**RAI Volume 4, Chapter 2.4, First Set, Number 1:**

Clarify apparent inconsistencies as to where evaluations to determine waste isolation impacts due to test construction, performance confirmation activities, or both, will be documented.

Basis: In Section 5.1 of its Performance Confirmation (PC) Plan (SNL, 2008), the applicant stated that each performance confirmation activity is evaluated to assess relevance to waste isolation impact due to test construction, performance confirmation activities, or both. Also, in Section 5.2.2 of its PC Plan the applicant stated that PC Test Plans will require evaluations to ensure that planned testing does not adversely affect the ability of the geologic and engineered elements of the geologic repository to meet the performance objectives. Consistent with the applicant's stated requirement, the PC activity descriptions provided in the PC Plan include a brief statement about the potential for the activity to adversely affect the ability of the repository to meet performance objectives. For some PC activities, the lack of a potential for adverse effects is self-evident (e.g., off-site laboratory testing). Other PC activities are more complex. For example, the applicant stated in its PC Plan that future planning for waste package monitoring could require sensors placed directly on or through the waste packages. The applicant further stated an analysis or determination of impact will be conducted to evaluate if the instrumentation could affect the integrity of the package as compared to non-instrumented packages and that further evaluations on waste isolation and test-to-test interference will be conducted during the detailed test planning. However, it is not clear where such further evaluations will be documented.

In SAR Section 4.1.2, the applicant, citing the PC Plan, stated that during operations, the evaluation of effects on emplaced waste will be addressed in the PC test plans. However, statements in Section 5.2.3 of the PC Plan appear to indicate that evaluations of impact to emplaced waste, at least for some activities, would be conducted at a later stage of implementation and be documented in field work packages. Also, both the applicant's PC Plan and Section 4.1.2 of the applicant's SAR list the detailed information to be included in the PC test plans. An evaluation of the potential for the activity to adversely affect the ability of the repository to meet performance objectives is not among the twenty (20) items listed to be included in the PC test plans.

This information is needed to verify compliance with 10 CFR 63.131(d)(1).

## 1. RESPONSE

The evaluation to determine waste isolation impacts and test-to-test interferences will be documented under the Site Performance Protection Evaluation Program (SAR Section 1.3.6.1.3). This program also covers evaluations for waste isolation due to test construction and Performance Confirmation (PC) activities. Collectively these evaluations are termed 'site performance protection evaluations' (SPPE) and will be documented in accordance with applicable procedures. The program is guided by relevant features, events and processes (e.g., FEP 1.1.02.03.0A Undesirable materials left) (SAR Table 2.2-1) and applicable design control parameters (e.g., Parameter 02-03, Committed Materials) (SAR Tables 1.3.6-3 and 2.2-3). This program is part of the administrative controls, as described in SAR Table 1.3.6-3, Parameter 02-03, which will be imposed to prevent impact on waste isolation from materials used, lost, or left in the repository during construction of the emplacement drifts, and operation and closure of the repository. Procedures will be developed to control and evaluate materials not already controlled by the design that are used during the preclosure period.

