September 15, 2007

Clerk, Illinois Pollution Control Board
James R. Thompson Center
100 W. Randolph
Suite 11-500
Chicago, Illinois 60601

PCB 20

Re: PCB 2007-084 North Milam

Enclosed are documents, supplementing those I sent to you two days ago, from the U.S. Army Corps of Engineers St. Louis District website. They are three power point presentations displayed at the August 15, 2007 Levee Summit at Alton, Illinois, namely

1) "Illinois Levee Summit, Illinois Levee Systems", by David Busse, Flood Risk Management Business line manager, St. Louis District (COE) -- 28 p. NOTE: Pages 8 & 9 not retrievable
2) "Impact of Levees on Mapping Flood Risk and the National Flood Insurance Program" -- FEMA -- 28p.; Terry Fell, Presenter
3) "Risk and Reliability; Applying Risk Analysis to Hurricane and Flood Protection Solutions" -- 9 p; Colonel David Bercxek, presenter

Also enclosed is 44 CFR Section 65.10, "Mapping of areas protected by levee systems".

The updated FIRM maps are available for St. Clair County, including, therefore, that portion containing the existing Milam Landfill, but are not available for Madison County, including the site of the proposed "expansion". From the material submitted, it appears not unlikely that the FIRM map for the "expansion" site, when available, will show additional circumstances at the site suggesting great caution in locating the proposed facility there.

Thank you for your consideration.

Jack Norman
Member, Kaskaskia Group, Sierra Club
906 N. Metter
Columbia, Illinois 62236

618/281-5460
jmnorman@htc.net

a reissuance or revision of the flood insurance study or maps and will be deferred until such time as a significant change occurs;

(f) An additional 90 days is required to evaluate the scientific or technical data submitted; or

(g) Additional data are required to support the revision request.

(h) The required payment has not been submitted in accordance with 44 CFR part 72, no review will be conducted and no determination will be issued until payment is received.

[51 FR 30315, Aug. 25, 1986; 61 FR 46331, Aug. 30, 1996, as amended at 62 FR 5736, Feb. 6, 1997]

§ 65.10 Mapping of areas protected by levee systems.

(a) *General.* For purposes of the NFIP, FEMA will only recognize in its flood hazard and risk mapping effort those levee systems that meet, and continue to meet, minimum design, operation, and maintenance standards that are consistent with the level of protection sought through the comprehensive flood plain management criteria established by §60.3 of this subchapter. Accordingly, this section describes the types of information FEMA needs to recognize, on NFIP maps, that a levee system provides protection from the base flood. This information must be supplied to FEMA by the community or other party seeking recognition of such a levee system at the time a flood risk study or restudy is conducted, when a map revision under the provisions of part 65 of this subchapter is sought based on a levee system, and upon request by the Administrator during the review of previously recognized structures. The FEMA review will be for the sole purpose of establishing appropriate risk zone determinations for NFIP maps and shall not constitute a determination by FEMA as to how a structure or system will perform in a flood event.

(b) *Design criteria.* For levees to be recognized by FEMA, evidence that adequate design and operation and maintenance systems are in place to provide reasonable assurance that protection from the base flood exists must be provided. The following requirements must be met:

(1) *Freeboard.* (i) Riverine levees must provide a minimum freeboard of three feet above the water-surface level of the base flood. An additional one foot above the minimum is required within 100 feet in either side of structures (such as bridges) riverward of the levee or wherever the flow is constricted. An additional one-half foot above the minimum at the upstream end of the levee, tapering to not less than the minimum at the downstream end of the levee, is also required.

(ii) Occasionally, exceptions to the minimum riverine freeboard requirement described in paragraph (b)(1)(i) of this section, may be approved. Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted to support a request for such an exception. The material presented must evaluate the uncertainty in the estimated base flood elevation profile and include, but not necessarily be limited to an assessment of statistical confidence limits of the 100-year discharge; changes in stage-discharge relationships; and the sources, potential, and magnitude of debris, sediment, and ice accumulation. It must be also shown that the levee will remain structurally stable during the base flood when such additional loading considerations are imposed. Under no circumstances will freeboard of less than two feet be accepted.

(iii) For coastal levees, the freeboard must be established at one foot above the height of the one percent wave or the maximum wave runup (whichever is greater) associated with the 100-year stillwater surge elevation at the site.

(iv) Occasionally, exceptions to the minimum coastal levee freeboard requirement described in paragraph (b)(1)(iii) of this section, may be approved. Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted to support a request for such an exception. The material presented must evaluate the uncertainty in the estimated base flood loading conditions. Particular emphasis must be placed on the effects of wave attack and overtopping on the stability of the levee. Under no circumstances, however, will a freeboard of less than two

feet above the 100-year stillwater surge elevation be accepted.

(2) *Closures.* All openings must be provided with closure devices that are structural parts of the system during operation and design according to sound engineering practice.

(3) *Embankment protection.* Engineering analyses must be submitted that demonstrate that no appreciable erosion of the levee embankment can be expected during the base flood, as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability. The factors to be addressed in such analyses include, but are not limited to: Expected flow velocities (especially in constricted areas); expected wind and wave action; ice loading; impact of debris; slope protection techniques; duration of flooding at various stages and velocities; embankment and foundation materials; levee alignment, bends, and transitions; and levee side slopes.

(4) *Embankment and foundation stability.* Engineering analyses that evaluate levee embankment stability must be submitted. The analyses provided shall evaluate expected seepage during loading conditions associated with the base flood and shall demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment or foundation stability. An alternative analysis demonstrating that the levee is designed and constructed for stability against loading conditions for Case IV as defined in the U.S. Army Corps of Engineers (COE) manual, "Design and Construction of Levees" (EM 1110-2-1913, Chapter 6, Section II), may be used. The factors that shall be addressed in the analyses include: Depth of flooding, duration of flooding, embankment geometry and length of seepage path at critical locations, embankment and foundation materials, embankment compaction, penetrations, other design factors affecting seepage (such as drainage layers), and other design factors affecting embankment and foundation stability (such as berms).

