-	Limiting Condition for Operation
l.	LCS	-	Limiting Control Setting
m.	ORR	-	Operational Readiness Review
n.	OSR	-	Operational Safety Requirement
o.	PHA	-	Preliminary Hazards Analysis
p.	PrHA	-	Process Hazards Analysis
q.	SAR	-	Safety Analysis Report
r.	SER	-	Safety Evaluation Report
s.	SO	-	Secretarial Officer
t.	SSC	-	Structures, Systems, and Components
u.	TSL	-	Technical Standards List
v.	TSR	-	Technical Safety Requirement
w.	USQ	-	Unreviewed Safety Question

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4. IMPLEMENTATION PLAN CONTENT

The following subparagraphs provide supplementary guidance on the preparation of IPs. The organization of this section is not meant to imply a preferred format. Instead, it is intended to aid in the clear presentation of the content. At a minimum, the IP should address the following topics.

4.1 Overall plan. Overall plans should be developed on a contractor-wide or site-wide basis and include: a listing of facilities undergoing upgrade, subdivided by SO; an integrated upgrade schedule; general assumptions employed in developing the IPs; and factors considered in prioritizing the upgrades. Information presented in the overall plan should reflect a roll-up of information that is provided in more detail on a facility-specific basis.

4.1.1 Integrated upgrade schedule. The integrated upgrade schedule should provide the following:

a. Identification of the hazard classification level for the facilities based on application of DOE-STD-1027-92.

b. Overall schedule for draft SAR/TSR development, including projected start and end dates.

c. Identification of upgrade costs, both funded and unfunded, projected in the current and the next fiscal year, and the total projected in the out-years. The schedule and the costs of the upgrade need to be based on best estimates of funding, and should reflect an effective application of resources. The IPs should provide, as a separate item, the cost for annual updates.

d. Identification of facilities that are currently shutdown or are scheduled for near-term shutdown for which safety documentation may not be upgraded to comply completely with DOE 5480.22 or DOE 5480.23 at this stage of operation.

4.1.2 General assumptions employed in developing the IPs. General assumptions, such as endorsement of specific DOE or site guidance, funding assumptions, mission assumptions, or commitments with regulatory agencies that might impact safety documentation upgrades, should be identified. The general assumptions should indicate the extent to which safety documentation upgrades and associated costs have been included in other planning documents, such as Five-Year Plans.

4.1.3 Factors considered in prioritizing the upgrades. Upgrades should be prioritized to ensure that the most critical upgrades are done first. The IPs should identify the factors that affect prioritization of the upgrades, whether they are from DOE 5480.23 or not. Some of the factors that could affect prioritization include: hazard level, condition of existing safety documentation, relative risk during interim operation, life cycle stage, and programmatic or national importance. Additionally, another factor that could be relevant to the scheduling of upgrades could be the interdependency of the TSRs and the SAR.

Application of prioritization factors should result in an overall listing or ranking of facility safety documentation upgrades in descending order of priority. An example of how this could be presented is provided in table 4.I; however, other formats or methods of presentation are permitted.

4.2 Facility-specific plans. Facility-specific plans should be developed that include: the need for the upgrade; the level of effort expected in upgrading; a summary of the application of DOE-STD-1027-92; and the Basis for Interim Operation (BIO).

4.2.1 The need for the upgrade. The overall status of existing safety documentation for Hazard Category 1, 2, and 3 nuclear facilities relative to the requirements of DOE 5480.22 and 5480.23 should be presented. The IP should provide a discussion of the extent to which the safety documentation does and does not meet the requirements of DOE 5480.22 and DOE 5480.23.

It is emphasized that a clear understanding of the need for the upgrade is essential because it serves as the basis for determining specific actions to be taken to renew the safety basis, which in turn serves as the basis for determining SAR/TSR development costs, priorities, and schedules. The need for the upgrade is also the primary input in determining additional analyses to be performed for the BIO or, alternatively, restrictions on operations or compensatory measures during the upgrade process.

A contractor may determine that an upgrade is not warranted, based on the satisfactory status of existing safety documentation with respect to DOE 5480.22 and DOE 5480.23 requirements. Such situations may be handled in the IP by indicating compliance with SAR and TSR Order requirements, justifying the appropriateness of the extent of existing material based on the graded approach.

Alternatively, a contractor may determine that an upgrade for a facility not in compliance with DOE 5480.22 or DOE 5480.23 is not practical (e.g., given the short remaining operational lifetime of the facility). These cases may be handled by requesting exemptions from specific Order requirements with which compliance is considered inappropriate, or by requesting exemption from the Order(s) altogether. This is especially true for nuclear facilities that are scheduled to be shut down in the near term, or are currently shutdown and do not have their revised operational mission finalized. In both cases, upgrade efforts directed toward the shutdown condition may not be practical, and consideration should be

given to requesting exemption from upgrade requirements for the shutdown condition and developing a BIO to establish a safety basis in the interim, until a renewed operational mission is finalized (e.g., decontamination and decommissioning). At that point, the facility would still be expected to develop safety documentation in accordance with DOE 5480.22 and DOE 5480.23 before operation can begin.

In all cases where an IP is required, identification of plans to refrain from upgrading or to request exemptions to requirements should be made in the IP, with supporting justification.

4.2.2 The level of effort expected in upgrading. IPs should indicate the level of effort expected in upgrading the SARs and developing the TSRs, based on specific activities planned; e.g., the plan could present an annotated outline for nuclear facility SARs and TSRs or a specific format and content guide along with a discussion of application of graded approach for the SARs and TSRs. It is noted here that a SAR upgrade cannot be considered complete until TSRs, meeting the requirements of DOE 5480.22, have been prepared from information in, or developed and reflected in, the SAR.

Additionally, although the Orders permit a graded approach to the upgrade of documentation, any general or specific facility deviation from the elements of the list of topics for SARs [DOE 5480.23, 8.b(3)] or from the sections for TSRs (DOE 5480.22, 9.e.) should be identified in the IP for approval by the SO. In some cases, the deviation would require an exemption.

