



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

OFFICE OF  
LAND AND EMERGENCY  
MANAGEMENT

Kimberly C. Gettmann, Ph.D.  
Supervising Toxicologist, Branch Chief  
Human and Ecological Risk Office  
Site Mitigation and Restoration Program  
Department of Toxic Substances Control  
California Environmental Protection Agency  
Kimberly.Gettmann@dtsc.ca.gov

*Via email*

Dear Dr. Gettmann:

I am responding to your May 26, 2022, email inquiring about the appropriate use of the default Mass Loading Factor (MLF) for lettuce that is in EPA's Preliminary Remediation Goals for Radionuclides (PRG) calculator. An MLF is the amount, or mass, of soil that adheres to the plant surface.

Currently, the MLF for lettuce (0.0135) is the third most conservative MLF that EPA uses in the PRG calculator, following cereal grains and rice, which both have a MLF of 0.25. If cereal grains and rice are not considered to be potential food grown at the site, then assuming the lettuce MLF for all remaining fruits and vegetables would generally be an appropriate use of the EPA recommended MLF.<sup>1</sup> Please note that this response is focused solely on the usage of MLFs currently in the PRG calculator and is not evaluating your risk assessment methods. Also, there is no EPA guidance specifying that the most conservative MLF must be applied from a basket of potential produce at a particular site.

I have attached two documents to provide additional clarifications to several statements in your email. One attachment contains a November 15, 2016, screenshot of the last version of the PRG calculator before EPA instituted the approach in December 2016 to use different MLFs for various produce. The December 2016 updates were intended to add more specific produce to the PRG calculator to allow users to tailor their risk assessments to better address a variety of plants, which might be consumed by humans at a Superfund site. EPA was not correcting an error in the MLF in the PRG calculator. A change from 2 MLFs to 24 was only one of several 2016 changes to address the consumption of different plants more accurately, such as including specific human child and adult ingestion rates for each plant type, and root uptake transfer factors for different

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<sup>1</sup> Currently, the PRG calculator has MLFs for 25 plants for human consumption found in the 2011 version of the EPA Exposure Factors Handbook, which includes information on their rate of consumption by humans. There could be other plants that may be eaten by the public at a contaminated site and some of these plants may have higher MLFs than lettuce. The Agency continues to evaluate additional data and may refine the list.

groups of plants, soil types, and climate zones. The second attachment includes quotes from several paragraphs found in “Biota Modeling in EPA’s Preliminary Remediation Goal and Dose Compliance Concentration Calculators for Use in EPA Superfund Risk Assessment: Explanation of Intake Rate Derivation, Transfer Factor Compilation, and Mass Loading Factor Sources” summarizing these changes. Finally, the citation for the previous MLF for produce of 0.26 was Pinder, J. E., III., and McLeod, K. W. 1989; Hinton was the reference for the MLF for pasture of 0.25.

If you have any further questions, please contact Stuart Walker of my staff at [walker.stuart@epa.gov](mailto:walker.stuart@epa.gov) or (202) 262-9986.

Sincerely,

Larry Douchand, Director  
Office of Superfund Remediation and  
Technology Innovation

cc: Greg Gervais, OLEM/FFRRO  
Dana Stalcup, OLEM/OSRTI  
Brigid Lowery, OLEM/OSRTI  
Schatzi Fitz-James, OLEM/OSRTI  
Diana Cutt, OLEM/OSRTI  
Stuart Walker, OLEM/OSRTI

## Attachment

Screenshot from Section 5 “Recommended Default Exposure Parameters” and Section 6 “References” from the November 15, 2016 version of the PRG calculator User Guide which can be found at: [https://web.archive.org/web/20150910193026/http://epa-prgs.ornl.gov/radionuclides/prg\\_guide.html](https://web.archive.org/web/20150910193026/http://epa-prgs.ornl.gov/radionuclides/prg_guide.html)

MLF <sub>pasture</sub>	Pasture Plant Mass Loading Factor (unitless)	0.25	Hinton, T. G. 1992
MLF <sub>produce</sub>	Produce Plant Mass Loading Factor (unitless)	0.26	Pinder, J. E., and K. W. McLeod. 1989

Pinder, J. E., I., and K. W. McLeod. 1989. Mass loading of soil particles on plant surfaces, Health Phys. 57:935-942.

