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Revision 0

Approval of Waste Treatment and Immobilization Plant Contractor-Initiated Authorization Basis Amendment Requests (ABAR)

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Office of River Protection

P.O. Box 450
Richland, Washington 99352

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G. L. Jones
V. L. Callahan
WTP Safety Basis
Department of Energy - Office of River Protection

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Gregory L. Jones
Victor L. Callahan
Waste Treatment and Immobilization Plant Safety Basis
P. O. Box 450, Richland, Washington 99352
(509) 373-6821/(509) 373-9140
Gregory_L_Greg_Jones@rl.gov

Abstract

Objective: The objective is to describe the process used by the Office of River Protection (ORP) for evaluating and implementing Contractor-initiated changes to the Waste Treatment and Immobilization Plant (WTP) Authorization Basis (AB).

Relationship to the Workshop: The WTP Project's history has provided a unique challenge for establishing and maintaining an ORP-approved AB during design and construction. Until operations begin, the project cannot implement the classic Unreviewed Safety Question (USQ) process to determine when ORP approval of Contractor-initiated changes is required. A "quasi-USQ" process has been implemented that defines when AB changes could occur. The three types of AB changes are (1) Limited Scope Changes, (2) Authorization Basis Deviations, and (3) Authorization Basis Amendment Request (ABAR).

Description of the Work: DOE RL/REG 97-13, *Office of River Protection Position on Contractor-Initiated Changes to the Authorization Basis*, describes the process the WTP Contractor must follow to make changes to the AB, with and without ORP approval. The process uses a "safety evaluation" process that is similar to the USQ process but at a more qualitative level.

Results of the Work: The maturation of the WTP Contractor's facility design and activities, and other changing conditions, resulted in a process that allows the Contractor to make changes to the AB without ORP approval; however, those changes that may significantly affect nuclear safety **do** require ORP approval. This process balances the WTP regulatory principle of efficiency with assurance that adequate safety will not be compromised.

Benefits of the Work: The process has reduced the number of ABARs requiring ORP approval and reduced the potential for delays in design and procurement activities.

Introduction

The purpose of this paper is to summarize the salient features of the Office of River Protection (ORP) Waste Treatment and Immobilization Plant (WTP) Authorization Basis (AB) maintenance oversight function.

The initial concept for treatment and disposal of the high-level wastes at the Hanford Site was to use private industry to design, construct, and operate a WTP to process the waste from aging underground waste storage tanks. The WTP design was initiated in 1996 to build and operate facilities to treat the waste according to U.S. Department of Energy (DOE) specifications.

DOE developed a set of process, nuclear and radiological standards for the design of the WTP. DOE patterned its safety regulation of the WTP Contractor to be consistent with the concepts and principles of good regulation (stability, clarity, openness, efficiency, and independence) used by the Nuclear Regulatory Commission. These standards (including rules, DOE Orders, and standards) were consolidated into a single document called the Safety Requirements Document (SRD). This process meets the expectations of DOE's necessary and sufficient closure process (subsequently renamed Work Smart Standards process) in DOE Policy 450.3, *Authorizing Use of the Necessary and Sufficient Process for Standards-Based Environment, Safety and Health Management*, and is intended to be a DOE-approved process under DOE Acquisition Regulations (DEAR) 970.5204-2, *Laws, Regulations and DOE Directives*, Section (c).

The current WTP Project is a design-and-construct-in-parallel activity. The typical project would identify a design, get approval, and then construct. However, due to the long time for construction, DOE is allowing the Contractor to design the facility within the confines of process, radiological, and nuclear safety standards identified and approved prior to the design activity in the SRD. This process for nuclear safety allows waste treatment services to occur on a timely, predictable, and stable basis, with attention to safety.

The WTP Project is comprised of five unique facilities: (1) Pretreatment (PT) Facility, (2) Low-Activity Waste (LAW) Facility, (3) High-Level Waste (HLW) Facility, (4) Balance of Facilities (BOF), and (5) Analytical Laboratory.