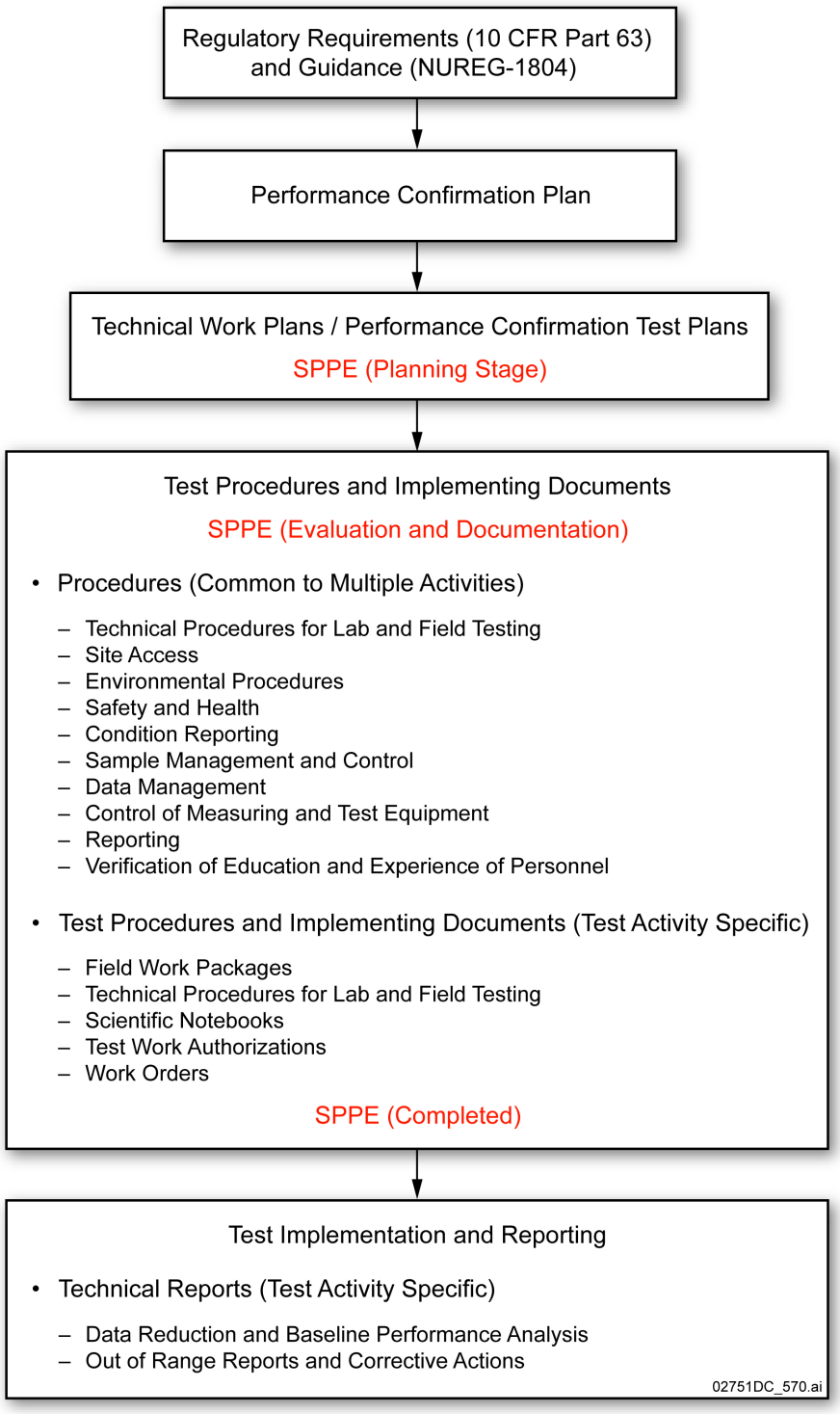
The SPPE Program will provide the technical evaluation to support the Subsurface Committed Materials Control Program (SAR Table 5.10-3), which is supported by the Technical Requirements Manual discussed in SAR Section 5.10.2.4.2. The Technical Requirements Manual provides a central location for compilation and control of operational and design restrictions that may be needed to support implementation of the license specifications (SAR Section 5.10.2.4.2). The Subsurface Committed Materials Control Program is specific to the subsurface, as described in SAR Table 5.10-3. This program will ensure that the types and quantities of materials added to the subsurface facilities (new materials or increased quantities) are properly evaluated and determined to be acceptable prior to repository closure.

The example specified in the RAI basis will be evaluated under the SPPE Program and is related, in part, to the design control parameter 04-09, Waste Package and Transportation, Aging, and Disposal (TAD) Canister Excluded Materials (SAR Tables 1.9-9 and 2.2-3). PC activities that may result in changes to structures, systems, and components (SSCs) designated as Important to Safety or Important to Waste Isolation (ITWI) are subject to design control. Such changes are subject to the same design control processes as established for any design change. Design control parameters reflect the important aspect of the feature or SSC that must be controlled by either configuration management or procedural safety control as described in SAR Section 1.9.2 and the management systems identified in SAR Chapter 5. Thus, SPPEs (i.e., evaluations to determine impact to waste isolation and test-to-test interferences) will be documented under applicable procedures under the SPPE Program and will include evaluations from applicable design control parameters.

Evaluations for PC activities will be evaluated under the SPPE Program for impacts to waste isolation, test-to-test interferences, test construction, and adherence to relevant design control parameters. These evaluations will be documented in accordance with applicable procedures under the SPPE Program and are required by the PC test plan (SNL 2008, Section 5.2.2). SAR Figure 4-1 illustrates the planning and procedural document hierarchy for PC testing implementation. This hierarchy also reflects the approximate sequential ordering of activities for PC testing. Figure 1 (Planning and Document Hierarchy and Sequence of PC Test

Implementation) shows in red the SPPE sequence for planning, evaluation and documentation in approximate relationship with PC planning and implementation sequence and hierarchy. These evaluations are documented separately from PC test plans in accordance with applicable procedures under the SPPE Program.