Below are quotes from pages vii and 1 of “Biota Modeling in EPA’s Preliminary Remediation Goal and Dose Compliance Concentration Calculators for Use in EPA Superfund Risk Assessment: Explanation of Intake Rate Derivation, Transfer Factor Compilation, and Mass Loading Factor Sources” (ORNL/TM-2016/328, November 2016) which summarize the updates in December 2016 in how the PRG calculator addresses consumption of homegrown produce and farm animals. This document may be found at:

[https://epa-prgs.ornl.gov/radionuclides/20161130\\_Biota\\_TM\\_KLM\\_Final\\_printable\\_version.pdf](https://epa-prgs.ornl.gov/radionuclides/20161130_Biota_TM_KLM_Final_printable_version.pdf)

“The Preliminary Remediation Goal (PRG) and Dose Compliance Concentration (DCC) calculators are screening level tools that set forth Environmental Protection Agency’s (EPA) recommended approaches, based upon currently available information with respect to risk assessment, for response actions at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites, commonly known as Superfund. The screening levels derived by the PRG and DCC calculators are used to identify isotopes contributing the highest risk and dose as well as establish preliminary remediation goals. Each calculator has residential gardening and subsistence farmer exposure scenarios that require modeling of the transfer of contaminants from soil and water into various types of biota (crops and animal products). New publications of human intake rates of biota; farm animal intakes of water, soil, and fodder; and soil to plant interactions require updates be implemented into the PRG and DCC calculators. Recent improvements have been made in the biota modeling for these calculators, including newly derived biota intake rates, more comprehensive soil mass loading factors (MLFs), and more comprehensive soil to tissue transfer factors (TFs) for animals and soil to plant transfer factors (BV’s). New biota have been added in both the produce and animal products categories that greatly improve the accuracy and utility of the PRG and DCC calculators and encompass greater geographic diversity on a national and international scale...”

“To provide the users of these tools the most accurate risk assessment possible, an update to biota modeling parameters was necessary to be in accordance with recent guidance from the International Atomic Energy Agency (IAEA) and the U.S. EPA 2011 Exposure Factors Handbook (EFH). The updates in biota modeling include newly derived biota intake rates and more diverse BVs, TFs, and MLFs. These updates will greatly improve the accuracy and utility of the PRG and DCC calculators and encompass greater geographic diversity on a national and international scale.

Formerly, the BVs used in these risk assessment tools were applied generically to all produce types. Now, the BVs are element-specific, biota-specific, climate zone-specific, and soil type specific, where applicable. These new BVs and TFs include contributions from the recent IAEA TRS-472 and TRS-479 as well as Science Report: SC030162/SR2 from the Environment Agency (EA) of the U.K. and were used to supersede most of the old generic values from the National Council on Radiation Protection and Measurements (NCRP), Radionuclide Soil Screening Levels (RADSSL), RESidual RADioactive (RESRAD), and A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture (Baes et. al., 1984). MLFs were also improved from a single MLF, that was applied to all produce, to individual MLFs that correspond with the individual produce items of each new produce. Previously, produce intake rates were based on generic fruit and generic vegetables. The new produce intake rates are based on 24 individual produce items, found in the 2011 EFH, that contribute to the overall produce ingestion PRG and DCC output. New animal products have also been added to the site-specific modes of these calculators. Finally, the intake rates for produce and animal products can be implemented in screening level calculations as raw weight or weight after cooking/preparation loss. Prior to these updates, raw weight was the only option.”