

**UPPER MISSISSIPPI RIVER SYSTEM FLOW FREQUENCY STUDY
(Upper Mississippi, Lower Missouri, & Illinois Rivers)
CITIZENS' PUBLIC INVOLVEMENT GROUP MEETING
December 1, 1999**

Final Minutes (Approved 6/28/00)

1. The Citizens' Public Involvement (P.I.) Group held its fourth meeting on December 1, 1999, in St. Louis, Missouri. A meeting agenda is attached. The minutes below are a summary of the discussions that occurred during the meeting and are not verbatim.
2. The meeting began with Chairperson Paul Soyke (Corps of Engineers, Rock Island District) asking attendees to introduce themselves. An attendance list is attached.
3. There were no additions or corrections to the minutes (pending approval) of the April 1999 meeting. Bill Lay moved that the minutes be approved as final; Peggy Smart seconded the motion. The P.I. Group voted unanimously to approve the motion. A copy of the final minutes was mailed to each P.I. Group and Task Force member. The final minutes can also be viewed under "Flow Frequency Study" on the Corps of Engineers' web page (<http://www.mvr.usace.army.mil/>).
4. The P.I. Group began to discuss the upcoming public meetings, which are *tentatively* scheduled for the early spring of 2001. It is important that the P.I. Group members understand the study so they can explain it to the publics in their areas. There are several decisions that the Group will have to make about designing the public meetings. Some of those decisions include the following:
 - a. **What is the purpose of the public meetings?** Paul Soyke, P.I. Group Chairman, stated that the study is not proposing a project and that the public cannot influence the results of the study. However, the public must be educated on what was done during the study and how the study results will impact an area. We need to explain how the study was done, that the Public Involvement Group has had the opportunity to have input, and that the State and Federal agencies (Task Force) also have provided input. Although some P.I. Group members do not feel like they have provided input yet, Paul said that their attendance and comments at the P.I. Group meetings have been effective and will continue to be effective.
 - b. **What kind of information should be given to the public?** There is concern that the public will not understand the study. Information must be presented in understandable formats. The P.I. Group discussed information that the public will be interested in and suggested that the information provided at the meetings include the following topics:
 - (1) Graphics, examples, history, why the study/changes are being made and are important, and what the impacts may be.
 - (2) Information on what will happen as a result of the study, if and how the study results will affect their flood insurance/PL 84-99 levee designation, and what happens next.
 - (3) The public will want to see a comparison between the old and the new frequency curves. It was suggested that USGS maps are present so the public can indicate where their area of interest is and then look at the frequency curves for that area.
 - (4) Prepare a list of how study results can be used; e.g., what happens next? How will future policy be affected? How will FEMA use the results? How will the results affect PL 84-99 and wetlands determinations?

(5) The public needs to understand the assumptions that go into the flood flow/stage frequency curves. The facts that are based on the assumptions will affect people's livelihoods. For example, there is concern that policy could change – depending upon the assumptions – and could affect the curves and the public – businesses, communities, farmers, etc.

(6) How are unregulated flows factored in? How are high and low flows factored in? How is it coming together?

c. **What is the best way to give that information to the public?** Meeting formats include:

(1) Formal presentation (slides), followed by small group (breakout) discussions, ending with summaries given by each small group to the entire group.

(2) Formal presentation, followed by questions and answers.

(3) Presentation, along with various tables with maps of the various study areas.

(4) Combination of the above or other formats.

d. **Where should the meetings be held?** The current plan allows for one meeting in each of the seven involved states. Is one meeting per state enough? If not, how many are enough? If the budget does not allow for more than seven meetings, then should the meetings be held in the areas where the study results will have the greatest impact (e.g., from the Quad-Cities on down)?

e. **When should the meetings be held?** Depending on intent of meeting, suggest that they be held:

(1) as soon as possible if the public can provide input into assumptions.

(2) at the end of the study if we're only going to give information and if decisions are already made.

5. The next few paragraphs highlight other public meeting discussion items. Many of the P.I. Group members feel that the public may have a lack of interest in this study, which could be translated into a lack of knowledge about the study. The public must be well informed about the meetings. Suggestions include:

a. Press releases with specific information about the study areas (e.g., what is considered a 100-year flood for each area?) should be sent well ahead of the public meetings.

b. In the meeting announcement, it would be helpful to send a comparison of profiles showing the levees with flood protection shown. (*NOTE: This may be too much information for an announcement given the large study area; however, possibly examples could be shown in the announcement and maps of the entire study area could be available at the public meetings.*)

c. Congressional staffers should be briefed before the public meetings take place so they understand the study and the study results.

