Overview of Fargo-Moorhead EOE

The Fargo-Moorhead EOE, which was held on September 28-29, 2009, in St. Paul, MN, was planned and implemented according to these three guidance documents:

- *Technical guide for use of expert opinion elicitation for U.S. Army Corps of Engineers risk assessments*, USACE Dam Safety Risk Management Center (2009).
- *A practical guide on conducting expert-opinion elicitation of probabilities and consequences for Corps facilities*, IWR Report 01-R-01 (2001).
- *Methods for expert-opinion elicitation of probabilities and consequences for Corps facilities*, IWR Report 00-R-10 (2000).

The *Technical guide* requires a Level II EOE when the specific information sought is not available from historical records, prediction methods, or literature review. Therefore, the Fargo-Moorhead EOE was a Level II EOE.

Why this EOE was needed

The Fargo, ND-Moorhead, MN metropolitan area has a relatively high risk of flooding from the Red River of the North and relies on emergency responses to ensure safety of the community. Given the high flood risk, the St. Paul District of the US Army Corps of Engineers is completing a feasibility study of alternative measures to reduce flood risk in the Fargo-Moorhead area.

The highest river stages usually occur as a result of spring snowmelt, but summer rainfall events have also caused significant flood damages. In fact, the Red River of the North has exceeded the National Weather Service flood stage of 17 feet in 50 of the past 106 years, and every year from 1993 through 2009.

A review of Red River flow data verifies the increase in flood magnitude and frequency in the relatively recent decades of the period of record (1901-2009). A time series of natural annual maximum mean daily flow for the Red River at Fargo is shown in Figure 1 (Source: David Ford Consulting Engineers, Inc., using USACE data). As can be seen, both the magnitude and variability of the flows have increased since the beginning of record. A review of pertinent research suggests that this increase in flooding magnitude and frequency is consistent with projections of possible effects of climate change.

The Fargo-Moorhead feasibility study follows Corps planning study guidelines, which require that "[r]isk-based analysis… be used to compare plans in terms of the likelihood and variability of their physical performance, economic success and residual risks" (ER 1105-2-100). The annual maximum discharge-probability function (also known as the flood flow frequency curve) at the location of interest is a key input to the risk analysis. For the Fargo-Moorhead project, the Red River frequency was developed following Corps guidelines in EM 1110-2-1415, *Hydrologic frequency analysis,* and EM 1110-2-1417, *Flood-runoff analysis*.