**DOE-STD-3009-2014**
**Frequently Asked Questions**

**Q1:** Why was DOE-STD-3009 revised?

**A1:** The goal of this revised Standard is to provide clearer criteria and guidance to support effective and consistent Documented Safety Analyses (DSAs) based upon lessons learned in implementing DOE-STD-3009-94. DOE has gained over 20 years of experience and lessons learned in implementing DOE-STD-3009-94. DOE also committed to revise DOE-STD-3009 in response to DNFSB Recommendation 2010-1.

**Q2:** What are the major changes in DOE-STD-3009-2014?

**A2:** This revision:

- Clarifies use of the Evaluation Guideline;
- Clarifies use of bounding parameters;
- Clarifies unmitigated and mitigated hazard evaluations to protect the workers, public, and environment;
- Clarifies standard industrial hazards and chemical hazards screening or further hazard evaluation;
- Establishes a clear criterion for use of the hierarchy of controls and requires documentation of the rationale;
- Clarifies major contributors to defense-in-depth for selection of safety significant controls;
- Incorporates methodologies for co-located workers and chemical hazard evaluations;
- Refines methods for air dispersion calculations;
- Provides specific criteria for determining the functional adequacy of safety class and safety significant structures, systems, and components; and
- Reduces the level of description required in DSAs for safety management programs.

**Q3:** Does 10 C.F.R. Part 830 require use of DOE-STD-3009-2014 for existing DOE nuclear facilities?

**A3:** No. 10 C.F.R. Part 830 requires contractors for DOE nuclear facilities to use a safe harbor standard for preparing DSAs, or to obtain approval of an alternate methodology. DOE-STD-3009 is the most-used safe harbor standard, and many existing DOE nuclear facilities use DOE-STD-3009-94. The 10 Code of Federal Regulations (C.F.R.) 830 safe harbor table requires use of "DOE-STD-3009-94, Change Notice No. 1 … or successor document." However, in an October 18, 2014 letter, the Secretary of Energy reiterated the following commitment for an evaluation of existing defense nuclear facilities relative to the new revision of DOE-STD-3009:

> *"In addition, as stated in Section 6.2 of the Department's 2010-1 IP, the evaluation of DSAs for existing defense nuclear facilities relative to the new revision of DOE-STD-3009 will be performed consistent with the current regulatory process for developing and maintaining DSA updates. This evaluation will look for and implement enhancements that can be made based upon lessons learned and best practices that have been incorporated in*

*the revised DOE-STD-3009, related to protection of the public from nuclear hazards. The Department is in the process of developing its approach for this evaluation."*

**Q4:** When do existing defense nuclear facilities need to complete this evaluation relative to DOE-STD-3009-2014?

**A4:** The schedule for completing these evaluations has not been finalized. The current draft evaluation protocol calls for evaluations to be performed ahead of scheduled annual DSA update cycles to support these annual updates. Evaluation results, along with annual DSA updates, are expected to be required to be submitted to the associated DOE Safety Basis Approval Authority no later than July 2016.

**Q5:** In what circumstances should major modifications to existing DOE nuclear facilities use the new DOE-STD-3009-2014?

**A5:** DOE O 420.1C Page Change 1 requires use of DOE-STD-3009-2014 for preparing documented safety analyses for major modifications to existing nuclear facilities, when the DOE-STD-3009 method is used as the safe harbor method to satisfy 10 C.F.R. Part 830, *Nuclear Safety Management*, requirements. For such major modifications to existing non-reactor nuclear facilities, DOE O 420.1C Page Change 1 also allows the appropriate Secretarial Officers, with concurrence by the applicable Central Technical Authority, to approve use of DOE-STD-3009-94. This PSO-approved exception is expected to be used for relatively smaller modifications, particularly those that do not add major new types of equipment or major new accidents. This PSO-approved exception is not expected to be used when major new structures or major new accident scenarios are added to existing facilities.

**Q6:** When a major modification to an existing facility uses the new DOE-STD-3009-2014, does the whole DSA have to be upgraded to the new STD-3009?

**A6:** No, not necessarily. Existing nuclear facilities undergoing a major modification are allowed to continue to use existing DOE-STD-3009-94, with approval by the appropriate Secretarial Officer and concurrence by the applicable Central Technical Authority. As described in A5, the approach should be based on the relative size and significance of the modification. It may be possible to use the requirements of the new DOE-STD-3009-2014 for design of the major modification, but not upgrade the overall DSA to the new standard.

