

ShortForms for Human Health Risk Assessment under the MCP

USERS GUIDE

Introduction

The purpose of the revised ShortForms is to replace the original ShortForm (published by DEP in 1992) and to further streamline the Method 3 risk assessment and review process. While Method 3 risk assessments are site specific, many exposure scenarios have become sufficiently standardized to allow for a template approach. Therefore, the Department has assembled recommended exposure assumptions and toxicity information from a variety of previous guidance and included them in the revised ShortForm. Use of these recommended inputs is intended to streamline the risk assessment process and increase consistency among Commonwealth risk assessments.

The ShortForms consist of individual Excel workbooks that address risks associated with contaminated drinking water or soil. Each workbook covers one receptor type (e.g., resident, construction worker, trespasser) and relevant exposure pathways for that receptor and medium. For example, the Residential Drinking Water ShortForm estimates risks associated with exposure to chemicals in drinking water for a resident due to ingestion, dermal contact, and inhalation. Each shortform associated with an exposure pathway will be released on the website as they become available.

Applicability

The ShortForms are intended for use in a MCP Method 3 Risk Assessment. The risk assessor must be aware, however, of the limitations to the applicability of the Shortforms. These include, but are not limited to:

1. The ShortForms might not cover all exposure pathways present at a site. For example, the Recreational Child 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 work would be needed to account for the associated risks.
2. It is incumbent upon the risk assessor to verify that the exposure assumptions in each ShortForm are appropriate for use at a site.
3. 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 DEP's 1995 *Guidance for Disposal Site Risk Characterization*, respectively. If these requirements are not met, results from the ShortForm are invalid.
4. The ShortForms use a generic approach to evaluate imminent hazards. DEP's regulations and guidance, however, call for chemical-specific approaches for evaluating imminent hazards associated with certain oil and/or hazardous material. It is incumbent upon the risk assessor to identify any site contaminants that require such a chemical-specific approach and evaluate them accordingly.

Differences from Original ShortForm

The revised ShortForms are significantly different from the original ShortForm. The most notable change is that the revised version is not limited to residential scenarios, but rather includes additional receptors such as construction workers, trespassers, recreational children, and office workers. These additions increase the applicability of the revised ShortForm, allowing its use at a greater number of sites.

Several other changes should be noted. Extensive documentation has been included in the Excel spreadsheets for the revised ShortForms. This documentation accompanies the risk tables and can be incorporated directly into the risk assessment report. The documentation is intended to satisfy transparency requirements for public access.

- Determination of Compounds of Concern (COCs) by comparison to background concentrations is not included in the revised ShortForms. This step must be performed prior to ShortForm use.

- Toxicity values have been significantly updated. The ShortForms are designed to use one file (a Vlookup file, see below) that contains these toxicity values. The Vlookup file is intended to be a living document. It will be updated on an as-needed basis, with the newest version available on MA DEP's website.
- In the original ShortForm, exposure to COCs through inhalation and dermal contact with drinking water was assumed to be a function of exposure via ingestion. The revised ShortForms calculate these exposures for a number of chemicals, based on mathematical models. A brief description and documentation of these models is available within the drinking water ShortForm. For the dermal pathway, exposure to some chemicals cannot be estimated using the model. Therefore, dermal exposure for these chemicals is assumed to be a function of exposure via ingestion.

Consistent with current risk assessment guidance and practice, dermal and inhalation exposures are estimated for showering only. The conservative assumptions incorporated into the showering exposure assessment are considered sufficiently health-protective to account for dermal absorption and inhalation exposures likely to occur during other household activities.

ShortForm Set-Up

The ShortForms are comprised of Excel workbooks, each of which addresses a specific receptor (e.g., future resident, trespasser, construction worker, etc.) exposed to OHM in either soil, drinking water, or surface water. All ShortForms are linked to the same VLookup workbook that contains chemical-specific information such as dose-response values and physical constants. Therefore, ShortForms and VLookup files should be extracted to the same folder before being opened. **DO NOT CHANGE THE NAME OF THE WORKBOOK.** To work properly, all workbooks must be saved to the same folder. Do not open the workbooks in a web browser to save them, as this will cause the links to fail. It is incumbent upon the risk assessor that the most recent versions of the ShortForm and VLookup files are downloaded from the DEP website when used to support a risk characterization report.

Each ShortForm workbook contains a number of worksheets, the first of which provides an index with a short description of each of the subsequent worksheets. The number and type of worksheets differs slightly from ShortForm to ShortForm. At a minimum, separate 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.

The Shortforms and the VlookUp file are intimately linked. To keep this relationship intact and the shortforms functional, anytime a new file is available, all of the files (VlookUp and Shortforms) should be downloaded again at the same time.

ShortForm Use

In order to assure 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. First, the risk assessor selects COCs in the first column of the Exposure Point Concentration (EPC) worksheet. COCs can be added using a drop-down menu that appears when a cell in that first column is selected. Second, site-specific EPCs are entered in the cell immediately to the right of each COC. 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. For example, because uptake by plants for some chemicals is very limited, no risk associated with produce consumption is calculated for these chemicals.

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 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.

A note of caution: **Under no circumstances should columns and/or rows be 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. Risk assessors, facile in the use of Excel, can add chemicals to the COC list, provided they have sufficient information on the physical and toxicological nature of a chemical.

Before printing out ShortForm tables, the user must make sure that the print area is set to encompass all COCs.

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. Other than adding COCs and their respective EPCs, **the spreadsheets must not be modified in any way if they are to be submitted as ShortForms.**

Contact Information:

Lydia Thompson
MassDEP, Office of Research and Standards
One Winter St.
Boston, MA 02108
617-556-1165
<mailto:lydia.thompson@state.ma.us>