

SELECTION OF ARF, ARR, OR RF VALUES FOR EPHA ANALYSES

QUESTION: Under what conditions is it appropriate to use Airborne Release Fraction (ARF)/Airborne Release Rate (ARR), or Respirable Fraction (RF) values other than the bounding values from DOE-HDBK-3010¹ in Emergency Planning Hazards Assessment (EPHA) analyses?

ANSWER: Although the Emergency Management Guide (EMG), DOE G 151.1-2 (page 2-18) indicates that “...*bounding ARFs, RFs, and ARR*s listed in the DOE-HDBK-3010 are normally most appropriate for use in hazards assessments,” the overall analysis approach that is encouraged throughout that section of the EMG is more “realistic” than bounding. DOE-HDBK-3010, Section 1.1, *Purpose of the Handbook*, clearly acknowledges a variety of possible applications of the handbook and states that “...*these data and the analyses...contained herein need to be critically evaluated for applicability in each situation in which they are used.*”

Because of the uncertainty in how an accident might progress or because no other choice is obvious, it is understandable that the EPHA analyst will make conservative (bounding) choices of some assumptions and parameter values to be used in the consequence calculations. Where possible, the analyst is expected to select the source term parameter values that most accurately represent the actual materials and release phenomena being modeled in the analysis. For example, if supporting information in Appendix A of DOE-HDBK-3010 indicates the bounding ARF/ARR and/or RF values are based on experiments that were not a particularly good representation of the specific material and/or release phenomenon being analyzed in the EPHA, parameter values more appropriate for the material and scenario may be selected based on local (site) experience, data published in the open literature, or the results of other experiments described in the handbook and its appendices. If, as is often the case, a large degree of uncertainty exists in how the accident processes being modeled for the EPHA compare to the experimental processes that yielded the source term parameter values, use of the bounding values is - preferred.

Use of ARF/ARR and RF median values from the handbook instead of bounding values in EPHA analyses may be justified on the basis of experimental data (as discussed above) or on the analyst’s assessment of conservatism already embodied in the modeling of a particular scenario. If the values selected for Material-At-Risk (MAR), Damage Ratio (DR), and/or Leak Path Factor (LPF) are judged to have produced a strong conservative bias (i.e., toward overestimation of the consequences), use of the median ARF/ARR

¹ DOE-HDBK-3010-94 Chg 1, Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities, March 2000

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and/or RF values instead of bounding values may be justified to minimize further exaggeration of the consequences.

Whether using bounding or median values as provided in the Handbook, or, alternatively, selecting values based on local (site) experience, data published in the open literature, or the results of other experiments described in the handbook and its appendices, the rationale for the choice of ARF/ARR or RF values should be documented in the EPHA.