- PT – Contain processes for pretreatment of waste transferred from the Hanford Site underground storage tanks before it is immobilized at the LAW and HLW Vitrification Facilities. Percent Complete: Design - 69% and Construction - 23%.

- LAW – Consists of two locally shielded melters and associated piping and vessels in adjacent process cells. The LAW melter systems are designed to immobilize pretreated waste and entrained solids that meet the LAW Vitrification Facility waste acceptance requirements when blended with the appropriate glass formers. Percent Complete: Design - 91% and Construction - 58%.

- HLW – The main HLW process facility is a 500,000 square foot, five-story structure that includes several belowgrade areas at different elevations. The HLW melter systems are designed to immobilize pretreated waste and entrained solids that meet the

waste acceptance requirements when blended with the appropriate glass formers. The quantity of glass produced will depend on the composition of the high-level waste. Each melter has a design capacity of up to 3 metric tons of glass per day. Percent Complete: Design - 82% and Construction - 18%.

- BOF – Consists of facilities and systems (not directly involved with processing or vitrification of radiological material) that are necessary for radiological waste processing by the other WTP facilities. For example, the BOF provides services and utilities such as electrical power, compressed air, and chilled water. Percent Complete: Design - 68% and Construction - 61%.

- Laboratory – Consists of facilities and systems that support process control, waste form qualification testing, limited technology testing, management of outsourced sample analysis, and receipt/analysis of samples. Percent Complete: Design - 77% and Construction - 46%.

ORP has established an Authorization Agreement with the WTP Contractor, Bechtel National, Inc. (BNI), authorizing full construction activities. This Authorization Agreement is the Construction Authorization Agreement (CAA) between ORP and BNI. The CAA defines the WTP AB as the composite of information provided by the WTP Contractor in response to radiological, nuclear, and process safety requirements (i.e., SRD). The implementation of these requirements forms the basis upon which the DOE grants permission to perform activities.

The following provides specific documents (including material incorporated by reference) that form the basis for DOE's decision to authorize full construction activities:

a. Safety Requirements Document (SRD), Volume II

b. Integrated Safety Management Plan (ISMP)

c. Quality Assurance Manual (QAM)

d. Radiation Protection Program for Design and Construction

e. WTP Criticality Safety Evaluation Report (CSER); the CSER documents the results of criticality safety analysis by which limits and controls associated with criticality safety are selected and confirmed by the Integrated Safety Management System (ISMS) process

f. Current Preliminary Safety Analysis Report (PSAR) and any associated safety evaluation reports (SER) written against the biennial update

The PSAR is currently in the form of several volumes. One volume contains the "generic" material that is pertinent to the entire WTP complex (e.g., site description, safety management programs, etc.). Then there are specific volumes for each of the WTP facilities identified above. These volumes contain the hazard/accident analysis, systems, structures, and components (SSC), and derivation of technical safety requirements (TSR). The facility-specific volumes are updated

biennially using a document called the Safety Envelope Document (SED). The SED is a "non-AB" document that is maintained current by the Contractor to within approximately 60 days of ORP approval of AB changes. The AB is not just relevant to specific ORP decisions but also serves several functions following the completion of a specific regulatory action. The AB describes the safety basis for the facility and is the benchmark used to evaluate the safety implications of changes made to a Contractor's facility design, operations, or administrative controls. The SRD portion of the AB identifies the standards which the Contractor uses to design, construct, and operate the facility, and against which the ORP assesses Contractor performance during each stage of the regulatory process. The importance of the AB to these ongoing activities and the need to maintain a credible safety basis for the facility requires that the AB be maintained. For changes to the SRD, the SRD must be maintained current so that both the Contractor and the ORP clearly understand the design criteria at any point in time. For potentially significant facility changes in the AB, as identified above, ORP approval of the change before its implementation is essential to ensure adequate nuclear safety is maintained. The AB for other facility changes and administrative controls changes is not updated as these changes are made, but periodically (at least biennially). The Contractor must keep records of all changes for periodic ORP oversight.