In summary, test construction and performance confirmation activities will be evaluated for their impact to waste isolation prior to test implementation. These evaluations are documented separately from PC test plans and are part of the administrative controls that will be managed under the SPPE Program, in accordance with applicable procedures.




Source: SAR Figure 4-1.

NOTE: SPPE = site performance protection evaluation. The planning, execution and implementation of SPPE is shown highlighted in red under sequential stages of the PC planning, operations, and documentation phases.

Figure 1 Planning and Document Hierarchy and Sequence of PC Test Implementation.

## 2. COMMITMENTS TO NRC

None.

## 3. DESCRIPTION OF PROPOSED LA CHANGE

None.

## 4. REFERENCES

SNL (Sandia National Laboratories) 2008. *Performance Confirmation Plan*. TDR-PCS-SE-000001 REV 05 AD 01. Las Vegas, Nevada: Sandia National Laboratories. ACC: DOC.20080227.0003; DOC.20080324.0002.

**RAI Volume 4, Chapter 2.4, First Set, Number 2:**

Provide a relative schedule for submitting each PC test plan to the NRC upon completion of the PC test plan so as to allow the NRC to review and evaluate any changes between the candidate and finalized parameters for that PC activity.

Basis: In its PC Plan, the applicant indicated that candidate parameters developed for its PC Plan remain preliminary until they are formalized in the more-detailed PC test plans. The applicant also noted that as PC test plans are developed, the rigor necessary for planning the details of the activity and developing expected limits and condition limits may result in the need to make some changes to the activity as described in the PC Plan, therefore, the anticipated methodology may deviate from the exact wording in the PC Plan. Justifications for deviations from the PC Plan will be documented in the PC test plans, when appropriate. The applicant stated this distinction between the PC Plan and PC test plans is necessary to ensure flexibility when testing and monitoring details are finalized in the PC test plans.

The NRC has stated "the general requirements at 10 CFR 63.131(a) allow DOE the flexibility to develop and implement an effective PC Program focused on confirming assumed subsurface conditions and assumed functionality of geologic and engineered systems and components important to postclosure performance" (NRC, 2001; 66 FR 55744). In addition, the NRC has stated "that it is DOE's responsibility to develop the details of a performance confirmation plan" and that "the Commission does not want to limit the applicant's options regarding testing methodologies" (66 FR 55745). However, the NRC also stated that "it is the applicant's responsibility to specify the important geotechnical and design parameters to be evaluated through observation and measurement during construction and operation, subject to NRC review and approval through review and evaluation of the license application" (66 FR 55745). Because the applicant has stated that candidate parameters remain preliminary until they are finalized in the PC test plans, the applicant should provide a relative schedule for submitting each PC test plan to the NRC upon completion of the PC test plan so as to allow the NRC to review and evaluate any changes between the candidate and finalized parameters for that PC activity.

This information is needed to verify compliance with 10 CFR 63.131, 10 CFR 63.132, 10 CFR 63.133 and 10 CFR 63.134.

