Federal Emergency Management Agency

Washington, D.C. 20472

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MEMORANDUM FOR: Hazard Mapping Division, Washington, DC Office
Regional Engineers, Regions I-X
Map Coordination Contractors

[original signed]

FROM: Michael K. Buckley, P.E.
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Federal Insurance and Mitigation Administration

SUBJECT: Policy for Accepting GIS Tools for Flood Hazard Mapping in the NFIP

Background:

The work group for FEMA's Automated Hydraulics and Hydrology (H&H) Map Modernization objective is addressing how the recent explosion of Geographic Information Systems (GISs), enhanced H&H modeling tools, and new computer software can be used to efficiently develop and update flood hazard information for the National Flood Insurance Program (NFIP). These new tools facilitate model building, perform data processing and storage tasks, improve graphics and visualization, and provide user-friendly graphical interfaces. Our goal is provide guidance to enable FEMA, Cooperating Technical Partners, Map Coordination Contractors, Study Contractors, and other partners to take full advantage of these automation tools in conducting flood insurance studies (FISs) for the NFIP.

The NFIP Regulations explain that specific criteria must be met before a computer model can be used for NFIP flood hazard mapping purposes. The purpose of this memorandum is to explain the policy for applying the NFIP Regulations to the automated H&H tools.

Applicable NFIP Regulations

The NFIP Regulations that apply to H&H models are as follows:

Paragraph 65.6(a)(6)

Any computer program used to perform hydrologic and hydraulic analyses in support of a flood insurance map revision must meet all of the following criteria:

(i) It must have been reviewed and accepted by a Federal government agency responsible for the implementation of programs for flood control and/or the regulation of floodplain lands. For computer programs adopted by non-Federal agencies, certification by a responsible agency official must be provided which

states that the program has been reviewed, tested, and accepted by that agency for purposes of design of flood control structures or floodplain land use regulation.

(ii) It must be well-documented, including source codes and user's manuals.

(iii) It must be available to FEMA and all present and future parties impacted by flood insurance mapping developed or amended through the use of the program. For programs not generally available from a Federal agency, the source code and user's manuals must be sent to FEMA free of charge, with fully-documented permission from the owner that FEMA may release the code and user's manuals to such impacted parties.

All computer models that meet the above criteria are published on a list titled "Numerical Models Accepted by FEMA for NFIP Usage," on FEMA's web site at www.fema.gov/mit/tsd/EN_modl.htm. The term "computer programs" as stated in 65.6(a)(6) is used interchangeably with "model" or "numerical models."

New Automation Tools and Their Relationship to Accepted FEMA Models

A wide variety of automation tools have been developed to facilitate H&H modeling. These products range from simple graphical user interfaces that help input model parameters to highly advanced GIS-based tools that contain state-of-the-art software and modeling approaches with fully-integrated data processing, graphics, and visualization capabilities. The Map Modernization Automated H&H work group is currently evaluating the spectrum of the most commonly used automation tools that are available today. We have organized these tools into three categories based on their relationship to accepted FEMA models. The following is the policy for their acceptance for use in FEMA's flood hazard mapping program.

Category 1:

Description: These simple tools can be either pre-processing or post-processing automation tools. Pre-processing tools are independent modules that perform input data pre-processing tasks to estimate model input parameters and/or help build H&H model input files. Post-processing tools are independent modules that perform model output data post-processing tasks to help plot, display, visualize, or manipulate H&H model results. They may simply be graphical user interfaces (GUIs) designed to help format, analyze, or display modeling input and output data. Additionally, they may be GIS- or CAD-based, have data storage capabilities and animation techniques, or help integrate a variety of different modeling components. In all cases, they function in conjunction with, but separately from, the executable file of a computer model that is on FEMA's accepted models list.

Policy for acceptance: These tools are considered acceptable for use in the flood hazard mapping program because they are not computer models themselves. Since they function independently from a computer model already on the accepted models list, they are acceptable. FEMA will not maintain a list of such modeling tools that fall into this category.

When map revision requests or flood insurance studies are submitted to FEMA for review that utilize one of these tools for H&H modeling, all required model input and

output must be made readily available. This would include all input model parameters and output data, which is required for QA/QC purposes in reviewing, maintaining, and revising the modeling data.

Category 2

Description: These software tools are computer models that perform modeling routines that emulate a model on FEMA's accepted model list; however, their source code has been re-written to perform these tasks, instead of using the accepted model's source code. For example, they may reproduce basic HEC-1 hydrology functions, but do not use the HEC-1 executable computer code. In general, they usually provide additional functionality, such as data pre- and post-processing, enhanced graphics, GUIs, or visualization techniques. They are considered computer models because they perform hydrologic and hydraulic calculations similar to other models that FEMA regulates.

Policy for acceptance: Category 2 software tools need to be reviewed in accordance with the conditions (i), (ii) and (iii) of Paragraph 65.6(a)(6).

Category 3

Description: These software tools use new H&H modeling methods and/or models not currently on the FEMA accepted numerical models list. They may add pre- or post-processing functions similar to the other categories of tools as well.

Policy for acceptance: Because these are new computer models, Category 3 software tools need to be reviewed in accordance with the conditions (i), (ii) and (iii) of Paragraph 65.6(a)(6).

Assessing Characteristics of Automation Tools

The Map Modernization Automated H&H work group has developed a simple and efficient method for assessing and categorizing automated H&H modeling and floodplain mapping tools. An evaluation form is filled out that describes the basic features of the software tools. The Internet or marketing information can often be used to obtain all information needed for the evaluation. If more information is needed, the software or model developer can be contacted to answer remaining questions. Once the software tool has been evaluated, FEMA can quickly determine which category the tool falls into, and whether it is acceptable for use in the NFIP.

For further information on any of these issues, please do not hesitate to contact Ms. Sally P. Magee of our Headquarters staff in Washington, D.C. at (202) 646-8242, or via e-mail at sally.magee@fema.gov.