Consideration should be given to cost-effective approaches to safety documentation upgrades; e.g., phased approach to SAR/TSR upgrade, consolidation of related facility SARs/TSRs under a single upgrade effort, and development of site-wide safety documents to address cross-cutting topics of individual facility SARs/TSRs (such as transportation of

materials and site characteristics). Additional guidance on this topic can be found in appendix C.

4.2.3 Summary of the application of DOE-STD-1027-92. For purposes of the IP, this Standard should be applied as a screening mechanism to be followed by a more detailed assessment as part of development of the BIO.

4.2.4 The Basis for Interim Operation (BIO). The BIO is the documented establishment of a safety basis for current facility operations and operational controls until more detailed documentation, fully compliant with the requirements of DOE 5480.22 and DOE 5480.23, is developed and approved by DOE. The guidance presented herein is primarily focused on the preparation of BIOs for nonreactor facilities. Contractors operating reactors should get guidance for BIOs from their SOs. For nonreactor nuclear facilities, a BIO should be prepared for each Hazard Category 1, 2, and 3 facility required to submit IPs in accordance with DOE 5480.22 or DOE 5480.23. An approved BIO serves as the interim DOE safety basis until the upgraded safety documentation is developed and approved.

4.2.4.1 BIOs for facilities with or without existing approved OSRs/SARs. Existing OSRs and SARs do not generally conform to the requirements of DOE 5480.22 and DOE 5480.23. In particular, many existing SARs do not address scenarios with significant impact only inside a facility. As such, it is expected that facilities with approved OSRs and SARs, with some possible exceptions, still require a SAR/TSR upgrade, and should submit an IP, including the BIO portion. Existing OSRs and SARs then become part of the safety basis documentation referenced in a BIO, albeit with a high degree of applicability to the content and scope of the BIO.

4.2.4.2 BIO scope and level of effort. The extent to which new material must be generated for the BIO depends primarily upon the need for the upgrade. Where the upgrade need is low (substantial material exists that meets requirements, or little additional effort is required beyond that which has already been performed), it is expected that the BIO will mainly summarize existing material. Conversely, where the need is high (substantial effort is required to upgrade the safety basis), it is expected that the BIO will mainly summarize material generated for the purpose of establishing an interim safety basis.

The level of detail incorporated in the submitted BIO will be significantly dependent upon a number of factors, and should be justified in all cases. These may include the need for the upgrade, the hazard potential (and hazard classification) of the facility, its complexity, and the stage of facility life cycle.

Examples of specific situations, along with an indication of the appropriate corresponding level of effort to generate new material and level of BIO detail, is presented below:

a. A complex and substantial-hazard facility, which is not near the end of its life cycle and whose safety documentation is not substantially complete, should follow guidance in appendix A (and appendix B) to prepare a BIO. Existing safety analyses should be reviewed for adequacy, and additional analysis performed as necessary to establish the appropriateness of controls during the upgrade process.

b. A facility whose upgraded SAR and TSR submittal is imminent (e.g., 6 months) can submit a BIO with a few sentences to that effect, along with the facility hazard category, a brief summary of the hazard potential, and a brief justification for the adequacy of controls in the interim.

It is noted here that the interim period should be well defined (as is always the case), and approval of the BIO is valid only for the specified duration.

c. For a facility whose safety documentation is basically compliant with the requirements of the Orders and whose safety basis remains current, the BIO may be a summary document that identifies the facility's basically compliant status, referencing the documentation upon which this conclusion depends. Information presented in the BIO should include a brief discussion of the facility's management of safety, the facility hazard category, a brief summary of the hazard potential, and a brief justification for the adequacy of controls in the interim. Additional material would be generated only to the extent that the current safety basis is inadequate to serve as the interim safety basis. (The current safety basis may be adequate despite a limited upgrade need, as long as sufficient safety assurance has been developed upon which to base interim operations.)

d. A BIO for a facility that will remain shutdown in the near term may be directed toward provisions in place to ensure safe conditions during shutdown, as opposed to controls that would be placed on process operations. It is emphasized that there may be unique vulnerabilities associated with a shutdown condition (such as corrosion, radiolysis, or evaporation), and additional analysis may be required to justify the adequacy of controls in the interim. Correspondingly, information presented in the BIO should establish that the facility can be safely maintained in a shutdown condition in the interim.

e. For Hazard Category 3 facilities, safety assurance generally depends more on a comprehensive understanding of the spectrum of worker hazards than on a focused evaluation of bounding hazards. Consequently, it would be appropriate for the BIO to emphasize discussions of the programs by which the facility manages worker safety, and deemphasize the presentation of dominant scenarios, which are usually most relevant to demonstrating adequate protection of the public (and onsite population). Existing safety analyses, or analysis performed for the purposes of the BIO, would therefore need only be qualitative, focusing on the identification of potential design or procedural vulnerabilities affecting worker safety.

Correspondingly, the safety analysis information presented in the BIO should include the facility hazard category and a discussion of identified vulnerabilities. Likewise, the identification of controls in place at the facility for operation in the interim should be largely directed at protecting facility workers.

4.2.4.3 Allowed duration of operation under BIO and BIO updates. An approved BIO would allow continued operation as projected in the IP until SAR and TSR submittals are approved in accordance with DOE 5480.22 and DOE 5480.23. In other words, the BIO will remain in effect as the interim authorization basis for the duration of time allowed under the approved SAR and TSR Order Implementation Plans. Changes to the BIO are governed by DOE 5480.21.

4.2.4.4 Additional guidance on preparation and submittal of BIOs. Appendix A of this document contains guidance on the preparation and submittal of BIOs, including guidance on the performance of safety analysis. (Appendix B also contains guidance on the performance of

safety analysis, focusing on PHA techniques.) Guidance presented on performing safety analysis should only be used when such material is absent at a facility. Where such material exists and is current and correct, it should simply be summarized in the BIO.