## 1. RESPONSE

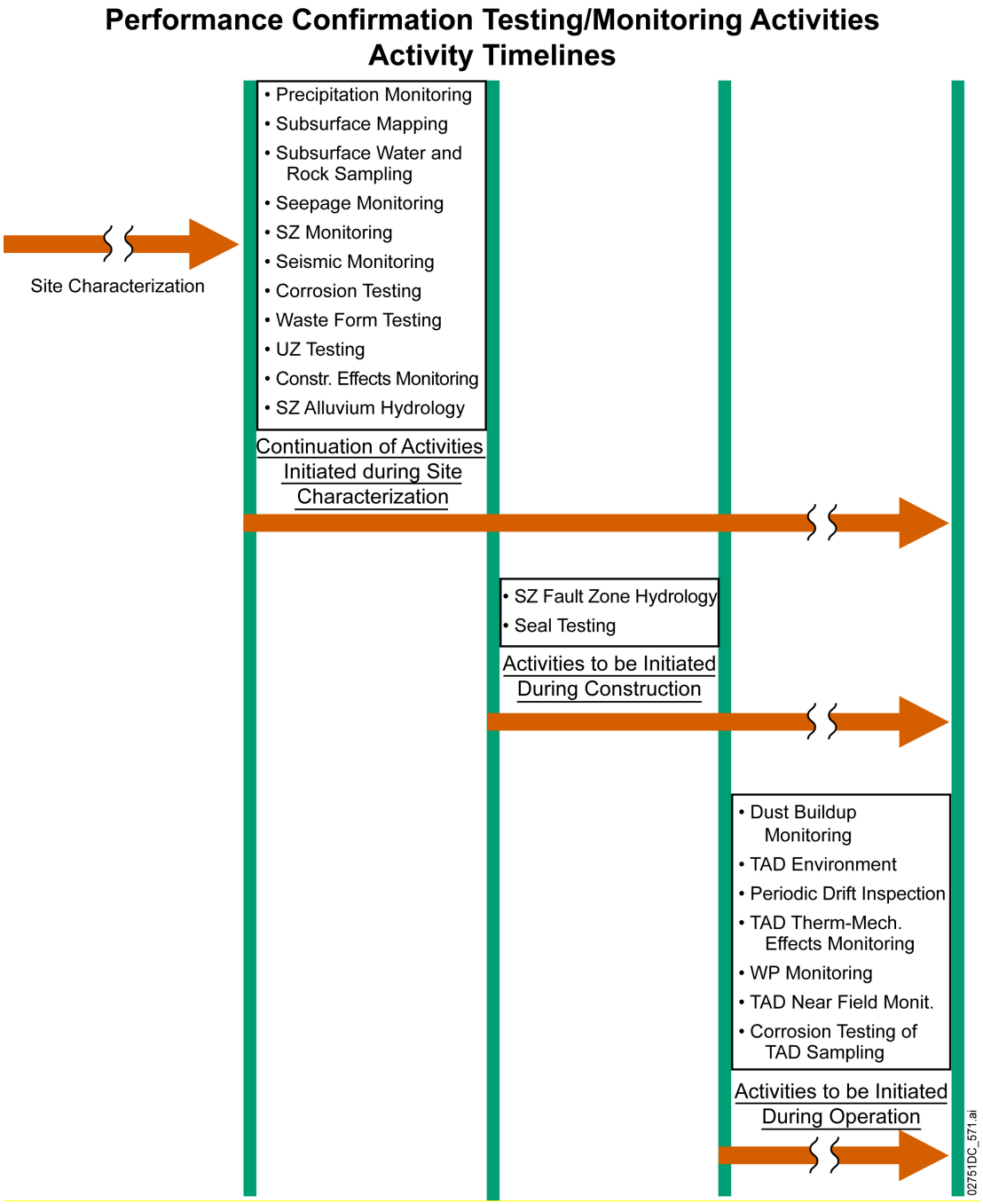
*Performance Confirmation Plan* (SNL 2008, referred to in this response as the PC Plan) identifies 20 activities for performance confirmation. As described in SAR Section 4.1.2, the PC Plan (SNL 2008) scope and implementation will be periodically assessed to evaluate its continued relevance. Technical need (i.e., consistency with the license application and the most current understanding of the total system performance assessment) is reassessed periodically

based upon updated performance assessment evaluations, sensitivity analyses, and ongoing science. New activities may be added, and currently planned activities may be curtailed or deleted as a result of reassessment. Updates to the SAR, due to a revision to the PC Plan (SNL 2008), will be prepared, as appropriate. Each of the 20 activities in the PC Plan (SNL 2008) includes multiple parameters and monitoring options. Development of the PC test plans will include specifying parameters that will meet the objectives of the activity; justification for inclusion or exclusion of parameter to be monitored will be provided. As described in SAR Section 4.1.1, when final details in the individual test plans are determined, differences between the test plan and the description in the PC Plan (SNL 2008) will be evaluated. The process for changes, tests, and experiments as specified in 10 CFR 63.44 will be applied to Performance Confirmation (PC) planning documents.

During the clarification call on September 16, 2009, the NRC emphasized the importance of submitting PC test plans prior to test implementation in order to receive Staff review and evaluation. Three completed PC test plans are referenced in SAR Chapter 4. These are: (1) construction effects monitoring, (2) seismicity monitoring, and (3) precipitation monitoring. Additional PC test plans will be completed consistent with technical need and regulatory and project milestones. Additional PC test plans will be provided to the NRC at first issuance prior to test implementation.

