

*Cl. Wallace
Dubois*



Federal Emergency Management Agency

Washington, D.C. 20472

MAY 22 1984

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Honorable Raymond C. Henery
Mayor, City of Burlington
P.O. Box 288
Burlington, Washington 98233

Dear Mayor Henery:

This is in response to an April 9, 1984, letter from Mr. Donald W. Moos, Director Washington State Department of Ecology, regarding the Preliminary Flood Insurance Study (FIS) for the Cities of Burlington and Mount Vernon in the Skagit River Delta, Washington. Based on his review of additional information we transmitted on February 24, 1984, Mr. Moos protests the Federal Emergency Management Agency's (FEMA's) approach to analyzing the delta's potential flood hazard and our resulting flood elevations. He comments on differences between our proposed 100-year flood elevations and those shown on the 1972 U.S. Army Corps of Engineers (COE) map currently used for flood plain management in the Skagit River Delta.

Our response to the points raised in Mr. Moos' letter are as follows:

1. According to Mr. Moos, our assumption that the entire overland flow of 130,000 cubic feet per second (cfs) exits the Skagit River channel upstream of Burlington is unrealistic and inconsistent with historic flooding. FEMA recognizes that the proposed base (100-year) flood elevations (BFEs) resulting from this assumption may not duplicate recorded flood events. However, because it cannot be predicted with sufficient certainty where flow breakouts caused by levee breaches and failures will occur, our modeling distributes all flow which exceeds the estimated river channel capacity of 110,000 cfs to the overbank areas. Since the Skagit River levees are inadequate to contain the total 100-year discharge of 240,000 cfs, our hydraulic analysis was performed as though the levees did not exist, in conformance with our levee policy.
2. Mr. Moos states that a photograph shown in a 1967 COE Flood Plain Information (FPI) report taken at a Burlington street intersection during the 1921 flood indicates that our proposed BFE is too low at the location. The 1967 COE FPI does not identify flood elevations for the overbank areas in Burlington. The 1972 COE workmap shows a BFE of 33-34 feet at the point in question, while our FIS depicts a 31-32 foot range of elevation. Our proposed elevation represents an average across the entire flood plain. Depending upon where levees breach and how the floodflow splits to the north and south of Burlington's high ground, flood elevations experienced at a specific location in the overbank may differ from our proposed elevation.

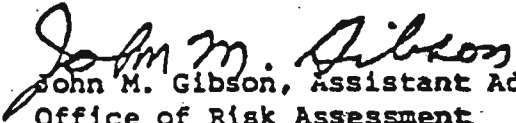
3. Citing the cover photograph on the 1967 COE FPI, Mr. Moos contends that our proposed flooding depths of 1-3 feet south of Mount Vernon to Conway are too low. The photograph does not appear to contradict our proposed 3-foot flooding depth for the area shown. Although we used historic information as the basis for depicting this area as subject to shallow flooding, the proposed depths were not derived from those experienced during past flood events. Depths greater than those shown in our study cannot be justified due to uncertainty about the location and amount of levee overtopping upstream and in the vicinity of Conway.
4. Mr. Moos' letter contains no point number 4.
5. Mr. Moos objects to our use of the steady state single dimension HEC-2 analysis to determine flood elevations in Burlington and Mount Vernon. It is not clear whether he recommends the application of the split flow option of HEC-2 that considers levee overtopping, or an unsteady state two-dimensional model. The split flow option cannot be applied to the Skagit Delta due to the uncertainty in the locations and size of the breaches. Regarding use of an unsteady state model, the COE in 1979 completed a gradually varied unsteady flow model to simulate conditions for sequential failure of 13 specific levee locations in the delta. However, uncertainty surrounding the location and sequence of levee failures caused this analysis to be rejected by the COE in favor of their 1972 work. As breach locations are repaired and often reinforced following a flood, historic information becomes less valuable for predicting where future breaks will occur. Once the levees are overtopped, breached, and finally washed out, they are no longer effective for confining flow to the Skagit River channel. In addition, use of either the split flow or the unsteady state model would require more specific input about levee stability and top elevations, channel cross section data for precise carrying capacity calculations, and improved topographic data for delineating flood boundaries in overbank areas. We believe that investing the effort to collect these data would not produce results significantly different from our analysis.
6. Mr. Moos points out that our proposed BFEs are up to 10 feet lower in some areas than those on the COE map. The COE map was reviewed as part of producing the Preliminary FIS for the Skagit Delta. However, the COE did not provide us with the backup data for their hydraulic analysis. Also, although overbank flow elevations are independent from channel BFEs, we feel that it is inappropriate to connect elevations determined for overbank flow paths between Avon and Sterling with channel elevations. The COE analysis is based on major levee breaks at Avon and Sterling. FEMA's analysis, which assumes failure of all levees along the Skagit River, therefore results in lower elevations for the Avon area. Any given area near a levee that fails may experience flooding more severe than that shown in the Preliminary FIS. However, given the available information, it is not possible to predict where such breaks will occur. It is the option of the

local communities to adopt stricter flood plain management criteria for areas adjacent to levees.

We appreciate Mr. Moos reviewing and commenting on our study, and his concern about our flood hazard assessment process. Unless we are provided with further information within the next 30 days, the process of producing an effective FIS for the Cities of Burlington and Mount Vernon, and of converting these Skagit Delta communities to the Regular Phase of the National Flood Insurance Program, will continue.

Should you have any questions concerning this matter, please do not hesitate to contact members of the Risk Studies Division in Washington, D.C., at (202) 287-0230.

Sincerely,


John M. Gibson, Assistant Administrator
Office of Risk Assessment
Federal Insurance Administration

cc: Mr. Donald W. Moos, Director, Washington State Department of Ecology
Mr. Bud Norris, Chairman, Skagit County Commissioners