



**US Army Corps
of Engineers®**
St. Louis District

St. Louis Sites Fact Sheet

RISK RANGE



The United States Army Corps of Engineers (USACE), St. Louis District, is conducting a radiological cleanup program for four Missouri sites (SLDS, SLAPS, SLAPS VPs, HISS). These sites contain soils contaminated with radium, thorium, and uranium as a result of activities associated with the Manhattan Engineer District/Atomic Energy Commission during the nation's early atomic program in the 1940s and 50s.

The CERCLA acceptable risk range is defined as the risk of one additional cancer in 10,000 to one additional cancer in 1,000,000 (or in scientific notation 10^{-4} to 10^{-6}). The risk range is used in the CERCLA process in three instances: the baseline risk assessment during the Remedial Investigation, development of remedial goals in the Feasibility Study, and in the documentation of protectiveness of the final site conditions during the Site Closeout.

To learn more about FUSRAP, contact the FUSRAP Area Office at (314) 260-3905 or write to the U.S. Army Corps of Engineers, St. Louis District, FUSRAP Area Office, 114 James S. McDonnell Blvd., Hazelwood, MO 63042.

WHAT IS THE "ACCEPTABLE RISK RANGE" AND WHY IS IT USED?

Under the Comprehensive Environmental Restoration, Compensation, and Liability Action (CERCLA), the acceptable risk range is defined as risk falling somewhere between 1 additional cancer in 10,000 and 1 additional cancer in 1,000,000. It is used in three instances: the baseline risk assessment during the Remedial Investigation, development of remedial goals in the Feasibility Study, and in the documentation of protectiveness of the final site conditions during the Site Closeout. The risk assessment is used to quantify threats posed by a hazardous substance to human health and the environment. The results of the risk assessment are used to establish the basis for taking a remedial action and aid in the development of cleanup alternatives during the Feasibility Study. The condition of the site after cleanup is documented in the Post Remedial Action Report (PRAR), which ultimately becomes part of the final Site Closeout Report.

RISK RANGE IN THE RISK ASSESSMENT

Whether or not a risk is unacceptable is based on a comparison of the total current (and/or future) risks to the acceptable risk range. The acceptable risk range is defined as risk falling somewhere between 1 additional cancer in 10,000 and one additional cancer in 1,000,000. This range is commonly expressed as 10^{-4} to 10^{-6} . When the risk assessment indicates the total risk to an individual exceeds the 10^{-4} end of the risk range, action is generally warranted at the site. For sites where the total site risk to an individual, based on the reasonable maximum exposure or RME for both current and future land use, is less than 10^{-4} (the upper bound of the CERCLA risk range) action generally is not warranted unless there are non-cancer health effects or negative ecological effects that warrant action.

RISK RANGE IN THE FEASIBILITY STUDY

Once a decision has been made to take action, a Feasibility Study is conducted. As part of the Feasibility Study, cleanup levels (or remediation goals) are developed for the site. The first step in developing cleanup levels is to determine whether acceptable or reasonable and appropriate requirements (or ARARs) exist for the site. As a side note, ARARs at their simplest level refer to legal requirements for the cleanup of the site.

If an ARAR for a specific hazardous substance defines an acceptable level of exposure, compliance with the level in the ARAR will generally be considered protective even if it is outside the risk range. However, if there is the potential for exposure to multiple hazardous substances or pathways of exposure, and the individual ARAR levels for the substances or pathways add up to more than 10^4 , then compliance with the levels in the ARARs may not be protective.

The risk range is used to determine the cleanup level when an ARAR level is determined not to be protective. A risk of 10^{-6} is used as the starting point for determining the most appropriate cleanup level for the hazardous substance and is referred to as the "Preliminary Remediation Goal" or PRG. The final cleanup level (or remedial goal) could ultimately be anywhere within the acceptable risk range of 10^{-4} to 10^{-6} , but must have a CERCLA basis to move off the PRG. The final remedial goal is based on the consideration of site-specific exposure factors (which include pathways of exposure, exposure to sensitive persons such as pregnant women), technical factors (such as detection limits, background levels), and uncertainty factors (for example reliability of data, weight of scientific evidence regarding health effects).

The risk range is also used to determine cleanup levels when there are no ARARs to use as cleanup levels. As is done for ARAR levels that are not protective, a risk level of 10^{-6} is used as the starting point for determining the most appropriate cleanup level for a hazardous substance(s) at a site for which ARARs are not available. The final cleanup level without an available ARAR could be anywhere within the acceptable risk range of 10^{-4} to 10^{-6} . The final cleanup level is based on the consideration of the same site-specific exposure factors, technical factors, and uncertainty factors identified above.

RISK RANGE IN THE SITE CLOSEOUT

A residual site risk assessment is performed upon completion of remediation for each portion of the site. The risk of contaminants remaining on site is determined through this assessment and is documented in the Post Remedial Action Report and the Site Closeout Report. (These reports document the protectiveness of the overall site and of specific portions of the site.)

Lifetime Risk of Cancer Incidence