The milestones represented in SAR Figure 4-2 as vertical lines are project milestones: (1) the first vertical line is the end of site characterization, (2) the second vertical line is the beginning of construction, (3) the third vertical line is the beginning of waste emplacement, and (4) the fourth vertical line represents repository closure. The horizontal arrows shown in SAR Figure 4-2 represent the time frame during which the initial performance confirmation test plans will be completed. The underlined text in SAR Figure 4-2 explains whether the activity was conducted during site characterization or if it is a new activity that would be initiated during construction or during operations. The clarifying text for SAR Figure 4-2 is included as a note in Figure 1.

Table 1 shows the planned sequence of PC test plan development relative to repository construction and operation activities in greater detail than that shown in Figure 1. Figure 1 is focused on PC testing/monitoring activities, while Table 1 is focused on PC test plan development. In some cases the PC activity illustrated in Figure 1 represents a specific activity (e.g., periodic drift inspection) that is part of the broader PC test plan (e.g., drift inspection) shown in Table 1. As can be seen from Table 1, PC test plans that directly implement activities required during subsurface construction (e.g., subsurface mapping, seepage monitoring, subsurface water and rock testing, and drift inspection) are scheduled for completion before beginning subsurface construction. Additional PC test plans resulting from PC activities shown on SAR Figure 4-2 will be prepared during construction or during operations based upon technical need.




Source: SAR Figure 4-2.

NOTE: Vertical green lines indicate, from left to right: (1) end of site characterization, (2) beginning of construction, (3) beginning of operations (emplacement of waste), and (4) repository closure. The horizontal red arrows indicate the anticipated time frame for the performance confirmation activity to be initiated. The underlined text explains whether the activity was either conducted during site characterization or if it is a new activity that would be initiated during construction or during operations.

TAD = Thermally Accelerated Drift.

Figure 1. Schedule of Performance Confirmation

Table 1. Relative Schedule for Initial Issuance of Performance Confirmation Test Plan and Submittal to the NRC

| Performance Confirmation Activity | SAR Section | Plans Completed | Plans before Subsurface Construction | Plans during Construction | Plans during Operations (waste emplacement) |
|---|---|---|---|---|---|
| Precipitation Monitoring | 4.2.1.1 | X | — | — | — |
| Seismicity Monitoring | 4.2.2.2 | X | — | — | — |
| Construction Effects Monitoring | 4.2.2.3 | X | — | — | — |
| Seepage Monitoring | 4.2.1.2 | — | X | — | — |
| Subsurface Water and Rock Testing | 4.2.1.3 | — | X | — | — |
| Unsaturated Zone Testing | 4.2.1.4 | — | — | X | — |
| Saturated Zone Monitoring | 4.2.1.5 | — | — | X | — |
| Saturated Zone Fault Hydrology Testing | 4.2.1.6 | — | — | X | — |
| Saturated Zone Alluvium Testing | 4.2.1.7 | — | — | X | — |
| Drift Inspection | 4.2.1.8 | — | X | — | — |
| Thermally Accelerated Drift Near-Field Monitoring | 4.2.1.9 | — | — | — | X |
| Dust Buildup Monitoring | 4.2.1.10 | — | — | — | X |
| Thermally Accelerated Drift In-Drift Environment Monitoring | 4.2.1.11 | — | — | — | X |
| Subsurface Mapping | 4.2.2.1 | — | X | — | — |
| Thermally Accelerated Drift Thermal-Mechanical Monitoring | 4.2.2.4 | — | — | — | X |
| Seal and Backfill Testing | 4.2.3.1 | — | — | X | — |
| Waste Package Monitoring | 4.2.4.1 | — | — | — | X |
| Corrosion Testing | 4.2.4.2 | — | — | X | |
| Corrosion Testing of Thermally Accelerated Drift Samples | 4.2.4.3 | — | — | — | X |
| Waste Form Testing | 4.2.4.4 | — | — | X | — |

NOTE: Performance Confirmation activities are based on current technical information (SNL 2008).

## 2. COMMITMENTS TO NRC

Future PC test plans outlined in the SAR will be provided to the NRC at first issuance prior to test implementation.

## 3. DESCRIPTION OF PROPOSED LA CHANGE

None.