TABLE 4.I. Example of Prioritization of Upgrades

Prioritization for SAR and TSR Upgrades at LMN Site						
Priority	Facility	Category	Condition of Existing SAR	Risk During Upgrade	Life Cycle Stage	Programmatic Importance
1	Bldg. A	Cat 2	Poor - SAR written in 1980, OSRs last updated 1989	Moderate - Seismic event dominates facility risk	Active - No projected shutdown date	High - Facility supports projects X, Y, and Z at the site
2	Bldg. B	Cat 2	Fair - SAR written in 1986, OSRs last updated 1991	Moderate - Seismic and fire events dominate facility risk	Active - No projected shutdown date	High - Facility supports projects X, Y, and C at the site
3	Bldg. C	Cat 2	Good - SAR and OSRs updated 1989	Low - Updated OSRs limit facility risk	Active - No projected shutdown date	Moderate - Facility supports projects B and D. Project D will end in 1995.
4	Bldg. D	Cat 3	Fair - SAR and OSRs updated 1985	Low - Fire potential dominates facility risk	Active - No projected shutdown date	Moderate - Facility's labs support projects A, B, and Y
5	Bldg. E	Cat 3	Fair - Safety documentation (1979)	Very Low - Material form and lack of energy sources limits risk	Active - Scheduled for shutdown 1996	Low - Projects Z and D will end at facility by 1996
6	Bldg. F	Cat 3	Fair - Safety documentation (1990) covers shutdown status	Very Low - No operations, no energy sources	Shutdown - No operations foreseen in future	None - Only periodic maintenance and surveillance

5. SUBMITTAL AND REVISION OF IMPLEMENTATION PLANS

In developing IPs, it is critical that the contractors interface with field-level facility organization counterparts, particularly in terms of the extent to which SARs and TSRs will be upgraded in the future, the schedule, the cost, and the relative priority. As such, it is requested that the plan be reviewed and approved by the appropriate contractor line management organizations and subsequently approved by the senior management official of the contractor.

It is recommended, where possible, that IPs for SARs and TSRs be combined into a single IP for submittal to DOE. Both Orders require basically the same information, and given their interrelationship, it could be more efficient to combine the IPs into a single plan.

In instances where an Operations Office may have multiple contractors/sites with nuclear facilities, it is recommended that each contractor/site prepare an IP separately. Only a single plan should be submitted for each facility, however, and only one SAR and TSR document should be prepared for each facility. Operations Offices then send the IP to DOE Headquarters (HQ) as received.

The programmatic portion of the IPs should be updated as changes are made in the upgrade plan. It is recommended that the contractor submit, in the same manner as the original plan, changes to the previous plan as an Addendum. This does not apply to editorial changes that do not materially change the plan or to revisions required to reflect organizational changes. Changes not warranting submittal should be retained by the contractor and made available for audit. Changes to the BIO are governed by DOE 5480.21.

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APPENDIX A

Guidance for Preparation and Submittal of Basis for Interim Operation (BIO) for DOE Nonreactor Nuclear Facilities

A.1. INTRODUCTION

The Basis for Interim Operation (BIO) establishes the interim safety basis for a facility by summarizing and referencing existing information and, where necessary, by generating new information. The level of detail incorporated in the submitted BIO (see section 4.2.4.2) will be significantly dependent upon a number of factors, including the need for the upgrade. The guidance presented herein is directly applicable to substantial-hazard facilities not near the end of their life cycle for which the upgrade need is significant. In other cases, the level of detail may be reduced based on the adequacy of existing referenced documentation to cover the subject matter.

A.2. BASIS AND PURPOSE

DOE 5480.23, *Nuclear Safety Analysis Reports*, 9.b.(2), requires that covered contractors submit a plan and schedule for completing required safety analysis reports (SARs) "...to the Department for approval by 6 months after the date of issuance of this Order [SAR]. This submittal shall describe the need for upgrading the SAR and shall include a preliminary assessment of facility hazards, the basis for the content, schedule, and level of detail proposed, bases for interim operation or restrictions on interim operations, and administrative controls during the upgrade process." Similarly, DOE 5480.22, *Technical Safety Requirements*, 10.b, requires submission of a schedule for development and delivery of draft TSR documents in accordance with the Order. The TSR submission schedule must include "...the basis for the content, schedule, and level of detail proposed, basis for interim operation or

restrictions on interim operations, and administrative controls during the upgrade process." The part of the DOE contractor implementation plan (IP) that collectively documents "...a preliminary assessment of facility hazards,...bases for interim operation or restrictions on interim operations, and administrative controls during the upgrade process" is referred to as the "Basis for Interim Operation," or BIO. The BIO submittal applies to both DOE 5480.22 and DOE 5480.23.

The purpose of the BIO is to establish an interim safety basis by documenting provisions in place that provide safety to workers, the general public, and the environment through a summary description and identification of safety management programs, submission of the results of at least a qualitative (or semi-quantitative) safety analysis, and presentation of the controls in place at the facility to ensure that operations are conducted safely. The safety analysis is intended to provide assurance that hazards associated with processes at a facility have been identified, that characterization has been made of the potential impacts that deviations from normal operating parameters and conditions can have on facility workers, onsite workers, and the public, and that deviations with the potential for significant contamination of the environment have been evaluated.

A.3. SCOPE

The BIO submittal discussed in this Standard applies to any DOE nonreactor facility that is subject to the requirements of DOE 5480.22 and DOE 5480.23, and is a part of their IP. It is emphasized that because of the interim nature and expected level of effort of the BIO, maximum use of appropriate existing programs and safety documentation is encouraged, and discussions on the covered topics should be brief and by reference where possible. It is expected that summary text accompanying referenced information will be sufficiently detailed to provide adequate background and context for the presentation of major findings or

conclusions. It is not expected that the BIO will contain a derivation of assumptions used as a basis for results.

The BIO is a document that establishes an interim safety basis by summarizing and referencing safety analyses, safety and operating limits, institutional safety programs, implementing procedures, etc. Examples of such source material are existing SARs, safety evaluation reports (SERs), operational safety requirements (OSRs), preliminary hazard analyses (PHAs), health and safety plans, system design specifications, Conduct of Operations programs, and facility operating histories. Only when this material is not sufficient to establish the interim safety basis should additional information be developed. This appendix (and appendix B) includes guidance on the performance of safety analysis. Guidance on performing safety analysis should only be used when such material is absent at a facility. Where such material exists and is current and correct, it should simply be summarized in the BIO. All referenced material, either whole or in part, used to substantiate safety-related assertions or conclusions made in the BIO, becomes part of the interim safety basis and should be controlled accordingly. Material incorporated by reference in a BIO should not be submitted to DOE, but should be retained as a "BIO-related" controlled document at the facility and made available for review and audit upon request by DOE. The BIO itself may be submitted as a stand-alone document, and should not be considered an addendum to the existing SAR.