**Q7:** In performing an evaluation of existing nuclear facilities to the new DOE-STD-3009-2014 in accordance with the Secretary's 10/18/2014 commitment, if a facility finds that it does not meet the new DOE-STD-3009-2014 requirements for Safety Class controls, is it acceptable to revise the existing DSA to meet those requirements without upgrading the entire DSA to meet the new Standard?

**A7:** Yes. The purpose of the evaluation is to provide added assurance that Safety Class controls will perform their safety functions. If DOE-STD-3009-94 is used as the safe harbor method for the existing facility, then the requirements of that safe harbor method must be fully satisfied by any DSA revisions. If the safe harbor requirements are fully satisfied, additional criteria, methods and guidance described in DOE-STD-3009-2014 may be used, as appropriate, to

supplement or complement the existing safe harbor method. On the other hand, if it is decided that the entire facility DSA should be upgraded to the new Standard DOE-STD-3009-2014 as the facility's safe harbor method to satisfy 10 C.F.R. Part 830 requirements for preparation of a DSA, it is necessary to use its entirety (i.e., all applicable "shall" statements are met).

**Q8:** What does STD-3009 say about "Equipment Important to Safety"?

**A8:** DOE-STD-3009-2014 says nothing about "Equipment Important to Safety." The Standard only recognizes three classifications of hazard controls: (1) Safety Class, (2) Safety Significant, and (3) Other Hazard Controls. 10 C.F.R. 830 does not use the term "Equipment Important to Safety" in reference to DSA preparation. This is a consideration for unreviewed safety question determinations, as described in the DOE Guide G 424.1-1B, and additional clarifications are being considered for the next revision to that Guide.

**Q9:** When using Option 1, is it acceptable to use either the 95$^{th}$ percentile directionally independent or the 99.5$^{th}$ percentile directionally dependent X/Q, even though this is not consistent with NRC Reg. Guide 1.145?

**A9:** Yes. In Section 3.2.4.2, under the heading "Determination of the Offsite $\chi$/Q," the Standard states: "While the three options allow for alternative methods to calculate the $\chi$/Q values, all three options shall evaluate the dose at the MOI using either a 95$^{th}$ percentile for a directionally independent method or a 99.5$^{th}$ percentile for a directionally dependent method. Option 1 is based on Reg. Guide 1.145; it is not a verbatim compliance to Reg. Guide 1.145.

**Q10:** Can the directionally independent 95$^{th}$ percentile X/Q credit irregular site boundary distances?

**A10:** Yes. The analysis is intended to be consistent with the NRC Regulatory Guide 1.145 determination of the "5 percent overall site" X/Q (i.e., 95$^{th}$ percentile) considering variable site boundaries and plume meander. The term "directionally independent" means that the determination of the overall 95$^{th}$ percentile $\chi$/Q is determined by creating a combined cumulative distribution function using the actual site boundary distance for each meteorological sector rather than at a fixed distance for each sector.

**Q11:** Regarding the Option 2 X/Q method, can the DOE Toolbox version of MACCS2 be applied, since it is not fully compliant with the NRC Regulatory Guide 1.145 methodology?

**A11:** Yes. Historically, MACCS2 has been used to calculate the offsite 95$^{th}$ percentile X/Q for DOE facilities despite the fact that the methodology used does not take into account variations in site boundary distances. As stated in DOE-EH-4.2.1.4-MACCS2-Code Guidance (June 2004), *MACCS2 Computer Code Application Guidance for Documented Safety Analysis*:

> "MACCS2 and MACCS do not comply fully with … (NRC Regulatory Guide 1.145 Position 3) methodology for determination of direction-independent 95th percentile dose to the offsite individual. It may be used to conservatively evaluate the 95$^{th}$ percentile direction-independent dose to receptors equidistant to the source."

> "Given site-specific data, the 95$^{th}$ percentile consequence is determined from the distribution of meteorologically-based doses calculated for a postulated release to downwind receptors at the site boundary that would result in a dose that is exceeded 5% of the time. [DOE-STD-3009] allows for variations in distance to the site boundary as a function of distance to be taken into consideration. Assuming the minimum distance to the site boundary applies in all directions is a conservative implementation that is easily supported by MACCS2 and that essentially makes the calculations sector independent."