(5) *Settlement.* Engineering analyses must be submitted that assess the potential and magnitude of future losses of freeboard as a result of levee settlement and demonstrate that freeboard will be maintained within the minimum standards set forth in paragraph (b)(1) of this section. This analysis must address embankment loads, compressibility of embankment soils, compressibility of foundation soils, age of the levee system, and construction compaction methods. In addition, detailed settlement analysis using procedures such as those described in the COE manual, "Soil Mechanics Design—Settlement Analysis" (EM 1100-2-1904) must be submitted.

(6) *Interior drainage.* An analysis must be submitted that identifies the source(s) of such flooding, the extent of the flooded area, and, if the average depth is greater than one foot, the water-surface elevation(s) of the base flood. This analysis must be based on the joint probability of interior and exterior flooding and the capacity of facilities (such as drainage lines and pumps) for evacuating interior floodwaters.

(7) *Other design criteria.* In unique situations, such as those where the levee system has relatively high vulnerability, FEMA may require that other design criteria and analyses be submitted to show that the levees provide adequate protection. In such situations, sound engineering practice will be the standard on which FEMA will base its determinations. FEMA will also provide the rationale for requiring this additional information.

(c) *Operation plans and criteria.* For a levee system to be recognized, the operational criteria must be as described below. All closure devices or mechanical systems for internal drainage, whether manual or automatic, must be operated in accordance with an officially adopted operation manual, a copy of which must be provided to FEMA by the operator when levee or drainage system recognition is being sought or when the manual for a previously recognized system is revised in any manner. All operations must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP.

(1) *Closures.* Operation plans for closures must include the following:

(i) Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials, that will be used to trigger emergency operation activities and demonstration that sufficient flood warning time exists for the completed operation of all closure structures, including necessary sealing, before floodwaters reach the base of the closure.

(ii) A formal plan of operation including specific actions and assignments of responsibility by individual name or title.

(iii) Provisions for periodic operation, at not less than one-year intervals, of the closure structure for testing and training purposes.

(2) *Interior drainage systems.* Interior drainage systems associated with levee systems usually include storage areas, gravity outlets, pumping stations, or a combination thereof. These drainage systems will be recognized by FEMA on NFIP maps for flood protection purposes only if the following minimum criteria are included in the operation plan:

(i) Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials, that will be used to trigger emergency operation activities and demonstration that sufficient flood warning time exists to permit activation of mechanized portions of the drainage system.

(ii) A formal plan of operation including specific actions and assignments of responsibility by individual name or title.

(iii) Provision for manual backup for the activation of automatic systems.

(iv) Provisions for periodic inspection of interior drainage systems and periodic operation of any mechanized portions for testing and training purposes. No more than one year shall elapse between either the inspections or the operations.

(3) *Other operation plans and criteria.* Other operating plans and criteria may be required by FEMA to ensure that adequate protection is provided in specific situations. In such cases, sound emergency management practice will be the standard upon which FEMA determinations will be based.

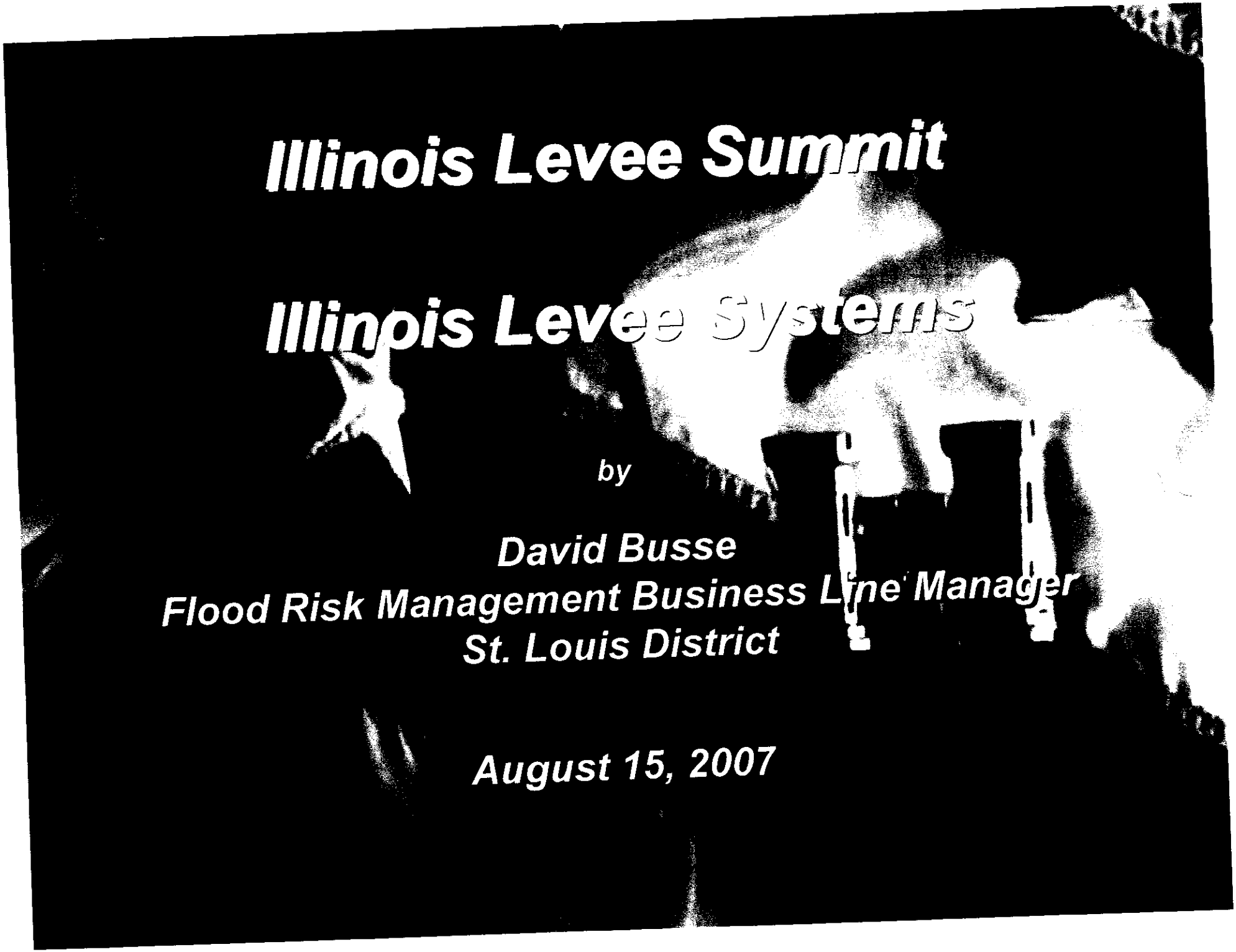
(d) *Maintenance plans and criteria.* For levee systems to be recognized as providing protection from the base flood, the maintenance criteria must be as described herein. Levee systems must be maintained in accordance with an officially adopted maintenance plan, and a copy of this plan must be provided to FEMA by the owner of the levee system when recognition is being sought or when the plan for a previously recognized system is revised in any manner. All maintenance activities must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP that must assume ultimate responsibility for maintenance. This plan must document the formal procedure that ensures that the stability, height, and overall integrity of the levee and its associated structures and systems are maintained. At a minimum, maintenance plans shall specify the maintenance activities to be performed, the frequency of their performance, and the person by name or title responsible for their performance.