6. The public will want to know what will happen as a result of the study and what the results will be used for. Study results will provide an economic evaluation of new/improved floodplain. Currently, we have good topographic data, but if the data are off 6 inches, farmers have lost crops.

7. There are 110+ levee districts in Missouri which will be affected by the study; public infrastructure will be involved.

8. If a levee is low, can it be raised so drainage districts can get the Government's help (through the PL 84-99 program)?
9. What will FEMA do with the results of the Flow Frequency Study?
 - a. Update the flood rate inundation maps.
 - b. FEMA will be concerned with how the study will affect the public (flood insurance) and the implications of what flood level the land is (10-year, 50-year, etc.).
 - c. FEMA will map the stage frequency curves along the rivers. The curves will be given to FEMA for mapping the counties. FEMA is interested in Digital Terrain Models (DTMs). See paragraph 17.b. for a further explanation of DTMs.
 - d. FEMA *may* hold public meetings after ours, although those meetings would be a separate process. At those meetings, FEMA would address what the public has heard and the public would be given the chance to comment on floodplain maps.
10. The bottom line of the study: Flood profiles will be updated along studied rivers.
11. The P.I. Group requested that the Corps (Paul Soyke and Sue Simmons, with input from others) send a proposed public involvement plan for the public meetings to them and they will comment on and provide input to that plan. The plan will be sent to members before the next P.I. Group meeting and will be discussed at that meeting.
12. The discussion then switched to the assumptions used in the study. Arlen Feldman, Chief, Research Division, of the Corps of Engineers' Hydrologic Engineering Center in Davis, California, and advisor to the Citizens' P.I. Group, stated that the Technical Advisory Group and the Interagency Advisory Group are reviewing a report summarizing the assumptions to be used in the study
13. Arlen then discussed several components of the study: unregulated flow frequencies, regulated flows, terrain data, river hydraulics and levees, and stage frequencies and FEMA. A summary of these discussions is included in the following paragraphs.
14. Unregulated flows are those natural flows that are unregulated/without dams. Many issues are included when studying unimpaired flows:
 - a. Climate change; i.e., have the meteorological forces producing the rain, snow, etc., changed? A study undertaken by the Corps of Engineers' Institute for Water Resources shows that there are some apparent trends in precipitation in parts of the basin, but we can't say that with enough confidence to warrant changing from current methods (Bulletin 17B). The study looked at trends in daily precipitation and streamflow data. For example, some precipitation gages in Iowa showed apparent trends, but those trends were not reflected at the streamflow gages.
 - b. Changes in flood frequency: No comparisons of old and new flood frequency curves have been made yet; preliminary analyses indicate there will be increases in some areas and decreases in others.
 - c. Historic floods: The Technical Advisory Group has made the decision not to use historic flood data because there is a long systematic record of gaged flows, and historic flood peaks are not as accurate as the gaged records. Also, the long systematic record greatly reduces the weighting given to the historic events in the frequency analysis procedure.

d. Mixed populations; i.e., floods used to compute the frequency curve should be from the same population. (Population is defined as the group of precipitation and runoff phenomena that produce the flood. Examples of populations used in prior studies are snowmelt floods, rain floods, ice-jam floods, and hurricane floods.) Arlen provided an example of a mixed population analysis on the Missouri River for summer (rain) and spring (snowmelt and rain) floods. (See attached Figure 1.0.) The Corps of Engineers is finalizing this study now. The resulting mixed-population flood frequency curve is a best estimate using both curves; i.e., use the summer curve to where it crosses at spring and then use the spring curve.

e. Unregulated/natural flows are used in the flood frequency analysis to obtain an understanding of the basic underlying flood frequency relationship. Natural streamflows show good conformance to analytical (e.g., Log Pearson III) distributions, whereas regulated streamflows have discontinuities due to reservoir regulation which do not fit a regular analytical relationship. The parameters typically used to describe a flood frequency curve are the mean (average), standard deviation (slope), and skew (curvature). Because these parameters are not known (they are only estimated from the observed streamflows), the Corps performs a risk and uncertainty analysis to better estimate their variability.