The maturation of the Contractor's facility design and activities, and other changing conditions, result in a need to establish a process for the Contractor to make changes to the AB that may significantly affect nuclear safety. This process needs to balance the WTP regulatory principle of efficiency with assurance that adequate safety will not be compromised.

There are three main types of Contractor-initiated changes to the AB:

- Limited Scope Changes – Changes(s) to the facility and to administrative controls without changing the AB
- Decisions to Deviate Changes – Change(s) to the facility that deviate from the facility description in the AB
- Authorization Basis Amendment Requests (ABAR) – Changes that require ORP approval prior to implementation

The purpose and process for each of these changes are discussed in the following sections.

Limited Scope Changes

Limited scope changes are those that do not involve major reorganizations of the Integrated Safety Management Plan (ISMP) or PSAR, or that broadly affect these documents. Limited scope changes are not potentially significant design changes. These types of changes can be made without prior ORP approval as long as the Contractor performs a safety evaluation. The safety evaluation must determine that the change complies with all applicable laws and regulations, conforms to the SRD, and provides adequate safety. Basically, the limited scope change might affect the level of detail in the AB but does not involve a significant facility design change. A significant facility design change is a change that meets one of the following:

1. Creates a new design basis event (DBE).

2. Results in more than a minimal increase in the frequency or consequence of an analyzed DBE as described in the safety analysis report.

3. Results in more than a minimal decrease in the safety functions of important-to-safety SSC.

4. Changes how an SSC meets its respective safety function – Changes how a safety class (SC) SSC meets its respective safety function, or for radiological protection of co-located workers or facility workers, changes how a safety significant (SS) SSC meets its respective safety functions.

Note: The criterion allows the Contractor to modify how a SS SSC meets its respective safety function for hazardous chemicals without prior ORP approval.

The Contractors safety evaluation is provided as Figure 1. The safety evaluation process is very similar to the unreviewed safety question (USQ) process used for operating facilities.

Figure 1 - Example Part 1 Safety Evaluation

Part 1 Safety Evaluation			
Description of change:			
Discussion of hazards and/or event sequence:			
Discussion of frequency, consequences, severity levels:			
Discussion of control strategies:			
		YES	**NO**
1.	Does the change affect the safety envelope (SRD and applicable facility SED[s]), or is it a "broad scope" change?	☐	☐
	Basis:		
2.	Does the change create a new DBE?	☐	☐
	Basis:		
3.	Does the change result in more than a minimal (≥ 10 %) increase in the frequency or consequence of an analyzed DBE as described in the SED?	☐	☐
	Basis:		
4.	Does the change result in more than a minimal decrease in the safety functions of important-to-safety SSCs or change how a Safety Design Class or Safety Class SSC meets its respective safety function, or, for radiological protection of co-located workers or facility workers, change how a Safety Significant SSC meets it safety function?	☐	☐
	Basis:		
5.	Does the change result in a noncompliance with applicable laws and regulations (i.e., 10 CFR 820, 830, and 835) or nonconformance with top-level safety standards (i.e., DOE/RL-96-0006)?	☐	☐
	Basis:		
6.	Does the change fail to provide adequate safety?	☐	☐
	Basis:		

If all the answers to the questions are "no," to questions 1-5 and "yes" to question 6, then the Contractor may make the changes without prior ORP approval. If there is a "yes" answer to questions 2 through 5, the change is considered "significant" and ORP approval of an ABAR is required (which is discussed later in this paper). Monthly, the Contractor submits a summary of all safety evaluations that do not require ORP prior approval. ORP reviews the safety evaluations to ensure agreement that a change does not involve a significant change. In addition, ORP has established an adequacy review checklist to ensure the Contractor has provided sufficient information and justification to allow an independent qualified reviewer to reach the same conclusion. Figure 2 provides the ORP Safety Evaluation Adequacy Review.