(e) *Certification requirements.* Data submitted to support that a given levee system complies with the structural requirements set forth in paragraphs (b)(1) through (7) of this section must be certified by a registered professional engineer. Also, certified as-built plans of the levee must be submitted. Certifications are subject to the definition given at §65.2 of this subchapter. In lieu of these structural requirements, a Federal agency with responsibility for levee design may certify that the levee has been adequately designed and constructed to provide protection against the base flood.

[51 FR 30316, Aug. 25, 1986]

§65.11 Evaluation of sand dunes in mapping coastal flood hazard areas.

(a) *General conditions.* For purposes of the NFIP, FEMA will consider storm-induced dune erosion potential in its determination of coastal flood hazards and risk mapping efforts. The criterion to be used in the evaluation of dune erosion will apply to primary frontal dunes as defined in §59.1, but does not



Illinois Levee Summit

Illinois Levee Systems

by

David Busse
Flood Risk Management Business Line Manager
St. Louis District

August 15, 2007

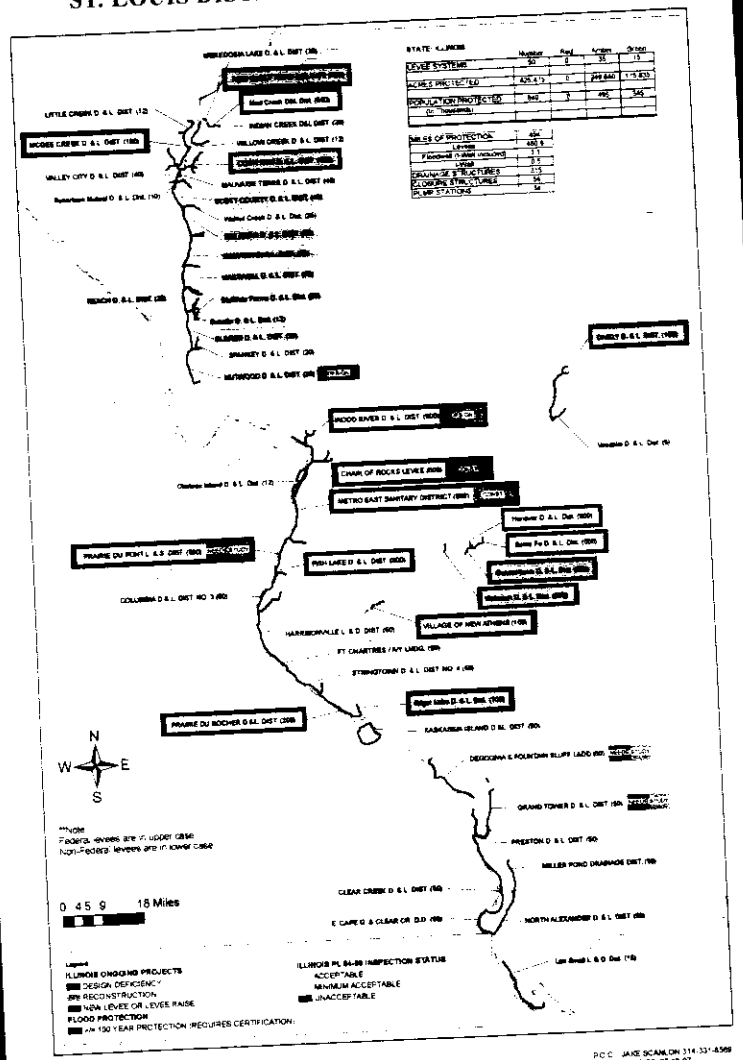
Flood Risk Management

- Levees
- Reservoirs
- Floodplain Policy
- Communication of Risk
- FEMA

US Army Corps
of Engineers

Illinois Levee Systems

ST. LOUIS DISTRICT - ILLINOIS LEVEE MAP



Illinois Levee Systems

- **50 Levee systems**