## 4. REFERENCES

SNL (Sandia National Laboratories) 2008. *Performance Confirmation Plan*. TDR-PCS-SE-000001 REV 05 AD 01. Las Vegas, Nevada: Sandia National Laboratories. ACC: DOC.20080227.0003; DOC.20080324.0002.

**RAI Volume 4, Chapter 2.4, First Set, Number 3:**

Clarify which design concept for the thermal test facility (one-emplacement drift or two-emplacement drift) is being proposed as the final design. If the one-drift concept is being proposed, clarify (i) plans to update the PC Plan to reflect the final design selection; and (ii) how the objectives of the seven activities to be executed in the thermal test facility can be accomplished using the one-drift design.

Basis: In its PC Plan, the applicant described the thermally accelerated drift test bed as a two-emplacement drift design concept with an observation drift at a lower elevation than the two heated drifts. This design concept was not changed in the most recent addendum to the PC Plan (SNL, 2008). Details of the design concept for the thermal test facility are not discussed in SAR Section 4 (Performance Confirmation Program). The discussion of performance confirmation openings in SAR Sections 1.3.3.1.6 and 1.3.3.1.7 indicate that a one-emplacement drift concept is the current design choice.

In its PC Plan, the applicant states the goal of thermally accelerated testing is to gain technical insight into the repository postclosure response to heat with the emplacement drifts. The applicant stated that a one-drift concept may have favorable aspects compared to the two-drift concept, but special handling of the waste packages would be required and if this cannot be performed, then the two-drift concept will be implemented. In addition, the applicant stated that screening calculations supporting the conceptual test design conclude that two accelerated drifts may be required (with different thermal management regimes in the two accelerated drifts).

This information is needed to verify compliance with 10 CFR 63.132, 10 CFR 63.133, and 10 CFR 63.134.

## 1. RESPONSE

The design concept for the thermal test facility consists of one emplacement drift (Emplacement Drift 1-3), with an observation drift and alcove excavated beneath and offset from Emplacement Drift 1-3 (SAR Section 1.3.3.1.6). *Performance Confirmation Plan* (PC Plan) (SNL 2008, Section 3.4.5), indicates that a one-drift concept requires special handling of the waste packages (i.e., movement of waste packages). The repository and waste package handling equipment have been designed with the capability to remove and relocate waste packages from emplacement drifts as briefly described in SAR Section 1.3.4.8.1. For the PC Program thermal test facility, waste packages in Emplacement Drift 1-3 could be removed, temporarily relocated to an alternate emplacement drift, and emplaced back in Emplacement Drift 1-3 for a different stage of the thermal test program. The operational steps for relocation of waste packages are described in more detail in SAR Section 1.11.1.1.2, which explains waste package retrieval or removal operations. Therefore, the seven proposed PC activities (SNL 2008, Section 3.4.5) can be

accommodated by a single drift using a staged approach to vary waste package loading in the drift to attain relevant thermal regimes. These activities are as follows:

- Seepage Monitoring
- Drift Inspection
- Thermally-accelerated Drift Near-field
- Dust Buildup Monitoring
- Thermally-accelerated Drift In-drift Environment Monitoring
- Thermally-accelerated Drift Thermal-mechanical Effects Monitoring
- Corrosion Testing of Thermally-accelerated Drift Samples.

The staged approach is possible because of the ability to move waste packages with the transport and emplacement vehicle. The screening calculations referred to in the RAI basis did not consider movement of waste packages to attain the two different thermal regimes, thereby resulting in the two-drift concept. The ability to move waste packages with the transport and emplacement vehicle allows for a one-drift concept. The one-drift concept of the thermal test facility will have different stages corresponding to various thermal environments. Conceptually, the two thermal regimes can be created in stages (e.g., sequentially, spatially) to attain the different thermal environments. The thermal environments necessary to meet the objectives of the seven activities are near-ambient and peak drift wall temperatures. A variety of waste package loading schemes (e.g., spacing between waste packages, heat output of waste packages) and ventilation can be used to achieve the needed thermal environments. Therefore, the objectives of the seven PC activities can be met at different stages of thermal testing in a single drift.

The decision analyses that resulted in selecting PC activities will be periodically reassessed, based on updated technical information and total system performance assessment results, to ensure continued relevance of the activities (SAR Section 4.1). The PC Plan (SNL 2008) will be revised and updated as program development continues. The configuration of the relevant thermal regimes will be further developed as the PC Plan is updated. At that point, test configurations will be developed to meet confirmation goals. PC test plans are required to contain an explanation of relevance to performance by means of correlation of parameters to risk, dose, or uncertainty. These performance metrics will be evaluated to justify the confirmation activity and the parameters to be measured and monitored, as well as the expected ranges of these parameters and reportable limits. PC test plans will be provided to the NRC as stated in the response to RAI 4.2.4-002.