**Q12:** In Section 3.2.4.2 of DOE-STD-3009-2014, what is intended by the term "recent" in relationship to meteorological data? Does this imply some expected periodicity?

**A12:** In this context, "recent" means within ten years. Regarding the implied periodicity in the term "recent," with respect to meteorological data and analysis for X/Q, the forthcoming Accident Analysis Handbook will recommend a reanalysis of X/Q every ten years. The five years average is expected to change slowly over time and there is no need for more frequent reanalysis.

**Q13:** In Section 3.3.1 of DOE-STD-3009-2014, what is intended by the following sentence: "Further, it is DOE's goal that the combined effectiveness of the suite of SC and/or SS controls will be such that accident consequences would be well below the EG"? Does DOE expect this goal to be demonstrated in the DSA?

**A13:** The cited sentence is merely a description of DOE's goal; it does not contain or imply any requirements. The primary requirement in this Section is that the DSA demonstrate how SC SSCs or SACs mitigate consequences of anticipated accidents below the EG, when preventive controls do not terminate the scenario or eliminate the hazard. Beyond that, the cited sentence permits consideration of other SS controls (i.e., entire suite of SC and SS) to achieve the goal of consequence reduction "well below the EG."

**Q14:** In Section 3.3.1 of DOE-STD-3009-2014, what is intended by the following sentence: "If unmitigated off-site doses between 5 rem and 25 rem are calculated (i.e., challenging the EG), SC controls should be considered, and the rationale should be described for decisions on whether or not to classify controls as SC"? Does this sentence describe a requirement? Will DOE reviewers of DSAs turn this sentence into a requirement?

**A14:** The cited sentence is a recommendation, not a requirement. The standard clearly defines the use of "shall" for requirements and "should" for recommendations. The phrasing of this sentence is also consistent with that in DOE-STD-1189-2008 for new facilities and major modifications. The intent is to consider SC controls or provide DOE with the rationale when not establishing SC controls for accidents with consequences between 5 and 25 rem. This is to help in establishing a basis for risk acceptance (e.g., consequence calculations have multiple conservatisms that don't warrant SC controls, etc.) In general, DOE expects that DOE-STD-3009-2014 will provide for more consistent and conservative consequence calculations based on clear requirements, and therefore the EG of 25 rem serves as the appropriate "bright line" criterion for determining SC categorization for hazard controls.

**Q15:** Section 3.3.1 of DOE-STD-3009-2014 provides a requirement for new nuclear facilities that SC controls shall be applied to prevent identified accidents or mitigate consequences to below the EG of 25 rem. DOE-STD-5506-2007 (Section 6.3) states that doses greater than 10 rem should be considered sufficient to challenge the EG. How do these compare and which takes precedence?

**A15:** First, DOE-STD-5506 is a supplemental standard to the safe-harbors of 10 C.F.R. 830. It is expected that the standard will be revised in the future to reflect lessons learned captured in DOE-STD-3009-2014. As it is the primary safe harbor, DOE-STD-3009-2014 takes precedence. The two standards differ only slightly regarding thresholds for "challenging" the EG. DOE-STD-3009-2104 indicates that 5 to 25 rem is the range for "challenging the EG," whereas STD-5506 identifies a 10 rem threshold. However, and more important, DOE-STD-3009-2014 clearly establishes the SC control threshold at the EG of 25 rem. See also Q&A 14 above.

**Q16:** DOE-STD-3009-2014 states that hazard evaluation data are part of the DSA, whether included directly or by reference. The standard further states that "For each hazard scenario, hazard evaluation tables or data sheets document the following; … Available preventive and mitigative controls." If "available preventive and mitigative controls" are identified in the hazard evaluation tables or data sheets, and these are considered part of the DSA, does DOE expect that all "available" controls identified in these tables will be controlled, managed, and updated using the USQ process, even where such controls do not rise to the level of SC or SS?

**A16:** Yes, to the degree that one of the controls is involved with a "proposed change" as described in 10 C.F.R. Part 830 and DOE G 424.1-1B, or is somehow related to a discovery of a Potential Inadequacy in the Safety Analysis (PISA). While major contributors to defense-in-depth are identified as SS, other hazard controls that are not identified as either SC or SS are also important as they contribute to the overall defense-in-depth approach that is required for DOE nuclear facilities.