  - **17 > 100 year**
  - **33 < 100 year**

100 Year Flood?

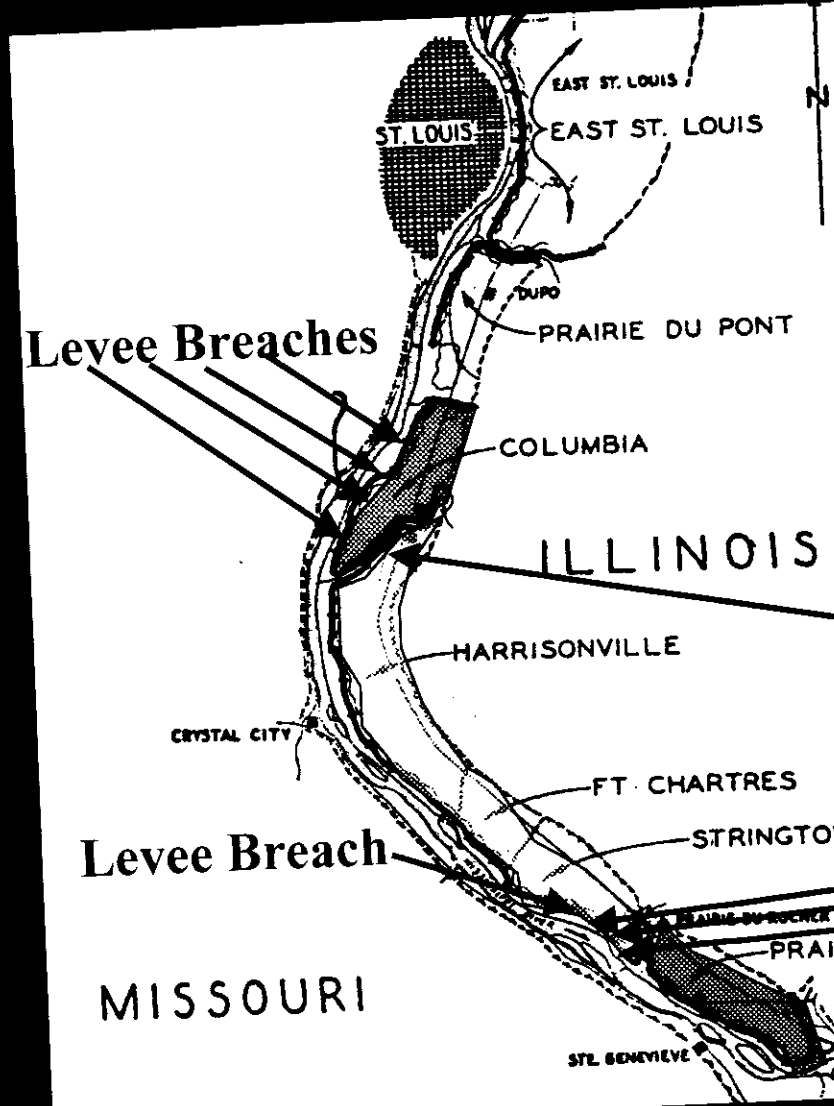
- "100 Year Flood" is the flood that has a 1% chance of occurring in any given year.
- A 1% chance of flooding in any given year equates to a 26% chance of flooding over the life of a 30-year mortgage.
- A 1% chance of flooding in a given year equates to a 33% chance of flooding during the 40 year career of my new hydraulic engineer.
- A 1% chance of flooding in a given year equates to a 63% chance of flooding over the next 100 years.

Levee Systems Interdependencies

- Levees should be looked at as systems.
- The performance of one levee can impact a downstream levee.

US Army Corps of Engineers

Levee Systems Interdependencies Demonstrated During the 1993 Flood



Columbia – 11 Breaches (4 River Front and 7 Flank Levee)

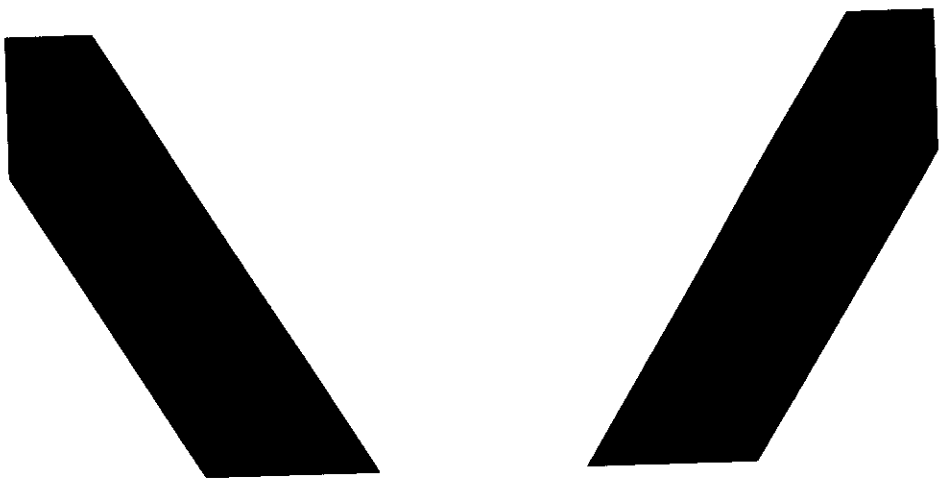
Harrisonville – 1 Breach (Flank Levee)

Ft. Chartres – 4 Breaches (River Front - 3 man-made breaches and 1 natural)

Levee Breaches (both Columbia and Harrisonville Levee Districts)

3 Man-made Breaches

Illinois River Levee Systems



Mississippi River Levee Systems
Wood River D&LD To Prairie Du Rocher D&LD

US Army Corps of Engineers

Potential Impacts

- Highways
- Bridges
- Railroads
- Fiber optic communication
- Hospitals

➢ Regional and national economics

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Will the levee perform?

