

**Attachment: Department of Health Services, Division of Public Health
response to questions on the former Badger Army Ammunition Plant
posed by Representative Fred Clark and Senator Jon Erpenbach
November 21, 2013.**

Q1. What are the specific assumptions about land use (i.e., types of activities and duration) and site conditions (i.e., vegetation, snow cover, etc.) for the default industrial USEPA RSLs (Composite Worker)?

A1. US EPA's composite worker soil land use equation for the derivation of default screening levels does not address specific activities, but is based on default exposure parameters and factors that represent Reasonable Maximum Exposure (RME) conditions for long-term/chronic exposures and assumes exposure from the following routes: incidental ingestion of soil, inhalation of particulates emitted from soil and dermal exposure. The default equations do not take into account percent of vegetative or snow cover, but these variables were incorporated for site-specific calculations. For composite workers, the US EPA assumes an exposure duration of 25 years, an exposure frequency of 250 days per year and an exposure time of 8 hours per day.

Q2. What were the specific assumptions about land use (i.e., types of activities and duration) and site conditions (i.e., vegetation, snow cover, etc.) applied at the Final Creek, Settling Ponds and Spoils Disposal Areas for recreational soil remediation goals (Site-Specific Residual Contaminant Levels or SSRCLs)?

A2. A conservative estimate of 50% vegetative cover was used for the calculation of site-specific residual contaminant levels (SSRCLs) at the Final Creek, Settling Ponds and Spoils Disposal Areas. Additionally, the default recreator exposure frequency of 75 days per year and estimated worker exposure frequency of 83 days per year were reduced by 33% based on historical weather data indicating that the ground at this site is frozen and/or snow-covered approximately 4 months per year. Specific land use activities were not addressed, but SSRCLs were based on default exposure parameters and factors that represent RME conditions for long-term/chronic exposures, as well as human health toxicity values likely to be without appreciable risk of deleterious effects (cancer and non-cancer) during a lifetime of exposure for the human population (including sensitive subgroups).

Q3. How is a Composite Worker defined and how do assumed activities and exposures for industrial USEPA RSLs compare to those assumed for a prairie restoration worker such as soil cultivation, invasive species removal, digging and planting, etc.?

A3. The US EPA defines a composite worker as "a long-term receptor exposed during the work day who is a full time employee working on-site and who spends most of the workday conducting maintenance activities outdoors. The activities for this receptor (e.g., moderate digging, landscaping) typically involve on-site exposures to surface soils. The composite worker is expected to have an elevated

soil ingestion rate (100 mg per day) and is assumed to be exposed to contaminants via the following pathways: incidental ingestion of soil, external radiation from contaminants in soil, inhalation of fugitive dust. The composite worker combines the most protective exposure assumptions of the outdoor and indoor workers. The only difference between the outdoor worker and the composite worker is that the composite worker uses the more protective exposure frequency of 250 days/year from the indoor worker scenario.” It is assumed that a prairie restoration worker would engage in similar activities, but with a significantly reduced exposure frequency.

Q4. Were default industrial USEPA RSLs for a Composite Worker adjusted to be inclusive of infants, children and pregnant mothers? If not, what assurance does the public have that these levels are protective of these populations?

A4. All US EPA RSLs are based on the use of human health toxicity values likely to be without appreciable risk of deleterious effects (cancer and non-cancer) during a lifetime of exposure for the human population (including sensitive subgroups).

Q5. Please provide the default "industrial" soil remediation goals (US EPA RSLs) for the 2,4-/2,6-DNT mixture, 2,4-DNT (single isomer) and 2,6-DNT (single isomer). Please compare each to the soil remediation goals based on recreational use.

*A5. The US EPA states that RSLs “are chemical-specific concentrations for individual contaminants in air, drinking water and soil that may warrant further investigation or site cleanup. **It should be emphasized that SLs are not cleanup standards.**” Thus, the relevance of this question to the cleanup activities at the former Badger Army Ammunition Plant (BAAP) is unclear.*

Only technical grade DNT (tgDNT) was used at the former BAAP, which predominantly comprises 2,4-DNT and 2,6-DNT (~95%), along with small amounts of four other minor isomers (~5%). There are no appropriate peer-reviewed studies available to derive a suitable chronic human health toxicity value for tgDNT. Thus, the most appropriate toxicity value available for use in calculating a soil remediation goal at the former BAAP is for a 2,4-/2,6-DNT mixture. The SSRCL calculated for a 2,4-/2,6-DNT mixture, based on estimated child and adult exposures at BAAP was 11.4 mg/kg.

Q6. Using the EPA web calculator, please calculate the default "industrial" USEPA RSL for "Dinitrotoluene, Technical Grade" (CASRN 25321-14-6) which is a mixture of all six isomers of DNT.