A.4. SAFETY ASSURANCE VIA BIO

The BIO establishes the interim safety basis for the facility; i.e., the information upon which DOE depends for its conclusion that operations at a facility can be conducted safely on an interim basis until SAR and TSR documents complying with the requirements of DOE 5480.22 and DOE 5480.23 have been approved. In this capacity, the BIO, including the supporting controlled referenced documentation, assumes the role of the

safety basis during the upgrade process. As such, the BIO must adhere to the safety basis principles prescribed by DOE 5480.23, although, consistent with its practical application, the BIO must satisfy the same principles at a significantly reduced level of detail of new analysis and presentation of information. The concept of safety basis prescribed in DOE 5480.23 encompasses not only the traditional emphasis on the hardware-related aspects of safety assurance, but also the managerial, institutional, and human factors dimensions as well. Additionally, it is to be applied not only to the assessment of safety with respect to the public, but also to facility and onsite worker safety and protection of the environment. As a result, existing safety analyses, however detailed, may not adequately address this broadened concept of safety basis established by DOE 5480.23, and additional effort, particularly with respect to institutional safety and worker safety, may be needed.

In accordance with the broadened safety basis concept of DOE 5480.23, the acceptability of the BIO depends upon its ability to demonstrate that the hazards at a facility are understood and controlled, as evidenced by (1) discussions of the facility's programmatic approach to safety management, (2) the results of a safety analysis (or analyses) at a level sufficient to identify vulnerabilities and establish restrictions on interim operations, and (3) identification of the controls placed on the facility to ensure safe operation, including the bases for the controls. For the purposes of this standard, these three elements are referred to as safety management, safety analysis, and operational controls, respectively. Together, these elements, along with supporting information such as facility description, document the interim safety basis in a manner similar to the chapters of DOE-STD-3009-94 that document the upgraded safety basis. The correspondence between the chapters of DOE-STD-3009-94 and the sections of the BIO as presented in section A-7 of this document is presented in table A.I.

TABLE A.I. Correspondence between DOE-STD-3011-94 and DOE-STD-3009-94

BIO Sections per DOE-STD-3011-94	SAR Chapters per DOE-STD-3009-94
Executive Summary Introduction	Executive Summary
Facility Description Relevant Operational History	Site Characteristics Facility Description Safety Structures, Systems, and Components
Safety Management	Prevention of Inadvertent Criticality Radiation Protection Hazardous Material Protection Radioactive and Hazardous Waste Management Initial Testing, In-Service Surveillance, and Maintenance Operational Safety Procedures and Training Human Factors Quality Assurance Emergency Preparedness Program Provisions for Decontamination and Decommissioning Management, Organization, and Institutional Safety Provisions
Safety Analysis	Hazard and Accident Analysis
Operational Controls	Derivation of Technical Safety Requirements

A.4.1 Safety Management. Facility safety on a day-to-day basis depends on safety management programs to ensure (1) adequate level of worker safety from routine industrial hazards, (2) adequate level of worker and public safety from normal operational releases and exposures, and (3) adequate level of worker and general public safety from postulated accidental release of radioactive and chemical hazardous material. Safety management is a broad discipline covering several topics, from hazard identification and assessment to hazard control during design and operation. [Subtopics under hazard control include radioactive and hazardous material waste management; criticality protection; radiation protection; hazardous material protection; training; testing; surveillance; maintenance; conduct of operations; configuration management; quality assurance (including document control); experimental review; provisions for decontamination and decommissioning (D&D); and emergency preparedness.] Documentation of safety management within the SAR (and consequently the BIO) is focused primarily on protection against accidental release of radioactive and chemical hazardous material. Routine industrial hazards and normal operational exposures are generally addressed outside the scope of the SAR and TSRs.

A.4.2 Safety Analysis. All facilities with radioactive materials should perform a hazard classification in accordance with DOE-STD-1027-92. Those facilities classified as Hazard Category 1, 2, or 3 should submit the results of the hazard classification activity as part of the BIO, and include a summary identification of the maximum hazardous radioactive material inventory, the facility hazard category, and the hazard categories of any facility segments. The performance of this activity satisfies the requirement for a preliminary assessment of facility hazards, as discussed in section 2.1 of DOE-STD-1027-92.

Additionally, Hazard Category 1, 2, and 3 facilities should also submit the results of a safety analysis (or analyses) as discussed in section

4.2.4.2. Facilities whose situations are consistent with section 4.2.4.2.a. should submit analytical results at least at the level of PHA. Facilities in other situations should grade the level of effort expended in satisfying the safety analysis element as appropriate to demonstrate that hazards are understood and safeguards are in place to protect against uncontrolled hazardous releases. It is expected that most facilities to which this guidance is applicable currently have some form of safety analysis, and that the existing analyses can be used, either whole or in part, to satisfy the majority of the safety analysis element.

The level of safety analysis appropriate for facilities consistent with section 4.2.4.2.a. should be comprehensive enough to ensure that all major hazards have been evaluated and that the dominant accident scenarios with the potential for significant impact inside or outside the facility have been identified. Scenario progression should include safeguards, both physical and administrative, in place at the facility that prevent or mitigate the consequences of the identified accident. This level of detail is necessary to establish the basis for restrictions on interim operation and administrative controls during the upgrade process, as required by DOE 5480.22 and 5480.23.

It is expected that the analysis will identify only a handful of major hazards and dominant accident scenarios. For scenarios resulting in a significant impact outside the facility, the extent of detail incorporated in the analysis must ensure that a qualitative or semi-quantitative determination of the consequences and frequencies of the identified scenarios can be made. Scenarios that only impact inside a facility should be defined only qualitatively. In both cases, the level of detail must be sufficient to identify areas where design or operational flaws could constitute vulnerabilities.