- Levee Height
- Levee Maintenance
- Levee and Foundation Condition
- Past History
  - 1993/95 floods
  - Flood fighting

US Army Corps
of Engineers

Levee Height

- Design heights are based on flood flow frequency analyses and period of record.
- Settlement of the levee embankment.
- All Illinois levees have adequate height to meet their original authorization levels.

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Levee Maintenance

- Maintain erosion resistant grass turf 2" to 12" high.
- No trees or woody vegetation on or within 15 feet of levee.
- No animal burrows or tunnels in levee embankments.
- No ruts or depression on levee crown and slopes.
- No utility poles or structures in levee embankments.
- Steel gates painted to protect against corrosion.
- Flood gate components functional and well maintained.
- Drainage structure gates and operators aligned and greased.
- Drainage pipes are inspected, evaluated, lined or replaced when needed.

US Army Corps of Engineers

Public Law 84-99 Annual Inspection

- All Illinois levees in the St. Louis District have an acceptable or minimally acceptable rating.
- Many of the Illinois levees received a minimally acceptable rating due to trees in the levee or too close to the levee toe.
- Steps to dealing with tree issue:

  The Corps of Engineers inspection team (PL84-99) makes a preliminary assessment if the trees may be a problem.

  A "tree team" then is sent to make a technical assessment to see if tree is a hazard and if it is how they can be removed in an environmentally acceptable manner.

  No levee will receive an unacceptable rating for trees if they are making an effort to remove those trees identified by the Corps within two years.

US Army Corps of Engineers

Levee and Foundation Condition

- Uncontrolled Seepage causes sand boils and loss of foundation materials under the levee.
- Deteriorating Corrugated Metal Drain Pipes allows loss of foundation materials under the levee.
- Pipe Joints Separating allows loss of foundation materials under the levee.
- Corroding Steel Floodgates and Valves allows uncontrolled flood waters into the protected area.
- Structural Instability causes sliding and rotation of the embankment or structure and loss of protection.
- Insufficient Levee Height results in a lack of protection.
- Trees on or too close to the levee can cause a problem.

US Army Corps of Engineers

Past History

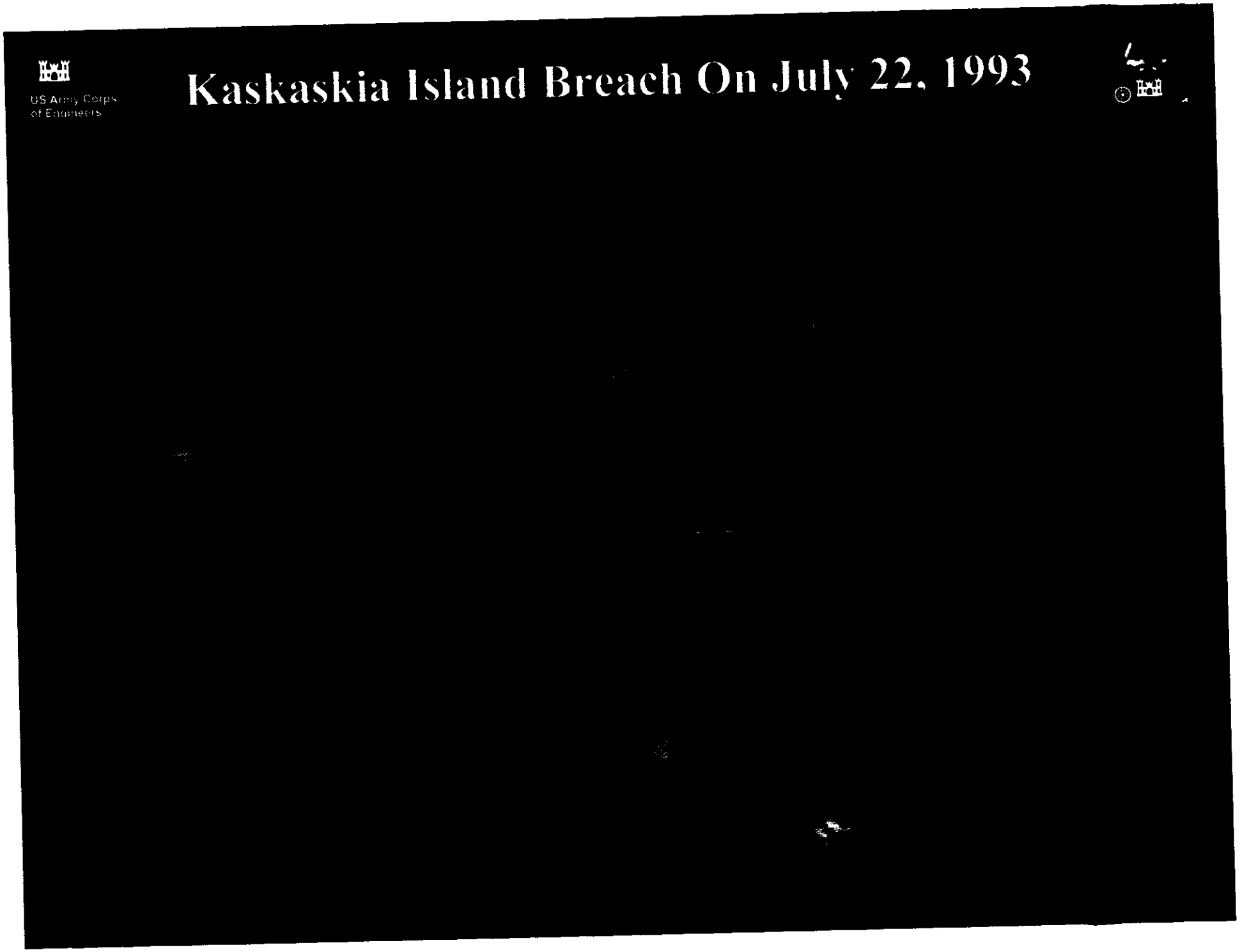
- All "100-Year" or greater levees passed the 1993 Flood
- All Illinois levee districts within the St. Louis District either held back the flood or exceeded their design flood elevations before they overtopped or breached.
- Generally the levees underperformed due to underseepage and drainage pipe failures.

