



GUIDELINES FOR PREPARING USSD DRAFT AND FINAL MANUSCRIPTS

All papers accepted for the Conference will be published in an online library. Your final paper must be submitted to Catalyst by **March 20, 2020** in both Word and pdf formats.

Questions? Contact Sue Anderson, sanderson55@comcast.net, 970-231-2274.

To help you format your paper properly and to ensure uniformity among papers, you must use the template document provided, which carries the appropriate margins, Word styles for headings and text, and headers and footers. You can type directly into the document, or cut and paste into it, deleting unnecessary template material. Please refer to the instructions below for additional guidance. A sample page one is included at the end of this document for your reference.

FORMATTING INSTRUCTIONS

Paper Size: letter size paper (8 1/2 by 11 inches)

Margins: Top and bottom: 1.0 inches; left and right: 1.25 inches. **All** text, figures, tables and photographs **must** fit within these margins. Please reduce illustrations as needed to fit.

Font: 12-point Times New Roman for text, paper title, captions and headings. **Footnotes** should be in TNR 10 point.

Align Left. Do not indent first line of paragraphs.

Single spacing with one blank line between paragraphs.

Length: Papers should be 10-15 pages, including tables and figures.

Pagination: Page numbers are included in the template footer.

EXTENDED INSTRUCTIONS

Paper Title/Author Block: The title (please limit the title to 12 words) should be in all caps, bold and single spaced, 12-point Times New Roman font. Place one blank line following the paper title before listing the authors. For one to five authors, center author's names, one name per line. For six or more authors type them in pairs, flush left and flush right. For an odd number of authors, center the last author under the others. Place one blank line after authors' names, before the Abstract. Please see sample page for example. Use of professional credentials (PE, PhD, etc.) is optional. Do not use job positions.

Author Information — a **footnote** reference stating present position, employer, city, state and e-mail must appear on the bottom of the first page for each author. Use the Word footnote function, not footers.

Abstract — Paper should begin with an Abstract of no more than **300 words**. Use Heading 1 **ABSTRACT**. The Abstract should reflect the information actually included in the paper; this is not necessarily the abstract submitted in response to the Call for Papers. The Abstract should not include figures, tables or photographs.

Footnotes — A solid line separating footnotes from text should extend two inches (50 mm) from left margin.

Headers and Footers — Do not modify the Word headers and footers found in the template. As noted above, author information should be provided in **footnotes**, not footers.

References —The References section should immediately follow the text, rather than beginning on a new page. Use Heading 1 style **REFERENCES**. References should be listed alphabetically by last name of the first author. Please do not indent reference text; double space between citations.

Units — Authors may select either SI or English system of units. Conversion to the other system is not recommended.

HEADINGS

Following are the formats of the three levels of headings. Note: **headings should not be numbered.**

HEADING 1 STYLE

Heading 2

Text begins here . . .

Heading 3. Text begins here . . .

Heading 1 Style should be in all capital letters, **bold**, centered. One blank line before and after heading. (Suggested use of Heading 1: Abstract, Introduction, two or three major technical sections, Conclusions, and References.)

Heading 2 style should have initial caps (title case), begin at left margin, **bold** and underlined. One blank line before and after heading.

Heading 3 should begin at left margin, with initial caps, underlined (not bold), followed by a period. Begin text on the same line.

FIGURES, TABLES AND EQUATIONS

Figures and Photographs — All figures and photographs should appear within the main text as soon after the initial reference as possible. Figures and photographs may be in color. **All figures and photographs must fit within the same margins as the text** (no more than six inches wide). Place the caption (12-point Times New Roman font) below the illustration, centered, as follows:

Figure 1. Project Location Map

Tables — Should appear within the main text as soon after the initial reference as possible. **All tables must fit within the same margins as the text.** Place the caption (12-point Times New Roman font) above the table, centered, as follows:

Table 1. Rainfall Intensity

Equations — Place one blank line between text and equation, and center equation on page. Number equations consecutively. Equation number should be in parentheses and flush right (ending at right margin). Use Normal Style or Microsoft's Equation Editor for equations; choose symbols from the Symbol or Times New Roman, Latin, or Greek sets.

APPROACHES TO ESTIMATING INDIVIDUAL RISK FOR DAM SAFETY TOLERABLE RISK EVALUATION

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ABSTRACT

Dam safety tolerable risk guidelines have been defined for both individual and societal risk. Individual risk is *the chance that a particular individual ... will be harmed* whereas societal risk characterizes *the scale of an accident in terms of numbers killed or harmed* (HSE 2012). However, societal risk (and annual probability of failure) has been the focus of tolerable risk evaluations for dams in the US. In contrast, individual risk is the sole focus in many other fields in many countries. Currently, USACE HEC-FIA and LifeSim software for estimating life loss are more suited for supporting decision-making based on the societal risk perspective.

This paper discusses the value of evaluating both individual and societal risk, and reviews some alternative ways of estimating individual risk, including considering actual persons vs. hypothetical persons. Two approaches are recommended for estimating individual risk using HEC-FIA or LifeSim in conjunction with DAMRAE risk analysis software. The first approach relies on information that is currently used for societal life-loss estimation. It is proposed for use in screening and issue evaluation study (IES) risk assessments. The second approach requires the construction of hypothetical persons. It is proposed for dam safety modification study (DSMS) risk assessments for informing decisions on selection of risk reduction measures and for judging the tolerability of residual incremental risk. A variation of the first approach would provide mapping of iso-lines of estimated individual risk, which could be useful for as-low-as-reasonably-practicable (ALARP) evaluations for DSMS risk assessments.

INTRODUCTION

Background and Importance of Individual Risk

The purpose of this paper is to review approaches to estimating individual incremental risk and to describe an approach that is suitable for use in the USACE dam and levee safety programs using the HEC-FIA and LifeSim software.

The USACE Engineering Regulation ER 1110-2-1156 for *Safety of Dams - Policy and Procedures* (USACE 2014) tolerable risk guidelines considers individual and societal (population) risks. As stated in HSE (2012) these are defined as follows:

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