Facility case-by-case noncompliances with SRD implementing codes and standards with narrow application may be made as a limited scope change provided a safety evaluation is transmitted to ORP within 30 days of identification of the noncompliance or determination of the need for the noncompliance. The safety evaluation must conclude that the deviation complies with all applicable laws and regulations, conforms to the SRD safety criteria, and provides adequate safety. A limited scope change involving SRD noncompliance would (1) involve work not yet initiated that would impact cost or schedule if not done on a timely basis, or (2) work already completed if re-work would impact cost or schedule. If OPR determines that the justification for the noncompliance is insufficient, the Contractor must correct the noncompliance within 60 days of written notification.

The Contractor may not make revisions to the SRD safety criteria without prior ORP approval. The Contractor may not make changes to the SRD Implementing codes and standards without prior ORP approval, except decisions to deviate (DTD) discussed later in this paper.

For limited scope changes, the Contractor will update the AB (PSAR or the ISMP) at least every two years, commencing in September 2003, if changes have been made in the prior two years that affect the PSAR or the ISMP. This update will be submitted to ORP for approval.

Figure 2 - ORP Monthly Safety Evaluation Adequacy Review Checklist

The questions below should be asked to ensure that changes evaluated by Part 1 Safety Evaluations (SE) do not inadvertently significantly change the authorization basis and hence require an ABAR/ORP approval. After reviewing the Part 1 SE there are two outcomes, (1) the Part 1 SE is acceptable and the change can be implemented at the next scheduled update to the PSAR, or (2) there are questions that need to be clarified prior to a determination. If the review determines an acceptable Part 1 SE, document the fact that a review was performed by signing the form and returning to the Safety Basis Team Lead for filing. If there are "unacceptable" results, provide a justification as to why it is unacceptable. Discuss with BNI to resolve the questions/issues. Maintain the original justifications and add clarifying statements provided by discussions with BNI to make it acceptable. If after the discussion with BNI, the ORP SB engineer believes the proposed change should be addressed by an ABAR, involve the SB Team Lead to reach agreement with BNI on path forward. Document the path forward in the recommendation section, sign form and submit to Safety Basis Team Lead for Concurrence and filing.

	Adequacy Review		Justification if Unacceptable
Technical	Acceptable	Unacceptable	
1. Does the Part 1 SE provide the reason for the change or addition in sufficient detail to understand the basis for the change? (Is the change required?)	☐	☐	
2. Do the answers to the safety evaluation questions include a discussion of why... hazards are not affected?	☐	☐	
3. ...potential accident/event sequences (i.e., frequency) are not affected?	☐	☐	
4. ...accidental consequences are not affected? (public, co-located worker, and the worker)	☐	☐	
5. ...control strategies and alternatives are not affected?	☐	☐	
6. Is the change adequately justified as not involving a broad scope perspective?	☐	☐	
7. Are changes to other AB/safety envelope documents requiring modification identified, as applicable?	☐	☐	
8. Could a knowledgeable reviewer identify the technical issues considered and the basis for the determination of safety?	☐	☐	
9. If ISM meeting minutes are referenced, do the minutes specifically describe the change? Are they detailed enough?	☐	☐	
10. Are there other technical issues? Describe.	☐	☐	
Recommendation/Path Forward:			

Reviewers	Name	Date
Responsible ORP/WTP SB Engineer		
Safety Basis Team Lead		

Decision to Deviate

Prior to the start of cold testing, for change(s) to the facility that deviate from the facility description in the AB that must be made under the provisions of an ABAR or for changes to SRD implementing codes and standards that potentially affect cost or schedule, the Contractor may make these changes without prior ORP approval provided that:

a. The Contractor has performed an evaluation and determined the following:

   1. Conformance with applicable laws and regulations, top-level standards and principles, and SRD safety criteria is maintained.

   2. Specific change(s) to be authorized do not cause or threaten imminent danger to the workers, the public, or the environment from radiological, nuclear, or chemical hazards.

b. The specific change(s) that will deviate from the AB have been identified.

c. The Contractor's process for implementing the change(s) is consistent with the documentation and administrative controls described in DTD.

d. Delay of implementation of the change(s) could affect cost or schedule.