US Army Corps
of Engineers

Kaskaskia Island D&LD
Uncontrolled Seepage July 1993 Flood

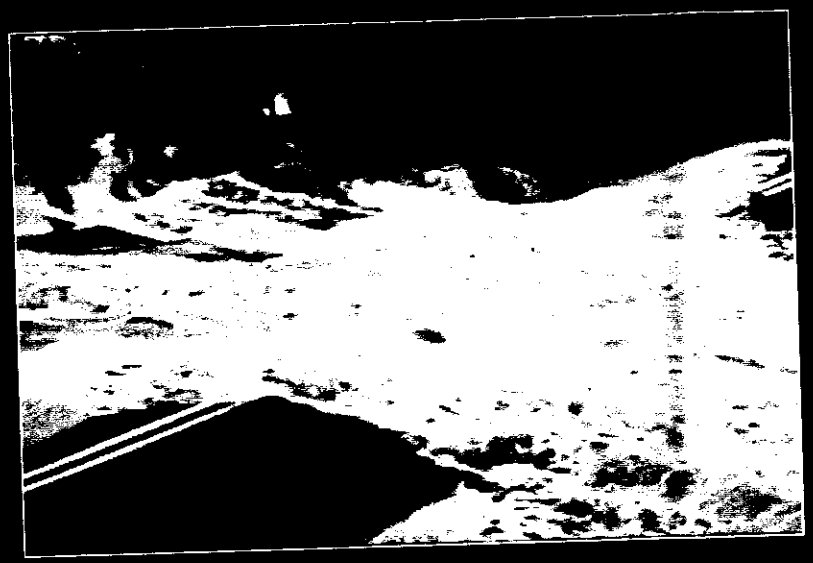
US Army Corps of Engineers

Kaskaskia Island Breach On July 22, 1993



US Army Corps of Engineers

Kaskaskia Island D&LD Failure
Uncontrolled Seepage July 1993 Flood



U.S. Army Corps of Engineers

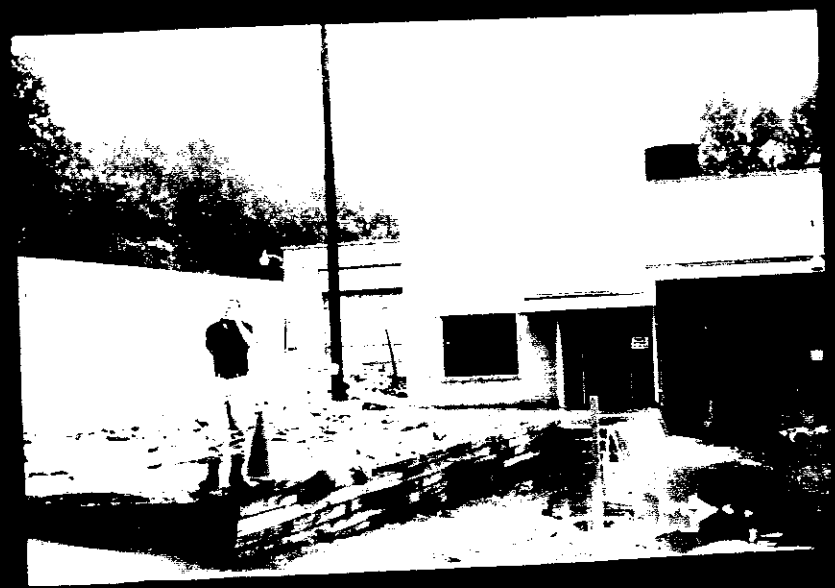
St. Louis Flood Protection

Uncontrolled Seepage Flows From Under The Floodwall July 1993

US Army Corps of Engineers

St. Louis Flood Protection

Uncontrolled Seepage Flows From Under The Floodwall July 1993



US Army Corps of Engineers

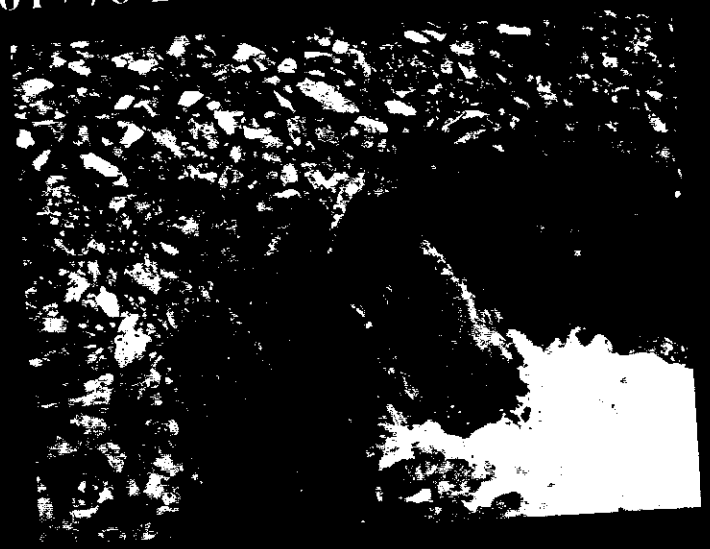
Wood River D&LD

Deteriorating Riverside CMP Gravity Drain 2005

US Army Corps of Engineers

Grand Tower D&LD

Two Deteriorating CMP Gravity Drains, July 2002
Sta 473+12 Top Photos & Sta 501+76 Bottom Photos



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After 1993/1995 floods

- D&LDs came to the Corps of Engineers concerned with what was seen as underperformance issues.
- Studies were funded by the Congress

US Army Corps of Engineers

Illinois Levee Systems

The Corps of Engineers based on studies completed does not have the required level of confidence that the following urban protection levees could pass the "100-year" event without flood fighting.

