Microbial Risk Assessment for Unrestricted Wastewater Reuse during Army Deployments, May 2014

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The purpose of this supplement is to provide additional information on how to interpret the key risk estimates from the risk assessment, shown in Table 1 below.

Table 1. Field Wastewater Unrestricted Reuse Risk-Based Water Concentrations (RBWCs)[a,b]

Target Daily Risk of Gastrointestinal (GI) Illness (prevalence)	Predicted *E. coli* Concentration in the Treated Wastewater (CFU/100 mL)	Predicted Annual Risk of GI Illness (incidence)
Assuming 1 Shower per Day		
1 in 100 per day	10	54 in 100 per year
1 in 1,000 per day	1	74 in 1,000 per year
1 in 10,000 per day	N/A[c]	76 in 10,000 per year
Assuming 1 Shower per Week		
1 in 100 per day	100	66 in 100 per year
1 in 1,000 per day	10	103 in 1,000 per year
1 in 10,000 per day	1	109 in 10,000 per year

Notes:
[a] Summarized from Table 21 and Table C1 from the risk assessment.
[b] The information in the table is based on an analysis that assumes personnel are showering in treated wastewater and incidentally ingesting 10 ml of water each showering event.
[c] Not applicable, concentration whose volumes lead to fractional CFU in 100ml sample volume. For example, in a 1L sample volume the RBWC would be 1 CFU/L.

Correct interpretation of the rows in the above table

How to correctly interpret the above tables is shown below. The following examples articulate what the 1 in 100 per day rows mean.

<u>Correct Interpretation of a Target Daily Risk of 1 in 100 per day experiencing GI Illness from showering in the treated wastewater:</u>

On average, on any given day, the desire is that no more than 1 individual in a population of 100 experience GI illness caused from the treated wastewater on that

given day; whereby GI illness is defined as diarrhea, vomiting, nausea, and/or stomachache that may impact their activities.

While it is assumed that the GI illness will last multiple days, it is incorrect to assume that such an individual will then be sick for the next 5 days. The model is not able to pinpoint which shower initiated the GI illness; therefore an individual's exposure (shower) from up to 4 days ago could have been the shower that initiated the GI illness.

The target risk of 1 in 100 per day represents an "acceptable" prevalence[1] of personnel with GI illness symptoms on any given day. This is a risk management decision. Based on that, and other model assumptions, the RBWC is computed. The RBWC was then used in a model to predict the annual incidence[2] of treated wastewater induced GI illnesses within an exposed population.

The model estimates *average probabilities.* Therefore, if a unit showering with treated wastewater experiences 'an unfortunate roll of the dice over a month' and several individuals experience GI illness, then the probabilistic nature of the model predicts that the number of individuals getting sick over the course of the next months should be much lower. In other words, the distribution of actual cases of GI illness will average out to "1 in 100 per day" over time.

<u>Correct Interpretation of a Predicted Annual Risk of 54 in 100 per year experiencing GI Illness from showering in the treated wastewater:</u>

On average, over a year, 54 individuals in a population of 100 (who are all showering with the treated wastewater over that year) will experience one or more cases of GI illness, with each case lasting up to 5 days.

Points of Contact for Further Information

Mr. Stephen Comaty / stephen.j.comaty.civ@mail.mil
Dr. Brandolyn Thran / brandolyn.h.thran2.civ@mail.mil
Mr. Matthew McAtee / matthew.j.mcatee.civ@mail.mil

Environmental Health Risk Assessment Program
Army Institute of Public Health

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[1] Prevalence is the total number of persons with the condition during a specified time period.
[2] Incidence is the total number of persons exhibiting a condition for the first time during a specified time period.