During the WTP construction phase, the Contractor notifies ORP of each Contractor-approved deviation from the AB:

1. Either verbally or in writing within 24 hours.

2. In writing including a copy of the Contractor's approval within 3 working days.

As soon as practical but not later than 60 days following the decision to deviate from the AB, an ABAR that will resolve the deviation from the AB is approved by the Contractor and submitted to ORP. ORP approval of amendment requests submitted resulting from decisions to deviate shall be obtained within 120 days of the Contractor's approval of these change(s).

If time limits specified are not met, extensions to the 60-/120-day time limits may be requested and be approved by ORP when adequate justification for the delay is provided. If time limits specified are not met and extensions are not requested and/or not approved by DOE, then:

1. All physical work associated with implementing the authorized change(s) (as documented in the decision to deviate documentation) shall stop.

2. Corrective action shall be immediately taken to promptly correct the deviations.

All revisions to the AB associated with AB deviations shall be completed and resolved prior to the start of cold-testing.

Authorization Basis Amendment Requests (ABAR)

If the proposed change(s) does not meet the conditions of approval for limited scope changes or are in response to a decision to deviate, ORP approval is required. An AB revision that requires the approval of ORP prior to implementation may be executed following ORP approval of the request to amend the AB. An amendment request, submitted to ORP by means of an ABAR, shall include the following:

a. Description of the proposed revision.

b. Reason for the proposed revision.

c. Description of the proposed implementation schedule for the revision and associated change(s).

d. Copy of the AB document or appropriate excerpt showing the proposed revision.

e. Safety evaluation of the proposed revision as described in limited scope changes as applicable for the type of change(s).

f. If the revision involves the deletion or modification of a standard previously identified in the approved SRD, certification that the revised SRD will identify a set of standards that will continue to provide adequate safety, comply with all applicable laws and regulations, and conform to top-level safety standards.

The SRD will be updated within 30 days of Contractor receipt of ORP approval of the ABAR. For facility changes, the Contractor will update the AB (PSAR) every two years, commencing in September 2003, if changes have been made in the prior two years. This update will be submitted to ORP for approval.

Upon receipt of the ABAR from the Contractor, ORP performs an adequacy review to ensure there is sufficient information to allow a qualified review. ORP has developed an "Adequacy for Review Checklist" to document that an ABAR meets ORP expectations (see Figure 3).

Figure 3 - ABAR Adequacy for Review Checklist

Technical	Adequacy Review: Acceptable	Adequacy Review: Unacceptable	Justification if Unacceptable
1. Does the ABAR provide the reason for the change or addition in sufficient detail to understand the basis for the ABAR? (i.e., what is the current wording in the SED, what is proposed and SRD requirement being met by the proposed change/addition?)	☐	☐	
2. Are all SE questions answered for each change and the bases provided?	☐	☐	
3. Does the description of the change/addition or answers to the safety evaluation questions include a discussion on hazards?	☐	☐	
4. ...on potential accident/event sequences?	☐	☐	
5. ...on accidental consequences? (public, co-located worker, and the worker)	☐	☐	
6. ...on control strategies and alternatives considered and justified?	☐	☐	
7. Is the hazard evaluation (items 3-6, above) documented in sufficient detail in the changed AB/safety enveloped pages such that an independent reviewer comes to the same conclusions?	☐	☐	
8. Is the change broad scope perspective? If so, have all affected facilities been included in the ABAR? If not why not?	☐	☐	
9. If the change is to an SSC not currently described in the AB, should it be? (i.e., should Chapter 2 of the Authorization Basis be modified?)	☐	☐	
10. Are other AB/safety envelope documents affected?	☐	☐	
11. Could a knowledgeable reviewer identify the technical issues considered and the basis for the determination of safety?	☐	☐	
12. Does the ABAR conflict with pending/unapproved AB changes?	☐	☐	
13. If ISM meeting minutes are referenced, do the minutes specifically describe the change? Are they detailed enough?	☐	☐	
14. Should a meeting be held with DOE, prior to ABAR submittal, to discuss technical issues?	☐	☐	
15. Are there other technical issues? Describe.	☐	☐	