A6. The US EPA web calculator does not calculate RSLs, however, it can be used to calculate SSRCLs. With that said, the calculation of an SSRCL for tgDNT is inappropriate based on the lack of a suitable chronic human health toxicity value for this specific mixture. The human health toxicity values available for tgDNT are unsuitable for calculation of an SSRCL because they are based on a single

unpublished study, and are considered by US EPA to be Tier 5 toxicity values that have considerable uncertainty associated with their derivation.

Q7. Using the EPA web calculator, please calculate the default "recreator" USEPA RSL for "Dinitrotoluene, Technical Grade" (CASRN 25321-14-6).

A7. Please see A6.

Q8. Please calculate the site-specific soil remediation goal (SSRCL) for "Dinitrotoluene, Technical Grade" (CASRN 25321-14-6) for the Final Creek, Settling Ponds and Spoils Disposal Areas.

A8. Please see A6.

Q9. USEPA RSLs are calculated under the assumption that only one contaminant is present, however multiple contaminants, including those in similar categories, are present in soils at the Settling Ponds. How were the default USEPA RSLs adjusted in response to potential additive and cumulative risks? How were additive and cumulative risks included in the calculations of SSRCLs?

A9. Cumulative risk assessments of human exposures to chemical mixtures are extremely complex and challenging. Individual chemicals target different tissues and have different mechanisms of toxicity and/or carcinogenicity. Additionally, chemicals do not always behave the same in mixtures as they do individually, and there is little toxicological research on chemical mixtures with which to inform these types of risk assessments. Lastly, the former BAAP consists of thousands of acres of land, and any mixtures of residual chemicals of concern are not uniformly present across the site, making a rigorous cumulative risk assessment unfeasible. With that said, the levels of any residual contaminants of concern in surficial soils (0-4 feet) across the majority of the former BAAP site are currently below levels of laboratory detection, and cleanup levels for individual chemicals are based on conservative exposure assumptions and human toxicity values that often incorporate considerable margins of safety.

Q10. The Alternative Feasibility Study for the Final Creek, Settling Ponds and Spoils Disposal Areas at Badger states that certain contaminants, such as carcinogenic polyaromatic hydrocarbons (PAHs) and arsenic (As), are not considered "pervasive" in soils meaning that they have been detected in certain areas, but not others. How will the public know where areas with elevated contaminant levels are located? From a human health perspective, would it be better if future fixed or repetitive recreational activities (that could disturb soils) are not sited in these locations?

A10. Out of over a thousand soil samples that have been analyzed from across the Final Creek, Settling Ponds and Spoils Disposal Areas at the former BAAP site, only one sample (SPB-91-01) contained the carcinogenic PAHs benzo(a)anthracene and benzo(b)fluoranthene above their residential US EPA RSLs. Similarly, only one soil sample (SPA-W-33) contained arsenic above the BAAP background concentration. Thus, these contaminants are not pervasive enough to pose a human health concern, regardless of recreational activity.

The sample locations noted above can be found in Figure 9 of the Alternative Feasibility Study for the Final Creek, Settling Ponds and Spoils Disposal Areas.

Q11. Asbestos has been released to the Final Creek, Settling Ponds and Spoils Disposal Areas at Badger. Asbestos monitoring results from 2007 to 2012 for the Bluffview sanitary system document 6 limit exceedance violations for asbestos, two of which WDNR said were significant. The wastewater treatment plant, now owned and operated by the Bluffview Sanitary District, was issued a WPDES permit effective July 1, 2012. This permit continues the requirement for monthly asbestos monitoring in the effluent to the seepage cells previously contained in the Badger permit. The WPDES permit also added asbestos to the list of parameters for the quarterly groundwater monitoring requirements, beginning in the July-September 2012 quarter.

What are the possible health risks associated with exposure to asbestos? How can asbestos fibers in soil become airborne? Can asbestos that is not visible to the naked eye pose a risk to human health? If asbestos fibers have been discharged to the land via wastewater and/or stormwater, in terms of public health would it be a good idea to test affected soils?

A11. The primary health risks associated with exposure to asbestos are lung scarring (i.e., asbestosis) and lung cancers. These health effects typically develop in workers exposed to asbestos, but not in the general public, as they require years of chronic exposure. Asbestos fibers could become airborne if soils containing asbestos are disturbed, but asbestos fibers are not able to move through soil.

Soil testing would be indicated if there was reason to believe that soils were contaminated and would be disturbed by human activity in the future. However, according to the DNR in a letter to Citizens for Safe Water Around Badger, dated September 5, 2012, "the Army and its Contractors have complied with all site asbestos cleanup requirements (and to my knowledge, other media program requirements as well). Surface soil has been removed from near some of the buildings due to paint chip and other contamination, and the removed soil has been appropriately land filled."