f. Who performs quality control and who makes the decision if non-standard methods are used? The Federal Guidelines (Bulletin 17B) recommend the Log- Pearson Type III analytical distribution and provide for the use of mixed populations and historic-flood weighting. However, provision is made to use other methods if they can be shown to be appropriate. The initial review of the results will be by the Corps of Engineers office and then the results will go up the chain for review. The results will then be reviewed by an independent technical group, the Interagency Advisory Group (Task Force), the Technical Advisory Group, and ultimately released for public comment.

g. Distribution selection: The Technical Advisory Group (TAG) looked at several different analytical distributions, data sets, and parameter estimation methods in an effort to find the distribution which best fits the data. The data sets were divided up in different ways to analyze the suitability of different distributions; e.g., a 100-year record may be divided into half, thirds, etc. The TAG did not find differences significant enough to deviate from using existing guidance (17B). Arlen provided an example of distribution selection on the Missouri River. (See attached Figure 2.0.)

(S. K. Nanda, Task Force Chairman, joined the P.I. Group meeting for a few minutes. He reiterated that the study team has been looking at various distributions to fit analytical frequency curves. However, all the different distributions studied showed the results within 5 to 10 percent of the 17B procedure. He also stated that the present study shows that the reservoirs do not have as large an impact on the Mississippi River as assumed in the 1979 profiles, but they have a large impact on the Missouri River.)

h. Arlen reviewed a Memorandum for Record dated July 22, 1999, from Dr. David Goldman, a Hydraulic Engineer at the Hydrologic Engineering Center in Davis, California, and a Task Force member. Subject of the memorandum: "Summary of Technical and Interagency Advisory Group Recommendations for Upper Mississippi Flood Frequency Study." The memorandum (also introduced to the P.I. Group as Figure 3.0) is a summary of the assumptions that the Task Force is considering in the study and reads as follows:

1. The methods outlined in the federal guidelines for computing the likely annual flood, such as the 1/100 year flood, were found to be adequate.
2. Consistent estimates of likely annual flood values will be obtained by smoothing estimates between gages based on drainage area. For example, estimates of the (1/100) year flood will increase in a logical fashion between gages given the total drainage area to a river cross-section of interest.

3. Historic information will not be used in estimating the likely annual floods because; the observed period of record of over 100 years is sufficiently long to obtain reasonable estimates; the historic information has not been observed accurately or consistently throughout the study area, and this information is not relevant to current conditions given land use and channel changes over the period of record.

4. Unregulated daily flow will be simulated in the period of record analysis and analyzed to obtain the likely annual daily maximum flood values. The likely peak annual flows can be obtained from simple regression relationships between peak and daily flow values.

The Group was concerned about the word “smoothing” (paragraph h.14.2. on page 4). S. K. Nanda said that smoothing would be used to ensure regional consistency of logical relationships – like flows have to increase as they go downstream – and there would be no discontinuity at the District boundaries.

i. St. Louis District should have the study of the unregulated flow frequency curves completed by December 31, 1999. (Note: Subsequent to the December 1, 1999, meeting, the St. Louis completion date of the unregulated flow frequency curves has been changed to March 30, 2000.)

15. Arlen’s next topic of discussion was regulated flows.

a. Reservoirs were added when looking at the regulated flows.

b. Arlen showed a graph of regulated vs. unregulated peak flows at Hannibal. (See attached Figure 4.0.) The regulated vs. unregulated relationship for a wide range of flows is necessary for use in converting an unregulated flow frequency curve to a regulated flow frequency curve.

c. Every applicable gage will be adjusted from unregulated to regulated flow frequencies.

16. Arlen and S. K. discussed climate and land use changes for regulated flows.

a. The study team looked at what changes occurred over a 100-year period and found that over that period there were no significant changes related to climate and land use. There is a misconception by the public that land use makes a significant change in the flows of large river basins like the Mississippi and Missouri Rivers. While land use changes do affect the runoff for the immediate area, land use changes are not a major factor on large river stations on the Mississippi and Missouri Rivers. This needs to be stressed at the public meetings.

b. S. K. commented on the impact of land use on hydrology. Are flows changing at gages as a result of land use? Urbanization has a localized impact. A report by the Corps of Engineers’ Institute for Water Resources shows some small changes, but overall no big changes. This report will be made available to the P.I. Group.

c. S. K. discussed the impact of wetlands. There are two ways to determine flood frequencies for a watershed: deterministic and stochastic. The deterministic method of study needs to incorporate watershed characteristics such as land use, infiltration, etc., to compute the flood runoff for a given frequency storm. The statistical method looks at the past flood peaks in the period of record (over 100 years of events for the Mississippi River) and looks at the mean and standard deviation and skew coefficients to predict flood frequencies. We are using the latter for the Upper Mississippi River System Flow Frequency Study. A 1994 White House Task Force concluded that wetlands have an impact on 2-5-year floods, but a smaller impact with large floods (e.g., 100-year floods).

d. At the next P.I. Group meeting, S. K. will ask someone from the Omaha District to be present to show the difference between the actual 1993 flood and what it might have been with other reservoir operation plans and initial storages. (This is in response to a concern about the Missouri River Master Plan.)