- Wood River
- Chain of Rocks
- East St. Louis & Vicinity
- Prairie Du Pont
- Fish Lake

US Army Corps of Engineers

Results of studies

- Wood River D&LD - Inadequate seepage controls and deteriorating corrugated metal pipes (CMP).
- E. St. Louis D&LD - Inadequate seepage controls and deteriorating corrugated metal pipes (CMP).
- Chain of Rocks Canal East Levee - Inadequate seepage controls.
- Prairie Du Pont D&LD - Inadequate seepage controls and deteriorating corrugated metal pipes (CMP).
- Fish Lake D&LD - Inadequate seepage controls and deteriorating corrugated metal pipes (CMP).

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Status of Fix

- Chain of Rocks Canal Design Deficiency Report –Approved, funding requested, under construction.
- Limited Reevaluation Report Wood River Levee System Reconstruction Project – Relief wells approved and funding requested, remaining features pending approval
- Prairie Du Pont – Fish Lake Flood Protection Project Section 905(b) (WRDA 96) Analysis – Pending approval
- East St. Louis and Vicinity General Design Memorandum Supplement – Pending completion

US Army Corps of Engineers

Perspective

- We have systems that worked in the past.
- We have an aging system.
- We have systems both urban and rural that have underperformance issues.
- We are challenged by a constrained federal budget.
- A regional approach may be the best path forward.

➢ We need to work together to assess, communicate and solve.

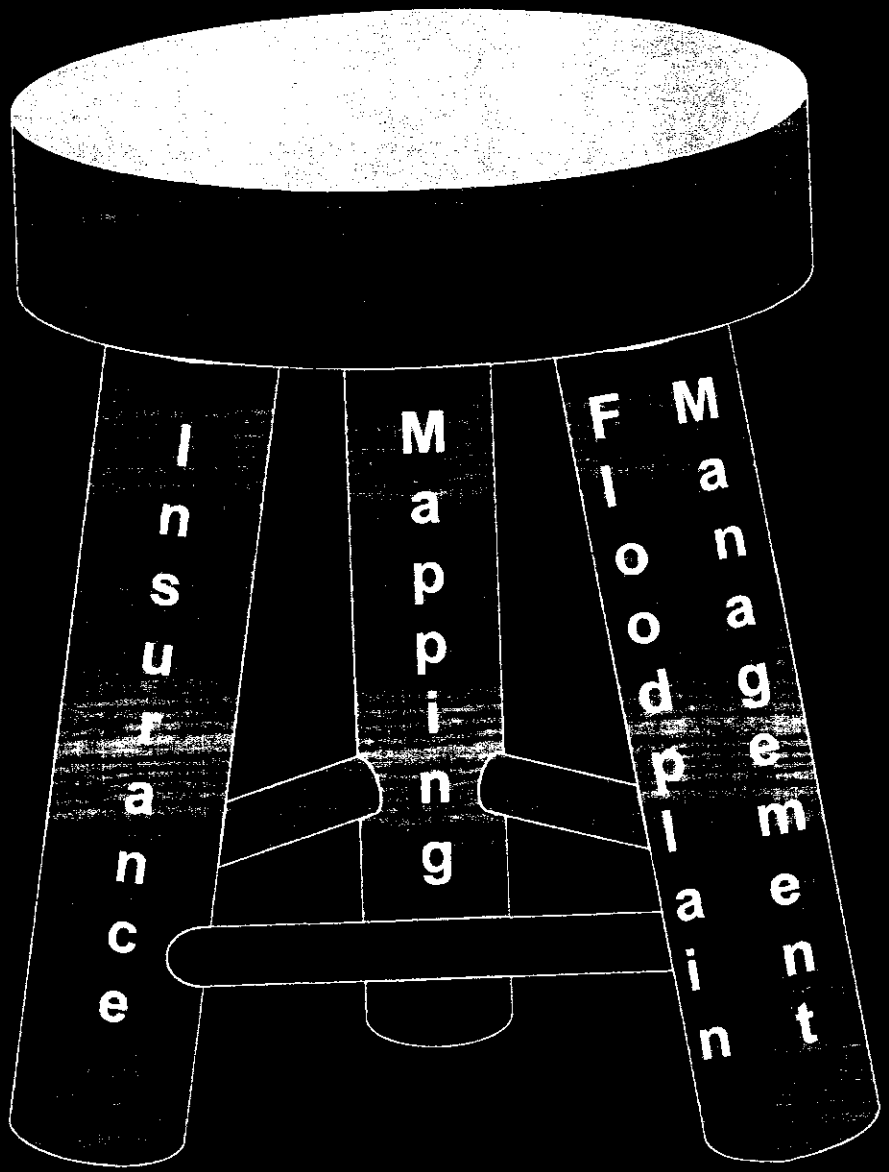
➢ Let us use this conference to influence the future.