The results should correspond to the level of detail presented below:

a. Hazard Identification - Hazard identification is generally based on the use of worksheets in conjunction with methodical facility walk-throughs and document reviews to produce a list of hazardous material and energy sources in terms of hazard type, quantity, chemical and physical form, process or storage condition, and location within the facility or process. This results in the determination of material, system, process, and plant characteristics that can potentially lead to an upset condition.

b. Hazard Classification - Hazard classification is performed in accordance with DOE-STD-1027-92. It results in the classification of the facility or facility segment according to the hazard categories defined in DOE 5480.23.

c. Process Hazard Analysis (PrHA) - Process hazard analysis, which includes PHA as the most basic type, links hazards with plant conditions to develop a set of accident scenarios. It is expected that PHA techniques, which develop qualitative or semi-quantitative accident scenarios defined on a functional level, will represent an appropriate level of analysis for the majority of processes. This approach is based on the postulation of deviations from design intent, followed by an evaluation of the adequacy of existing preventive and mitigative features to meet their intended safety functions.

To make maximum use of existing, appropriate analyses, it is expected that this process will include a review of existing analyses to determine the adequacy of accident

scenarios already identified, and develop additional scenarios, if necessary.

The level of functional resolution of the process, detail of scenario progression, and extent of numerical analysis should be determined in accordance with the graded approach, to allow for practical development of BIOs within the time and resources available. This effort will be directly applicable to the SAR itself. Additional guidance on PHA is presented in appendix B.

Completeness of hazard identification may be addressed through the use of accident initiator and scenario lists to provide assurance that all significant potential events have been addressed. Potential accident initiators include internal man-made initiators, external man-made initiators, and natural phenomena events. The analysis then evaluates the spectrum of possible subsequent events, with the aim of identifying potential design or procedural vulnerabilities and establishing the adequacy of preventive and mitigative features that protect against the release of hazardous material from intended confinement barriers. The analysis should include gross estimates of the consequences and frequencies of identified scenarios (the word "gross" is used to emphasize that the level refinement should be limited to that needed to place the scenario into a risk matrix, such as that shown in table B.I). This information is necessary for communicating the bounding hazard potential of the facility, and for presenting a baseline set of deviations against which the operational controls portion of the BIO can be assessed. Dominant contributors to risk (e.g., scenario Classes I and II in table B.I) should be explicitly identified and discussed. The results can also be displayed in a matrix of consequence versus frequency to illustrate the relative and absolute significance of each scenario.

Evaluation of internally initiated accident scenarios should be based on physical possibility of the initiator. Use of a minimum release frequency threshold such as 10^{-6}/yr for scenario binning should not be used as an absolute cutoff for dismissing low-probability accidents without any evaluation of preventive and mitigative features. This distinction is made to prevent "pencil sharpening" as a means of circumventing an objective evaluation of process hazards. Externally initiated man-made accident scenarios should be evaluated if they can cause a release with a frequency greater than 10^{-6}/yr as conservatively estimated, or 10^{-7}/yr as realistically estimated, in accordance with DOE-STD-3009-94. Natural phenomena event frequencies should be based on DOE 5480.28 and its associated implementation standards.

Among currently established and documented PrHA methods, PHA techniques represent the minimum level of analytical detail that can effectively identify vulnerabilities, thus serving as a basis for identifying restrictions on interim operations and administrative controls during the upgrade. Appendix B, Techniques of Preliminary Hazards Analysis, presents guidance on the performance of PHA for the purpose of the BIO for facilities performing additional analysis beyond that already included in the facility's existing safety basis. Additional information on the nature and applicability of PHA can be found in many references, such as Guidelines for Hazard Evaluation Procedures, Second Edition with Worked Examples, Center for Chemical Process Safety, American Institute of Chemical Engineers (AIChE), 1992. It is emphasized that PHA techniques represent a minimum level of analysis, and that additional, more sophisticated techniques may be appropriate for certain processes based upon the details of the processes being evaluated. In these cases, the use of additional PrHA methods, of which PHA is only one example, should be considered. Discussions of PrHA methods and their applications can be found in the above referenced AIChE document, as well as in DOE-STD-1027-92 and DOE-STD-3009-94.

A.4.3 Operational Controls. OSRs and lower tier documents, where they exist, maintain the safety envelope for a facility for the purpose of the BIO. OSRs consist of safety limits, operating limits, surveillance requirements, and administrative controls needed to satisfy the safety envelope derived in the SAR, and the bases thereof. As defined in DOE 5480.22, safety limits are limits on process variables associated with those physical barriers, generally passive, that are necessary for the intended facility function and found to be required to guard against the uncontrolled release of radioactivity and other hazardous materials. Operating limits consist of limiting control settings (LCSs) and limiting conditions for operation (LCOs), and represent the bounds of normal operation. Additionally, administrative controls implement safety programs that also bound the limits of normal operation. Surveillance requirements ensure that the necessary operability and quality of structures, systems, and components (SSCs), and their support systems required for safe operation of the facility are maintained. Lower tier documents, such as procedures, are reviewed against OSRs to ensure that the facility is maintained in a safe configuration during all phases of operation.

For facilities without a formal OSR structure, the safety envelope should be maintained by specific commitments to which a facility agrees to adhere to ensure safe operation of the facility. These commitments include those physical and administrative mechanisms by which the facility is prevented, with significant margins, from entering into an unsafe or unanalyzed condition.

A.5. SAFETY ACCEPTANCE GUIDELINES

No numerical acceptance criteria will be used for comparison to BIO results. Instead, BIOs will be assessed for evidence that hazards are comprehensively evaluated, that risks are not uncharacteristically high, and that a defense-in-depth philosophy has been applied to the control of

hazards and the identification and correction of potential design or procedural vulnerabilities.

A.6. BIO AS BASIS FOR UNREVIEWED SAFETY QUESTION (USQ) DETERMINATION

The concept of the USQ was established to allow contractors to make physical and procedural changes and to conduct test and experiments without prior DOE approval, as long as these changes do not explicitly or implicitly affect the authorization basis for the facility operations or result in a reduction of the safety margin for an operating limit in the TSR. USQs are both backward and forward looking, covering planned modifications as well as identified inadequacies in existing safety analyses.