Administrative	Adequacy Review: Acceptable	Adequacy Review: Unacceptable	Justification if Unacceptable
1. Are ABAR page changes numbered, complete?	☐	☐	
2. Have correct revisions of all documents been used?	☐	☐	
3. Are all the applicable implementing documents and activities listed and provided on a CD?	☐	☐	

After the adequacy review, ORP determines if a team review involving unique discipline support is required or that the safety basis engineer is sufficient to perform the review. In either case, the review is performed and documented in a safety evaluation report (SER) approved by the ORP Manager. The SER documents a summary of changes with respect to overall safety adequacy. In addition, the explicit individual page/section changes are evaluated on their own merit as well. Based on the results of the review, there are three possible approval mechanisms:

1. Approved as submitted.

2. Approved with directed changes where specific wording modifications are required by ORP.

3. Approved with Condition(s) of Acceptance (COA), where most of the document is considered approved but additional analysis or supporting documentation is required by ORP for specific review to close an issue.

When the Contractor submits an ABAR, the pages being modified are not the actual pages of the PSAR. In fact, the Contractor uses the language of "Page changes to the PSAR as represented by the SED." As mentioned in the introduction to this paper, the SED encompasses the hazard and accident analysis, SSC, and TSR sections of the PSAR. When an ABAR is approved, the SED, not the PSAR, is updated within 60 days of approval. The SED is the main document that the Contractor engineering forces refer to when evaluating design and design changes. When the PSAR is updated biennially, the SED is folded into the PSAR facility-specific volumes verbatim. For the biennial update to the PSAR, the Contractor updates necessary information collected over the previous two years and submits to ORP for approval and for updating of the CAA.

Future Challenges

Future challenges that ORP will face that involve the AB are:

- Transitioning from PSAR to Documented Safety Analysis (DSA) on a facility-by-facility basis, not as a project, and

- Regulatory aspect of maintaining oversight of pre-DSA AB evolutions coupled with DSA-compliant facilities at the same time. This includes establishing the USQ processes for some facilities.

The DSA for each facility must be approved by ORP and implemented (including associated readiness activities) prior to "hot commissioning." The current baseline schedule for each facility is:

- PT Hot Commissioning – Baseline September 2017
- LAW Hot Commissioning – Baseline July 2012
- HLW Hot Commissioning – Baseline December 2017
- BOF Hot Commissioning – Baseline May 2011
- Analytical Laboratory Hot Commissioning – Baseline October 2012

As indicated, the schedules span over a decade of DSA implementation. ORP and the Contractor will have both PSAR and DSA process in place at the same time but for different facilities. The goal is for the Contractor is to submit the DSA to ORP for each facility at least one year prior to hot commissioning. This allows ORP and the Contractor to integrate the overall implementation of the DSA, including functional test procedures, surveillance procedures, round sheets, etc. such that readiness activities can validate full implementation.

Some of the initiatives ORP are working with the Contractor include:

- Electronic PSAR where the hazard and accident analysis, SSC, and derivation of TSR are maintained current with respect to ORP authorization, thus eliminating the necessity of a biennial PSAR update.

- Coordinating both PSAR and DSA oversight simultaneously including a USQ process. In addition, the operating contractor has not been selected and could be different than the design and construction contractor. Therefore, it will require significant integration by both ORP and the contractor (s) as applicable.

- Early identification of specific administrative controls in accordance with DOE-STD-1186-2004, *Specific Administrative Controls*.

- Current nuclear and process safety requirements regarding classification of SSC identified in the SRD establishes a more conservative identification of defense-in-depth (DID) control strategies. Therefore, ORP is pursuing a transition from the existing SSC classification scheme for DID to the DID definition in DOE-STD-3009, *Preparation Guide for U. S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*.

These initiatives are in the planning phase and continued negotiation with the Contractor(s) will be required.