

MassDEP Shortforms for Human Health Risk Assessment under the MCP

USER'S GUIDE

In this User's Guide

Shortform Applicability	1
Shortform Set-Up	1
Using the Shortforms	2
Adding Non-listed Chemicals to the Shortforms	2
Contact Information.....	3

Shortform Applicability

The Shortforms are designed to streamline the Method 3 risk assessment and review process. While Method 3 risk assessments are site-specific, some exposure scenarios are sufficiently standardized for a template approach. MassDEP has assembled recommended exposure assumptions and toxicity information into the Shortform spreadsheets to calculate risk for each of these standard scenarios.

The Shortforms have important limitations. These include, but are not limited to:

1. Exposure Assumptions - It is the risk assessor's responsibility to verify that the exposure assumptions in each Shortform are appropriate for use at their site.
2. Exposure Pathways - The Shortforms may not cover all exposure pathways present at a site. For example, the Park Visitor Shortform for contaminated soil does not assess risks associated with inhalation of volatile compounds. At sites where this pathway might be of concern (e.g., athletic fields or parks established over former landfills), additional assessment would be needed.
3. EPC Development - Development of appropriate Exposure Point Concentrations (EPCs) for each exposure pathway is vital to ensuring that the results of the Method 3 Risk Assessment are valid. Regulations and guidance describing the development of EPCs can be found in 310 CMR 40.0900 and MassDEP's 1995 *Guidance for Disposal Site Risk Characterization*. If these requirements are not met, results from the Shortform are invalid.
4. Generic IH Calculations - The Shortforms use a generic approach to evaluating imminent hazards (IH). However, MassDEP's regulations at 310 CMR 40.0955(2)(c) call for chemical-specific approaches for certain hazardous materials. While some chemicals have reminders that pop up about a chemical-specific IH hazard quotient, it is the Shortform user's responsibility to identify contaminants that require a chemical-specific approach and evaluate them accordingly.
5. Non-Calculated Risks - Some risks are not included in the Shortforms. For instance, chromium(VI) in soils poses an imminent hazard due to contact dermatitis at a level of 200 mg/kg (rounded from 170 mg/kg), though the residential Shortform yields a hazard quotient of less than one for that concentration. All calculations should be reviewed to ensure that they comply with the MCP.

Shortform Set-Up

The Shortforms are comprised of Excel workbooks, each of which addresses a specific receptor (e.g., resident, trespasser, construction worker, etc.) exposed to oil or hazardous materials (OHM) in soil, indoor air, drinking water, or surface water. Each Shortform workbook contains several worksheets, the first of which is an index with a short description of each of the subsequent worksheets. The following worksheets provide information on Exposure Point Concentration (EPCs), equations to calculate cancer and noncancer risk ("C Eq" and "N Eq"), exposure assumptions ("Exp"), and chemical-specific information ("Chem") drawn from the Vlookup workbook. Tables in the worksheets are designed to be self-explanatory and compliment a written risk assessment report.

All Shortforms are linked to the same Vlookup workbook that contains chemical-specific information such as dose-response values and physical constants. The Shortforms and the Vlookup file are intimately linked. To keep this relationship intact and the Shortforms functional, anytime a new file is available, it's best to download all of the files again.

Using the Shortforms

The Shortforms and Vlookup files should be extracted to the same folder before being opened. In order to ensure that the workbooks link correctly, the Vlookup file should be opened first. Shortforms can then be opened subsequently.

Using each Shortform is a simple two-step process:

1. Select Contaminants of Concern (COCs) in the first column of the EPCs worksheet. COCs can be added using a drop-down menu that appears when a cell in that first column is selected.
2. Enter site-specific EPCs in the cell immediately to the right of each COC. Check to be sure the units of your data match those in the Shortform. Risks associated with each COC/EPC combination are calculated automatically and displayed in the cells to the right of the EPC. Risks are only displayed for pathways that might contribute significantly to overall risk.

The total site cancer (Excess Lifetime Cancer Risk, ELCR) and noncancer (Hazard Index, HI) risks for all of the COCs are summed at the top right of the EPC spreadsheet. If there is exposure to more than one medium (soil and groundwater, for example), the total risk must be calculated by adding the HIs and ELCRs from all of the applicable Shortform files.

Notes of caution: **Under no circumstances should columns or rows be deleted or inserted between existing ones in the Shortforms.** Doing so could disrupt the intra- and inter-worksheet links, thus compromising the validity of the risk calculations. Similarly, do not change the name of the Vlookup. The risk assessor is responsible for ensuring that the most recent versions of the Shortform and Vlookup files are downloaded from the MassDEP website when used to support a risk characterization report.

If the Shortform is submitted to fulfill a Method 3 Risk Assessment requirement, it must be submitted as a component of a report that includes a comprehensive site description, hazard identification, description of site activities and uses, identification of receptors and exposure points, discussion of the applicability of any Activity and Use Limitations (AULs), EPC estimation, risk characterization summary, and an uncertainty section. The Shortform is a risk calculation tool, intended for use by risk assessors in the context of a complete risk assessment.

Adding Non-listed Chemicals to the Shortforms

Risk assessors comfortable with Excel can use the Shortforms to include additional chemicals of concern. Other than adding COCs and their respective properties and EPCs, the spreadsheets must not be modified in any way if they are to be submitted as Shortforms. If toxicity values or exposures factors for listed chemicals are altered, any **modifications should be highlighted** through the use of bold text, changed titles, and text description that clarifies that the workbooks are no longer the standard MassDEP Shortforms. The risk assessor should also describe and provide technical justification for the changes in the accompanying text.

Risk assessors may add chemicals to the COC list, provided they have the required physical and toxicological information for that chemical. The instructions below are for use with MS Excel version 2007.

1. Open the applicable Shortform and the VlookUp file.
2. Add the chemical to the COC dropdown in the Shortform:
 - a. Unhide Column A by dragging the column marker left of Column B to the right until chemical names show.

- b. Add the chemical to the *bottom* of the dropdown list, adding “zz” before the name to protect the Vlookup alphabetizing, eg “zzEthylMethylTop”.
 - c. Click in column B under Oil or Hazardous Material to select the dropdown.
 - d. Go to the Data tab, choose Data Validation
 - e. Under Settings, change Source to include the new row, ie \$A\$126 instead of \$A\$125. Add more if adding more chemical rows, ending with \$A\$127 or \$A\$128 as applicable.
 - f. Check the box “Apply these changes to all other cells with the same settings”
3. Add the zz chemical to the Vlookup: in the last row of column A in tabs v1, v2, v3, and v4.
4. Add the necessary data for each tab. Only chemical data that is required for the media and exposures used in the Shortform that is being modified must be added.
5. Change the Vlookup named ranges used in the equations to include the new chemical info:
 - a. In the Vlookup, select the Formulas Tab -> Name Manager.
 - b. Select named range “physical_prop” -> edit.
 - c. Change the “refers to” box from “=V4!\$A\$2:\$F\$118” to “=V4!\$A\$2:\$F\$119”
 - This includes the new row. Add more if adding more chemical rows, ending with \$F\$120 or \$F\$121 as applicable.
 - d. Click “ok”
 - e. Repeat steps b. through d. to expand the “refers to” for these other named ranges:
 - RAFs
 - toxicity
 - V4Constants
 - WaterPUF
6. Hide column A in the Shortform again. Select column A, right click, and select Hide.
7. Add COCs and EPCs as usual.

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