

ISSUES RESOLUTION MATRIX FOR NIOSH-OVER-0009, “SKIN EXPOSURE”

Concern Number	Concern Description	NIOSH Response	Concern Resolution
1	<p>Concerns Related to NIOSH’s Dose Model for Chronic Deposition of Fine Particles on Bare Skin (transferred to Overarching Issues by the SCDRR):</p> <p>The derived dose of 16 mrem/yr to bare skin is based on unsupported and unrealistic assumptions, which include the following:</p> <ol style="list-style-type: none"> (1) Daily skin contaminations for each of the 250 workdays per year that only persist for 8 hours; (2) Implication that after 8 hours, each skin contamination is 100% removed by a standard daily shower; and (3) Only bare skin is subject to contamination and resultant radiation exposure. <p>SC&A provided details of these concerns in a white paper titled <i>Discussion Points Regarding Reconstructing Localized Skin Dose Associated with Direct Deposition of Uranium Oxide Dust and Flakes on Exposed Skin</i> (June 2013).</p> <p>01/07/14: SC&A agreed with the approach proposed by NIOSH to address fine particle deposition, with one exception. NIOSH found that uranium was not difficult to remove from skin and clothing, resulting in effective 100% removal during showering. SC&A recommended that NIOSH provide some documentation of this experience with respect to uranium decontamination of skin and clothing so that this concern can be closed.</p>	<p>07/18/13 and 11/07/13: The three skin exposure concerns were discussed, and NIOSH presented its approach to addressing fine particle deposition. Additionally, NIOSH personnel with actual experience at uranium facilities found that uranium was not difficult to remove from skin and clothing.</p> <p>02/11/15: In response to SC&A’s concern about uranium decontamination, NIOSH submitted a white paper titled <i>Removal of Uranium Skin Contamination through Washing</i> (February 2015).</p> <p>02/18/15: NIOSH discussed its white paper. Based on a literature search, NIOSH was able to locate two documents that qualitatively supported the removal of uranium by washing with soap and water. One additional document was also located that quantitatively supported the removal of radiolabeled soil using soap and water.</p>	<p>02/18/15: The SCPR and SC&A agreed with the conclusions of the NIOSH white paper. The SCPR closed this concern.</p>

DISCLAIMER: This is a working document provided by the Centers for Disease Control and Prevention (CDC) technical support contractor, SC&A, for use in discussions with the National Institute for Occupational Safety and Health (NIOSH) and the Advisory Board on Radiation and Worker Health (ABRWH), including its Working Groups or Subcommittees. Documents produced by SC&A, such as memorandum, white paper, draft or working documents are not final NIOSH or ABRWH products or positions, unless specifically marked as such. This document prepared by SC&A represents its preliminary evaluation on technical issues.

NOTICE: This document has been reviewed to identify and redact any information that is protected by the [Privacy Act 5 USC §552a](#) and has been cleared for distribution.

Concern Number	Concern Description	NIOSH Response	Concern Resolution
2	<p>Concerns Related to How IREP Derives POC and Its Relevance to How Dose Is Assigned (transferred to Overarching Issues by the SCDRR):</p> <p>Given that a skin dose only occurs to a limited area, SC&A has concerns about the relationship between the derived dose and how IREP uses this dose to derive a POC.</p> <p>If IREP did include the baseline risk to the head, neck, and hands, wouldn't that baseline risk be lower than the baseline risk attributed to the entire area of the skin? Also, if the baseline risk is lower, doesn't that mean that the POC would increase? Further, if IREP included the baseline risk for the head, neck, and hands, it would not be necessary to reduce the dose, resulting in a considerably higher POC.</p> <p>01/07/2014: Based on the discussions on this subject, SC&A now believes that its concern with respect to this matter has been resolved. SC&A recommends holding this concern In Abeyance until NIOSH issues a revision to its procedures confirming SC&A's understanding of the protocols NIOSH plans to use, especially with respect to skin exposures beneath clothing.</p>	<p>07/18/13 and 11/07/13: The IREP issue was discussed in concert with Concern 1. NIOSH provided an explanation of the relationship between derived dose and IREP to determine a POC. This issue is discussed in OTIB-0017 under section "Non-Uniform Exposure of the Skin." In summary, skin cancer risk factors present in the IREP program represent the risk from uniform whole-body irradiation of the skin. Therefore, the actual risk of cancer induction associated with partial-body irradiation is less than is indicated by the risk factors inherent in IREP. OTIB-0017 provides guidance for three specific conditions: (1) if a skin cancer occurred within a known area of contamination or partial-body irradiation, no skin area adjustment is made; (2) if it is known that the cancer occurred in an area not within the area of contamination or partial-body irradiation, no dose is assigned to that cancer location; and (3) if the precise location of a skin contamination is unknown and it is unclear whether the irradiated area included the skin cancer location, the skin dose would be adjusted for the fraction of skin area irradiated. Due to SC&A's concern, NIOSH consulted SENES, who concurred with this approach.</p>	<p>04/16/14: NIOSH, SC&A, and the SCPR agreed that this concern has been resolved. The Subcommittee closed this concern.</p>

Concern Number	Concern Description	NIOSH Response	Concern Resolution
3	<p>Concerns Related to NIOSH’s Dose Model for Large Uranium Flakes on Skin (transferred to Overarching Issues by the SCDRR):</p> <p>Assuming that the large uranium flake exposure scenario is plausible, at least for some AWE facilities in the early years, SC&A has the same basic questions as described in Concern 1 for fine particles, except now we are dealing with a very small area, perhaps 1 cm², and relatively high dose rates (e.g., 240 mrem/hr).</p> <p>SC&A acknowledges that we have no way of knowing how often such events occurred or how long the particle remained on the skin before it was washed off. Nevertheless, SC&A believes that this subject merits some discussion.</p> <p>01/07/14: SC&A recommends using the protocols described in ORAUT-OTIB-0017, where the skin exposure under a hypothetical flake is averaged over the entire surface area of the body. If NIOSH concurs with this basic strategy for addressing skin exposures to particles/flakes of uranium, SC&A recommends that this issue be closed.</p>	<p>07/18/13 and 11/07/13: The large uranium flake issue was discussed along with Concern 1. NIOSH indicated that this issue was addressed in OTIB-0017 (shallow dose reconstruction).</p>	<p>04/16/14: NIOSH, SC&A, and the SCPR agreed that this concern has been resolved. The Subcommittee closed this concern.</p>

AWE = Atomic Weapons Employer; IREP = Interactive RadioEpidemiological Program; POC = probability of causation; SCDRR = Subcommittee for Dose Reconstruction Reviews; SCPR = Subcommittee for Procedure Reviews