An approved BIO and its controlled referenced documents will be considered as the baseline safety documentation against which USQ determinations can be made in accordance with DOE 5480.21. USQ evaluations are to be assessed against information contained in both the BIO and its supporting documentation; i.e., the safety-related documentation upon which the authorization basis depends during the SAR and TSR upgrade programs. Revisions to the BIO or its references as a result of USQ findings should be made in accordance with DOE 5480.21.

A.7. FORMAT AND CONTENT

The following is a list of topics that the BIO should cover. Explanations are provided for topics as necessary. The suggested discussions of the topics are not necessarily exhaustive. The format presented below is not the only acceptable format, and other formats such as those in DOE 5480.23 or DOE-STD-3009-94 can be used if deemed appropriate. Referenced documentation should be clearly identified, and its relationship to the information presented should be apparent.

a. Executive Summary

Present a summary of the results of safety analyses including the hazard classification of the facility, safety assurance programs, identified vulnerabilities, compensatory measures, restrictions on interim operations, and operational history. Summarize the upgrade schedule for the facility, identifying exemption requests (if any), and discuss the operational expectations for the facility in the future.

b. Introduction

Present the reasons for the BIO and give a brief background about the facility, its current mission, its contribution to the site mission, its past relevant operating history, and the status of the existing authorization basis.

c. Facility Description

Provide a brief description of the facility, its designed mission, its processes, and the primary SSCs that are important to safety; e.g., those SSCs that have been given credit in the Safety Analysis section of the BIO submittal. The purpose of this section would be to develop a basic understanding of how the facility operates and an appreciation of the facility structure and operations without a need for extensive consultation of the controlled references.

d. Relevant Operational History

Provide descriptions of any significant abnormal occurrences and/or accidents, along with any compensatory measures that were planned or implemented. Summarize any safety-related changes to

the facility condition subsequent to issuance of DOE operation authorization, and/or the last update of the safety documentation. Provide a brief description of the significant safety-related findings from the most recent Operational Readiness Review (ORR), and/or inspection and audit.

e. Safety Management

Briefly discuss and reference the facility's programmatic approach to safety management for workers and the general public. Discussions under the safety management topic should cover the following programs as appropriate: radioactive and hazardous material waste management; criticality protection; radiation protection; hazardous material protection; training; testing; surveillance; maintenance; conduct of operations; configuration management; quality assurance; provisions for D&D; experimental review; and emergency preparedness. It is expected that discussions on each topic will not exceed a few sentences, and that reference will be made to controlled source documentation as appropriate.

f. Safety Analysis

Discuss and reference the approach for hazard identification and hazard classification as defined in DOE-STD-1027-92. Submit the results of a safety analysis (at least at the detail level of PHA, summarizing valid existing analyses to the maximum extent possible) as the analytical basis for the assurance of safety for the facility. Provide a description of the analytical methods and results, referencing controlled source documentation as appropriate. Discuss the impact of postulated accidents on workers and the general public, and evaluate the potential for contamination of the environment.

The potential for contamination of the environment should be limited to an evaluation of whether large accidental releases with the potential to cause significant environmental insult exist that an obvious and easily implemented design or operational change could minimize.

The dominant accident scenarios should be identified and evaluated qualitatively or semi-quantitatively. Identify any potential design, procedure, or equipment vulnerabilities related to the presented scenarios, and describe the administrative controls, compensatory measures, or restrictions on interim operation implemented as a result of the identified vulnerabilities.

Explicitly identify the system functions and operator actions (if any) that have been credited in each scenario analyzed. Briefly discuss the approach to deriving the estimates for credited system unavailabilities and/or operator error probabilities. (In both cases, these would be approximate estimates, while accounting for uncertainties by erring in the conservative direction.)

In addition, for highest risk scenarios (such as those with Class I or II designation in table B.I), discuss the potential for administrative controls, compensatory or corrective measures, and/or restrictions on the operation of the facility to reduce their consequences or frequencies (such as to scenario Class II designation or lower in table B.I). For lower risk scenarios, any cost-effective or simple fixes for risk reduction that have been identified during the PHA should also be discussed. Based on these discussions, an assessment should be made of the adequacy of existing safeguards or, alternatively, specific commitments should be made for modifications (or further analysis) directed at further reducing facility risk.

g. Operational Controls

Discuss and reference the controls in place that maintain the safety envelope of the facility, covering such topics as OSRs, restrictions on operations, and administrative controls. As part of OSR discussions, include identification of the OSR document or its equivalent; date of last major update (draft or final); identification of the guide that was used as basis for the existing OSRs, or its substitute; and special administrative controls, restrictions on operations, or removal of a hazardous material that may have been instituted.

Discussions should focus on presenting the controls for dominant scenarios (such as Class I and II scenarios from table B.I, or Class III and IV scenarios if no Class I or II scenarios are present), detailing the specific safeguards that the facility commits to preserving and how these safeguards are maintained. This should include items such as identification of the safety function, gradation of safety systems, operability requirements, procedures, surveillances, and OSRs. Note that the dominant scenarios might have as their receptors facility workers, onsite workers, the general public, the environment, or any combination thereof. Thus, the scope of the discussions under operational controls is not limited to any one class of receptors.

Additionally, any safeguards that are considered significant contributors to facility safety from a defense-in-depth perspective can be identified. The identification of such safeguards here is not intended to be exhaustive, and discretion should be used to limit the identified safeguards (if any) to a reasonable number.

Selected portions of some of the referenced documents, in particular the OSRs or their equivalent, may be submitted along with the BIO, to expedite the review process.

A.8. SUMMARY

The BIO submittal, along with the BIO-related controlled documentation, will serve as the interim safety basis until updated SAR and TSR documentation is approved by DOE. Hazard Category 1, 2, and 3 facilities must, as part of their IPs, submit BIOs containing sections on hazard identification and hazard classification in accordance with DOE-STD-1027-92. The safety analysis section should include the results of safety analyses at the level of PHA (at a minimum), identifying the dominant accident scenarios, potential facility vulnerabilities, and the administrative controls, compensatory or corrective measures, or restrictions on interim operation implemented as a result of the identified vulnerabilities. The operational controls section should discuss the specific safeguards for highest risk scenarios.