17. Arlen then discussed terrain data.

a. The Corps is currently checking terrain data; e.g., elevations. The study team will use that information to cut cross sections for river hydraulics. The data for the Mississippi and Illinois Rivers will be completed by December 31, 1999, and for the Missouri River by March 2000. (Note: subsequent to the December 1, 1999 meeting, the terrain data contractor revised the Mississippi River delivery date to February 29, 2000.)

b. The Corps Districts are verifying Digital Terrain Models (DTMs). In 1998, a contractor flew the entire study area and is providing a DTM for each of the five involved Districts (St. Paul, Omaha, Rock Island, St. Louis, and Kansas City) showing a grid of elevation points (including levee, railroads, and roadways). Although each District is responsible for handling the data as it wishes, Rock Island District plans to document each levee in the District and identify these levees in the DTMs. Other Districts are encouraged to do likewise. The data from the DTMs are incorporated into the UNET Models. St. Louis District has completed building its UNET Model with the new DTM data. All major and minor levee systems will be incorporated into the UNET Model(s).

NOTE: After the December P.I. Group meeting, a question was directed to Paul Soyke via email concerning the April 1999 minutes. The person asking the question was told: "...the accuracy of the ground data for the study was going to be based upon 4 foot contour mapping with an accuracy of plus or minus 2 feet. This is far less accuracy than the 0.6 feet promised by SK Nanda at the April 28, 1999, meeting...."

Paragraph 6.i. of the April 1999 minutes states: "Concern was expressed about the accuracy of topography. SK Nanda responded: 'The accuracy we will maintain is in inches. Data should be fairly accurate. Aerials taken after snow melt and before spring flooding maintain data within .6 foot accuracy. 90% of the time we should be within a foot.'"

The following is the response to the question, which reflects the April 1999 statement. "The data was designed and compiled so that **spot elevations** on well defined features would be **within 0.67 feet of the true position** (as determined by a higher order method of measurement) 67% of the time. The 0.67 feet comes from ASPRS Class 1 Standards as stated in the Corps EM on Photogrammetry. **It is approximately 1/6 of a contour (4 foot contour). Contours are not well defined features and they should be accurate to 1/3 of a contour** (approx. 1.33 feet). The data collected was designed for use in collecting cross section data for H&D design only. This was a decision at HQ. The level of detail in the elevation data was kept to the minimum for this purpose. **Mass points and breaklines to depict roads, railroads and levees were specified.** Other features may not be as detailed. This was done to maximize the data extent with the funding made available."

c. If a P.I. Group member has a particular levee that he/she wants to assure is included, he/she should notify the District within which the levee is located. This request also was included in the December 1999 newsletter.

d. If a P.I. Group member is interested in a particular Digital Terrain Model levee elevation or profile or in viewing the DTM data, he or she may contact Sue Simmons, Rock Island District, Corps of Engineers, by telephone at 309/794-5573, fax at 309/794-5883, or email at suzanne.r.simmons@usace.army.mil. Sue will coordinate requests with the appropriate District hydraulic modeler for the requested area. Additionally, local and regional planning authorities have Arc-View Spatial Analysis software, which may assist P.I. Group members in viewing DTM levee information.

18. Stating that the assumption for levee overtopping is important, Mike Klingner asked S.K. Nanda if we can assume that the levees will never be overtopped. This way, even if a levee District raises the levee system, then the flood profiles will not change. S. K. answered that levee overtopping assumptions will be discussed with the Interagency Group and the States and he will report at the next Task Force meeting.

19. The Corps of Engineers' Hydrologic Engineering Center in Davis, California, is conducting a wetlands-impacts study on floods and a report will be available when the study is completed. The Institute of Water Resources is conducting a study on impact of land use change on floods and a report will be available when the study is completed.