## 2. COMMITMENTS TO NRC

None.

## 3. DESCRIPTION OF PROPOSED LA CHANGE

None.

## 4. REFERENCES

SNL (Sandia National Laboratories) 2008. *Performance Confirmation Plan*. TDR-PCS-SE-000001 REV 05 AD 01. Las Vegas, Nevada: Sandia National Laboratories. ACC: DOC.20080227.0003; DOC.20080324.0002.

**RAI Volume 4, Chapter 2.4, First Set, Number 4:**

Clarify whether the following potential parameters were considered in developing candidate parameters relevant to PC activities that focus on the internal condition of the waste package:

1. pH buffering capabilities of stainless steel corrosion products.
2. Aqueous chemical characteristics of the corrosion products domain.
3. Radionuclide sorption properties of stainless steel corrosion products.
4. Colloid generation potential of corroding stainless steel under in-package conditions.

For each of the four potential parameters identified above, provide the technical basis for its exclusion from the candidate parameters identified in SAR Table 4-1, in terms of (i) sensitivity of barrier capability and system performance to the parameters; (ii) level of confidence in the current knowledge about the parameter; and (iii) accuracy of information obtained by a particular test activity. Alternatively, provide a revised list of candidate parameters that includes the parameter.

Basis: The applicant (SAR Sections 4.2.4.2 and 4.2.4.3) plans corrosion testing of Type 316 stainless steel as part of activities related to corrosion testing of engineered barriers. The waste form testing activity (SAR Section 4.2.4.4) is intended, in part, to "evaluate in-package expected conditions" relevant to, among other factors, radionuclide release rates (SAR Table 4-1; see also Section 3.3.4.4 in SNL, 2008). In TSPA, a feature of the commercial spent nuclear fuel waste package interior important to radionuclide release is the mass of iron oxyhydroxides produced by stainless steel corrosion in the corrosion products domain (SAR Section 2.3.7). These model corrosion products are effective at sorbing dose-significant radionuclides such as neptunium and plutonium. In addition, radionuclide solubility and colloid stability are modeled in the corrosion products domain and also affect radionuclide release rates. Models of these processes and of the chemical environment of the corrosion products domain are important but uncertain. For example, the relatively narrow range of modeled pH in the corrosion products domain as a result of corrosion product buffering (Response to RAI 3.2.2.1.3.4-2-003) imposes relatively low solubility limits for neptunium and plutonium. Ionic strength and pH conditions affect the predicted concentrations of colloid species. Radionuclide sorption is a direct function of water flow paths and available surface area of steel corrosion products, and the surface complexation model used to calculate partition coefficients depends, in part, on the pH buffering capacity of corrosion product surfaces. The effectiveness of these processes through time will also depend on the generation rate of corrosion products, which is a function of the stainless steel corrosion rate.

This information is needed to verify compliance with 10 CFR 63.134.

## 1. RESPONSE

This response clarifies what parameters were considered in developing candidate parameters relevant to performance confirmation (PC) activities that focus on the internal condition of the waste package. The four parameters identified in the RAI are captured by the general candidate parameters listed in SAR Table 4-1 and in *Performance Confirmation Plan* (SNL 2008a, Table 3-2; referred to here as the PC Plan) for that activity. During development of the PC test plan for waste form testing, parameters important to radionuclide releases from the waste package will be evaluated, and the final set of test parameters identified. Core parameter characteristics deemed important to barrier capability, and which are possible to test or monitor, are candidates for inclusion in the PC Program (SNL 2008b, Section 6.1.7).

Although the four parameters listed in the RAI are not specifically identified in the PC Plan, these parameters and the general processes they represent were considered when developing the candidate parameter list for the waste form testing activity. Moreover, the four parameters are captured in the general candidate parameters provided for that activity in SAR Table 4-1 and in the PC Plan (SNL 2008a, Table 3-2). The PC waste form testing activity is described in SAR Table 4-1 as:

> Waste form testing (including waste package coupled effects) in the laboratory under anticipated in-package conditions.