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APPENDIX B

Techniques of Preliminary Hazards Analysis[1]

B.1. PURPOSE AND SCOPE

The Preliminary Hazard Analysis (PHA) methodology briefly discussed below represents a level of analytical detail appropriate for preparation of a Basis for Interim Operation (BIO) for facilities whose situations are consistent with section 4.2.4.2.a. It is emphasized that the BIO should make maximum use of existing analyses, and that the performance of additional analysis should be restricted only to those cases where current existing analyses are insufficient to establish an interim safety basis at a facility, given the degree of compensatory measures and restrictions on interim operation to be implemented. In the absence (whole or partial) of existing safety analyses, this methodology can be used in the preparation of BIOs to ensure a comprehensive assessment of facility hazards and to identify the dominant accident scenarios associated with all processes within a facility that have the potential to significantly impact inside or outside the facility.

This Standard calls for the performance of a functional-level PHA for most facilities. PHAs have been in use in the chemical industry for many years. For a functional level PHA, the facility is split into nodes representing major unit functions, such as receiving, storage, dissolution, and glovebox operations. The PHA team then investigates deviations from design intent. Examples of deviations are uncontrolled reactions, explosions, criticality, crane drops, and spills.

[1]Adapted from Guidelines for Hazard Evaluation Procedures, Second Edition with Worked Examples, American Institute of Chemical Engineers, 1992.

The team first addresses the causes and consequences of these deviations. If a cause is identified and there are significant consequences, the team will then discuss existing safeguards. If the team considers that these safeguards are not adequate, it may then recommend design or procedural changes, and/or further analyses.

A typical PHA team consists of a team leader, a scribe, and a number of cognizant facility operators. Participation of facility operators throughout the PHA team exercise and subsequent analysis is crucial to the success of the effort.

For scenarios with the potential for significant impact inside a facility, a qualitative search for the most significant events or vulnerabilities is appropriate. These would encompass those activity elements that significantly deviate from accepted standards of good practice or process norms. Each accident scenario derived from PHA has an initiating event, subsequent success or failure of preventive or mitigative features and/or operator responses, gross estimates of a release source term (or internal consequence), and the frequency and consequence (external) of the scenario. These characteristics can be qualitative or semi-quantitative. The identified scenarios are then binned on a risk matrix to focus attention on those scenarios that are of greatest concern.

B.2. ANALYSIS PROCEDURE

Performing a PHA identifies major hazards and accident scenarios that could result in undesired consequences. In addition, the PHA should also identify design changes or operational alternatives that could eliminate or reduce those hazards. Obviously, experience is necessary in making such judgements. For each area of the subject process, analysts identify hazards and evaluate the possible causes and effects of potential accidents involving these hazards. The scenarios should

cover the entire spectrum of possible events for a given hazard: from small consequence events, for which existing procedures or equipment is acknowledged to provide adequate protection, to reasonable worst-case conditions, in terms of both accident frequency and consequence magnitude. Unlike "worst-case," "reasonable worst-case" does not consider every parameter to be in its most unfavorable state. Thus, if a toxic material is normally handled as a liquid at room temperature during processing, a reasonable worst-case release does not have to consider a spill with the liquid at 130 °F. Each scenario is then located on a "risk matrix" of the type shown in table B.I based on its consequence and frequency. Finally, the team classifies the significance of the scenario based on its location within the matrix. A typical set of scenario classes are:

Scenario Class IV - Negligible
Scenario Class III - Marginal
Scenario Class II - Serious
Scenario Class I - Major

Scenario classes are associated with sectors of the risk matrix in such a way as to prioritize accident scenarios for review or further analysis primarily in terms of the risk that they present, with the consideration that scenarios in the low-consequence sectors should represent no more than a marginal concern, regardless of the frequency.

In general, the approach to scenario ranking is based on the detail for a given facility and the experience of the analysts, and there are many acceptable approaches using both qualitative and quantitative methods of ranking scenarios. Tables B.II and B.III provide examples of a consequence classification mechanism using qualitative and quantitative measures for scenario binning, depending upon the receptor. Note that the values in tables B.II and B.III are intended for binning purposes only

TABLE B.I. Example PHA Risk Matrix - Consequence Versus Frequency

High Cons.	II	I	I
Moderate Cons.	III	II	I
Low Cons.	IV	III	III
	below 10^{-4} /yr	10^{-4} to 10^{-2} /yr	above 10^{-2} /yr
		Frequency	

TABLE B.II. Radiological Accident Consequence Levels*

	Public	Workers
High Cons.	> 5 rem at site boundary	> 25 rem at 600 m or prompt death in facility
Moderate Cons.	> 0.1 rem at site boundary	> 0.5 rem at 600 m or serious injury in facility
Low Cons.	< Moderate	< Moderate

*Values are intended for binning purposes only and do not reflect the acceptability of accident consequences.

TABLE B.III. Chemical Accident Consequence Levels*

	Public	Workers
High Cons.	> ERPG-2 at site boundary	> ERPG-3 at 600 m or prompt death in facility
Moderate Cons.	Not applicable	Serious injury in facility
Low Cons.	< High	< Moderate

*Values are intended for binning purposes only and do not reflect the acceptability of accident consequences.

and do not reflect any consideration regarding risk acceptance. Other schemes could be used, based on the specific needs of the application. It is important to note that these schemes are just auxiliary tools, and that the use of a quantitative binning mechanism does not imply the need for extensive quantitative development of scenarios. Where calculations are performed, rough numerical estimates are generally appropriate for binning. Alternatively, judgement can be used to bin qualitatively defined scenarios within a quantitative matrix, recognizing that such a practice is no less rigorous than the binning of qualitative scenarios within a qualitative matrix. In fact, one consideration in the choice of numerical consequence thresholds for table B.II was that the range should be broad enough to allow placement of qualitatively defined scenarios in the moderate consequence bin, without the need for precise numerical evaluation.