20. Arlen then discussed river hydraulics.

a. Cross sections, flows, and hydraulic parameters go into the UNET unsteady flow river model, which should be ready by the end of Fiscal Year 2000. The information will contain data on river lengths and roughness across the width, not depth. Cross sections will be cut from the DTM data at about every half mile.

b. The assumption is that levees fail at the top and no flood fighting is included in the levee height. This assumption was recommended by the Federal agencies and endorsed by the States

c. Once the levees fail, water goes into storage only on the Mississippi River from Quincy, Illinois, on down. On the Missouri River, the water is treated as conveyed flow.

d. Question: Can the study look at assuming no levees fail and then run another set of analyses?
Answer: If funding is there and if the team can still meet the schedule, then it possibly can be done. However, this will be studied in the proposed Upper Mississippi River Basin Comprehensive Plan Study.

e. Nicholas Pinter, a new member of the P.I. Group from the Geology Department of Southern Illinois University, asked that the following be included in the minutes of the meeting: trends in discharge and in stage should be looked at, as well as flows, as they relate to conveyance.

f. **The P.I. Group's recommendation to the Task Force:** perform an analysis of frequency curves run with levees containing flows – no failure - on the Missouri and Mississippi Rivers.

21. The topic then changed to stage frequency. Arlen provided graphs (attached Figure 5) showing a river profile with regulated flow frequency and UNET-produced rating curve to determine the stage-frequency curve with uncertainty. The Flow Frequency Study produces stage frequencies along the rivers in the Upper Mississippi System.

a. Flow and stage information for all floods at a location is used to develop a rating curve – this produces a fit best estimate rating curve. The best estimate rating curve is used with the regulated flow frequency curve to compute the regulated stage frequency curve. The regulated stage-frequency curve is used to determine the 1% value for FEMA maps.

b. How many profiles will be developed? UNET will develop 2-, 5-, 10-, 25-, 100-, 200-, and 500-year floods. The Standard Project Flood (SPF) will not be developed or considered; however, the P.I. Group asked if the SPF could be included in this study. (Note: S.K. answered later that SPF profiles will not be developed in this study.)

c. Several questions came up:

(1) Can there be an indication of the SPF between the lower valley vs. the upper valley?

(2) What is the equivalent of the SPF?

(3) What is FEMA going to do? Answer: A separate effort will be required to perform FEMA mapping; this is currently under discussion by the Corps of Engineers and FEMA.

(4) When you run a model and the existing Federal levee is shown overtopped, is it defined as a floodway? Answer: the area behind the levee is assumed to be a conveyance area on the Missouri River; and a storage area on the Mississippi River. If the levee is in the floodway now, nothing can be done. This study will not change the floodway. The UNET is modeling from bluff to bluff.

d. Not moving the floodway boundary will raise/lower elevations if they change.

22. Many P.I. Group members prefer to meet in March rather than in April. If scheduling allows, we will try to do that. However, it is important to try to meet before the Task Force meetings. A P.I. Group member also expressed a concern that some members are not attending the P.I. Group meetings because the meetings are always held in St. Louis and traveling to St. Louis involves an expense on many members' parts. He suggested meeting Kansas City. S. K. suggested that we take a poll of the P.I. Group members to determine the best location for our meetings to see if the meeting location was keeping members away. Paul Soyke brought up the concern that if members who have not participated since the study began begin coming to meetings, and if members who have participated since the study began stop coming to the meetings, all continuity of the group will stop. Although P.I. Group members who have not previously attended are welcome to attend all future meetings, it is important that those who have attended and who have an understanding of the study to date continue to attend the meetings. Later in the day we asked the P.I. Group members where they would prefer to meet – St. Louis or Kansas City. Of the seven members who responded to our location question, four stated that they preferred St. Louis; one preferred Kansas City (who was the gentleman making the initial request); and two said either location was acceptable. However, we will send out a questionnaire asking each P.I. Group member of his/her meeting location preference (St. Louis or Kansas City) and will discuss the results with the Task Force.

23. Since there was no Task Force meeting the day after the P.I. Group meeting, these draft minutes will be sent to the Task Force. (When the Task Force meets the day after the P.I. Group meets, then a meeting summary is given at the Task Force meeting and the Task Force does not receive a copy of the minutes until they are finalized.)

24. An agenda will be sent to the Citizens' Public Involvement Group members before the next meeting and the P.I. Group will be asked to comment on the agenda items. A proposed public meeting plan will be sent with the agenda.

/s/

SUZANNE R. SIMMONS
Recording Secretary
Citizens' Public Involvement Group

Attachments