The expanded description of the waste form testing activity in the PC Plan (SNL 2008a, Section 3.3.4.4, p. 3-83) is:

> This activity includes waste form testing (including waste package coupled effects) in the laboratory under anticipated in-package conditions. Candidate parameters that may be measured include: radionuclide release rate, dissolution, environmental and hydrochemical indicators (Eh, pH, colloid characteristics), bare waste form dissolution, fuel rod waste form dissolution, including cladding degradation, failure and unzipping rate, and waste form and waste package performance under coupled chemical environments. This long-term laboratory testing provides direct measurements of waste form performance under internal waste package conditions. This activity assesses the source term for radionuclides derived from the waste form, which are potentially able to leave the waste package and be transported out of the Engineered Barrier System.

The PC Plan (SNL 2008a, Section 3.3.4.4, p. 3-85) states that "waste form and waste package performance under coupled chemical environments" refers to "coupled and nonlinear processes dominated by degradation of fuel and steel components inside the package." These coupled processes include the effects of steel corrosion and corrosion products on water chemistry, sorption, and processes affecting colloid generation and mobility within the corrosion product domain. For example, the PC Plan (SNL 2008a, Section 3.3.4.4, p. 3-84) states:

> Water chemistry and temperature within the waste package could affect the degradation rate of the spent nuclear fuel and vitrified wastes. Corrosion of the internal metallic components of the waste package could reduce pH, leading to

> higher dissolution rates. The water chemistry and especially pH will have a significant effect on reduction, sorption, and mechanisms that may significantly reduce the radionuclide release rate from a failed waste package.

Moreover, in Table A-2[a] of the PC Plan (SNL 2008a), individual features, events, and processes (FEPs) are linked to the PC activities that will provide supporting information. The waste form testing activity is listed, along with the corrosion testing activity, as providing support for two FEPs dealing specifically with the effects of corrosion products on releases from the waste package (SNL 2008a, Table A-2[a]):

- FEP 2.1.09.02.0A (Chemical Interaction with Corrosion Products)
- FEP 2.1.09.05.0A (Sorption of Dissolved Radionuclides in EBS).

These statements confirm that evaluation of the general processes occurring in the corrosion products domain is part of the scope of the waste form testing activity. The candidate parameters for this activity include (SNL 2008a, Table 3-2):

- Radionuclide release rate
- Dissolution rate
- Environmental and hydrochemical indicators (Eh, pH, colloid characteristics)
- Bare waste form dissolution
- Fuel rod waste form dissolution, including cladding degradation, failure, and unzipping rate
- Waste form/waste package performance under coupled chemical environments.

Although the four parameters addressed by this RAI are not specifically identified in the PC Plan, they are represented in the current candidate parameter list by two of the existing parameters. "Environmental and hydrochemical indicators (Eh, pH, colloid characteristics)" includes aqueous chemical characteristics, the effect of corrosion products on pH, and colloid generation potential in the corrosion products domain. "Waste form/waste package performance under coupled chemical environments" deals with the effects of corrosion products on water chemistry and waste package releases, including all four of the parameters listed in the RAI.

The existing candidate parameter list is preliminary until it is formalized in the more-detailed PC test plan for the waste form testing activity (SNL 2008, Section 3.5.1[a], p. 2[a]). During development of that document, a final list of specific parameters that are possible to test or monitor will be identified. The PC test plan for waste form testing activities will be completed during construction (response to RAI 4.2.4-002).

To summarize, the four parameters identified in the RAI are related to processes occurring in the corrosion products domain, and are already represented in the current candidate parameters for the waste form testing activity. The PC test plan for waste form testing, including the final parameter list, will be completed during construction and submitted to the NRC prior to test implementation (response to RAI 4.2.4-002).

## 2. COMMITMENTS TO NRC

None.

## 3. DESCRIPTION OF PROPOSED LA CHANGE

None.

## 4. REFERENCES

SNL (Sandia National Laboratories) 2008a. *Performance Confirmation Plan.* TDR-PCS-SE-000001 REV 05 AD 01. Las Vegas, Nevada: Sandia National Laboratories. ACC: DOC.20080227.0003; DOC.20080324.0002.

SNL 2008b. *Postclosure Nuclear Safety Design Bases.* ANL-WIS-MD-000024 REV 01 ACN 01 ERD 2. Las Vegas, Nevada: Sandia National Laboratories. ACC: DOC.20080226.0002; DOC.20080314.0004; LLR.20080507.0018; DOC.20080610.0007.