Qualitative estimates of frequency are made by estimating the frequency of the initiating event, along with the (conditional) probabilities of all other events necessary for the propagation of the accident leading to a release of radiological or toxicological material. Failure rate data, historical accident data, and other sources of information may be used to determine accident frequency. Scenarios should be defined on a functional level, using best-estimate values to describe the unavailability of each function under the accident conditions to which the corresponding system is exposed. Uncertainties in parameter values should be accommodated by erring in the conservative direction from best-estimate values. Phenomenological uncertainties should be handled in a similar fashion.

Consequences are determined based on parameters such as the bounding quantity of hazardous material involved in the accident, the release mechanism associated with the accident, and the release pathway taken by the hazardous material. Judicious use of conservative assumptions should be made in the determination of consequence magnitudes as well. Again, uncertainties in parameter values should be accommodated by erring in the conservative direction from best-estimate values. Uncertainty in the

placement of a scenario on the risk matrix should be incorporated by assigning to the more significant (i.e., lower) scenario class. Regardless of the specific method used, consistency in application of the method is crucial to prioritizing scenarios for recommendations or further analysis.

In general, "back-of-the-envelope" calculations are appropriate for estimating numerical quantities. For example, the use of simple, straight-line Gaussian dispersion calculations is considered an appropriate level of detail for analysis. The use of complex models or computer codes is considered to be beyond the level of analytical rigor implied by PHA, and where uncertainties in outcome cannot be resolved by straightforward methods, it is generally acceptable to simply make the conservative assumption. The selection of release fractions used in source term estimation should be well documented in the PHA because consequence results are particularly sensitive to assumptions made concerning them. DOE-HDBK-3010-94 contains current DOE guidance on the selection and application of release fractions, release rates, and respirable fractions for accidents at DOE nonreactor nuclear facilities.

B.3. ANTICIPATED PHA WORK PRODUCT

Provide the PHA tables (typically containing node designation and description; index number; parameter; deviation; causes; consequences; safeguards or preventive and mitigative features; and recommended actions, notes, or remarks) or other equivalent analysis as an attachment to the BIO submittal. A summary of the PHA results, including accident analysis, is included in the main text in the safety analysis section and should include the topics described therein.

APPENDIX C

Site-Wide and Activity-Specific Safety Documentation

C.1. INTRODUCTION

DOE encourages the use of site-wide safety documents to address specific topics that are applicable to all facilities located on a given DOE site for safety analysis report (SAR) upgrades as well as for Bases for Interim Operations (BIOs). Similarly, DOE also encourages the use of activity-specific safety documents to address topics or safety analyses that are applicable to facilities, activities, or operations occurring in several locations on the same DOE site (or that may even occur at different DOE sites) for SAR upgrades as well as for BIOs.

Numerous implementation plans submitted so far have proposed site-wide SARs, site-wide SARs with facility-specific addendum, and activity-specific SARs for SAR upgrades as well as for BIOs. DOE 5480.23, 9.a., requires SARs for DOE nuclear facilities. As such, it does not allow site-wide SARs or activity-specific SARs. DOE 5480.23 requirements for the scope and content of a SAR do not permit an individual topic to be considered a SAR, even if applicable site-wide or to certain types of activities or operations. Therefore, site-wide or activity-specific safety documentation that addresses such narrow issues cannot be designated a SAR for purposes of meeting DOE 5480.23 requirements.

Nevertheless, DOE recognizes and agrees that there are topics to be addressed in a facility-specific SAR that may be better considered on a site-wide basis through controlled reference documents, and that there are activities common to many facilities that may be better addressed in an activity-specific controlled reference document.

C.2. SITE-WIDE SAFETY DOCUMENTATION

Site-wide safety documents can and should be referenced in a facility-specific SAR in those sections where the information contained in such site-wide references are applicable and can be summarized. The site-wide safety documents should be submitted to DOE for approval prior to submitting the facility-specific SARs in which they are referenced. This would expedite the review of the facility-specific SARs because there would be no need to review the DOE-approved site-wide documents referenced in them.

Examples of topics to be addressed in a facility-specific SAR, which may be better considered on a site-wide basis through controlled reference documents, include site characteristics, radiation protection program, waste management program, fire protection program, quality assurance program, hazardous material protection program, and emergency preparedness program.

C.3. ACTIVITY-SPECIFIC SAFETY DOCUMENTATION

Similarly, activity-specific safety documents can and should be referenced in a facility-specific SAR in those sections where the information contained in such activity-specific references is applicable and can be summarized. The activity-specific safety documents should be submitted to DOE for approval prior to submitting the facility-specific SARs in which they are referenced. This would expedite the review of the facility-specific SARs because there would be no need to review the DOE-approved activity-specific documents referenced in them.

The use of broadly applicable safety documents with topical analyses and generalized results in a facility-specific SAR should be carefully considered and justified for each facility's circumstances, including the specific operation and location. In particular, safety analyses referenced in a facility-

specific SAR must reflect the actual operations for that facility. A facility-specific SAR cannot refer to safety analyses that assume operations other than those performed at the given facility. The use and applicability of an activity-specific safety document as a reference in a facility-specific SAR should be justified in the SAR.

Many DOE efforts, including environmental restoration programs, hazardous waste storage facilities, high-level waste tank farms, decontamination and decommissioning sites, inactive process facilities or nuclear reactors, and uranium mill tailings remedial action sites, should consider use of activity-specific safety documents. Activity-specific safety documents may include reports on removal efficiencies for a particular filter, release fractions from dropped waste containers, hydrogen generation rates for wet radioactive sludges, source terms for surface-contaminated objects, and other similar topics.

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CONCLUDING MATERIAL

Review Activities:

DOE	Operations/Field Offices	National Laboratories	Area Offices
DP	AL	EML	AR
EH	CH		BA
EM	OH		BK
ER	ID		PAO
LM	NV		
NE	OR		
	RFO		
	RL		
	OAK		
	SRO		

Preparing Activity:

DOE DP-31

Project Number:

SAFT-0019