Impact of Levees on Mapping Flood Risk and the National Flood Insurance Program

Overview

NFIP

NFIP



Flood Risk Mapping

Flood Risk Mapping

Map Modernization

FEMA Levee Responsibilities

FEMA Levee Review Responsibilities

providing flood protection and more flood risk areas may be identified

FEMA is not authorized to:

Levee Accreditation

Community/Levee owners Responsibilities

Community/Levee owners Responsibilities

- Promote public safety and wise risk management decision-making at the local level

State's Role

3 Levee Mapping Categories - 1

Accredited Levees

3 Levee Mapping Categories - 2

Provisionally Accredited Levee

3 Levee Mapping Categories - 3

Need for Levee Review

Coordination with the USACE

What this means for communities

3 Levee Mapping Categories

Impacts of De-Accreditation

Next Steps -St. Clair & Madison Counties

Public Safety is key

For More Information

[redacted]

FEMA


U.S. DEPARTMENT OF HOMELAND SECURITY

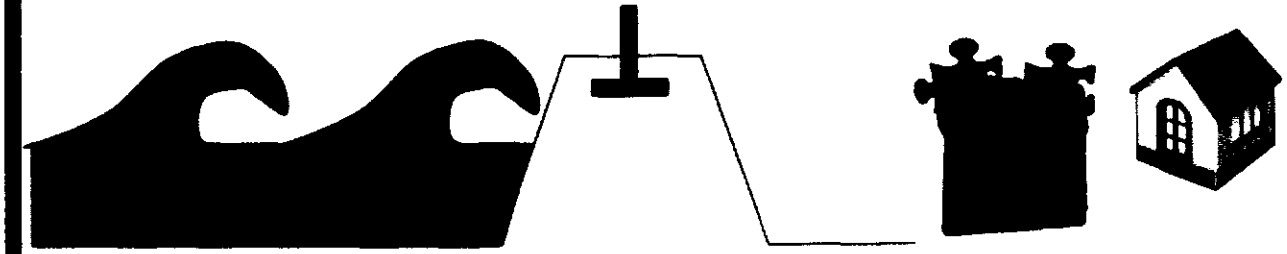
Risk & Reliability

Applying Risk Analysis to Hurricane & Flood Protection Solutions

US Army Corps
of Engineers

IPET Risk Assessment Model

HAZARD → SYSTEM PERFORMANCE → CONSEQUENCES → RISK

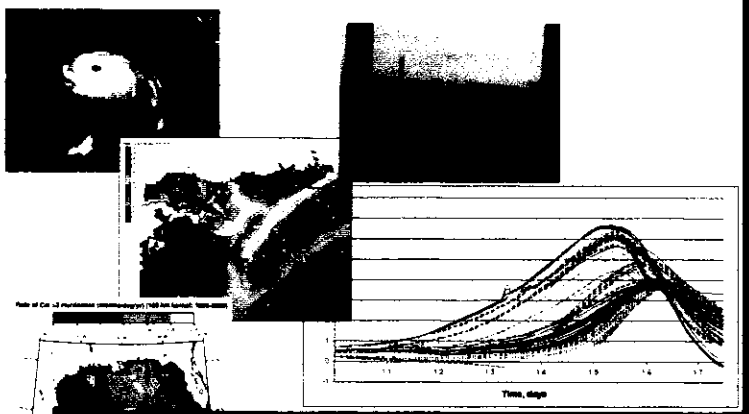


HAZARD	SYSTEM PERFORMANCE	CONSEQUENCES	RISK
Water levels – surge and wave height at 138 locations 152 hurricanes - 25-yr to 5,000 + frequency Variety of intensities, sizes, speeds and tracks	Pre-Katrina, Current, Future Performance of entire 350-mile system (134 reaches, 350 features) Overtopping, potential breaches, rainfall, pumping	Probability of flooding in each sub-basin Potential Property damage and loss of life caused by flooding Based on pre-Katrina population and property conditions for each sub-basin in New Orleans and vicinity	Index of relative losses in terms of Life & Property

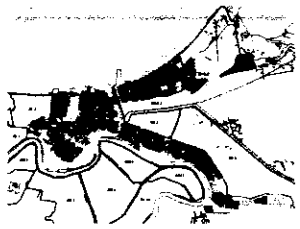
RISK = Chance of Flooding from Hurricanes X Loss of Property or Life

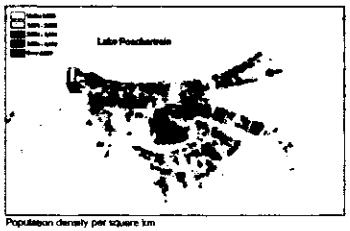
IPET Risk Assessment Model

The Hazard



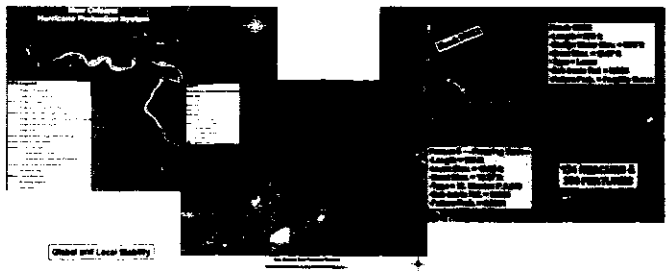
Consequences





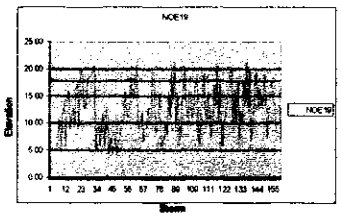
Pre-Katrina Situation Only

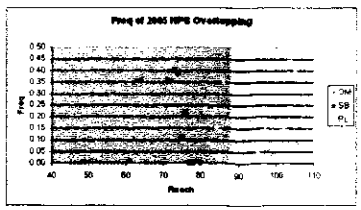
The System Reliability



Chance of volume of water entering protected area by rain, overtopping or breaching

Risk Assessment Information





US Army Corps of Engineers

Communicating the Results

- Inform & Educate
  - Empower public decision making to manage risks and consequences
- "Share not Scare"
- Use of the model
- Information to answer questions
  - Informed team members carry The Message to others
- Develop what is released
  - Team members assist in crafting an easily understood message

US Army Corps of Engineers

Dynamic Interaction

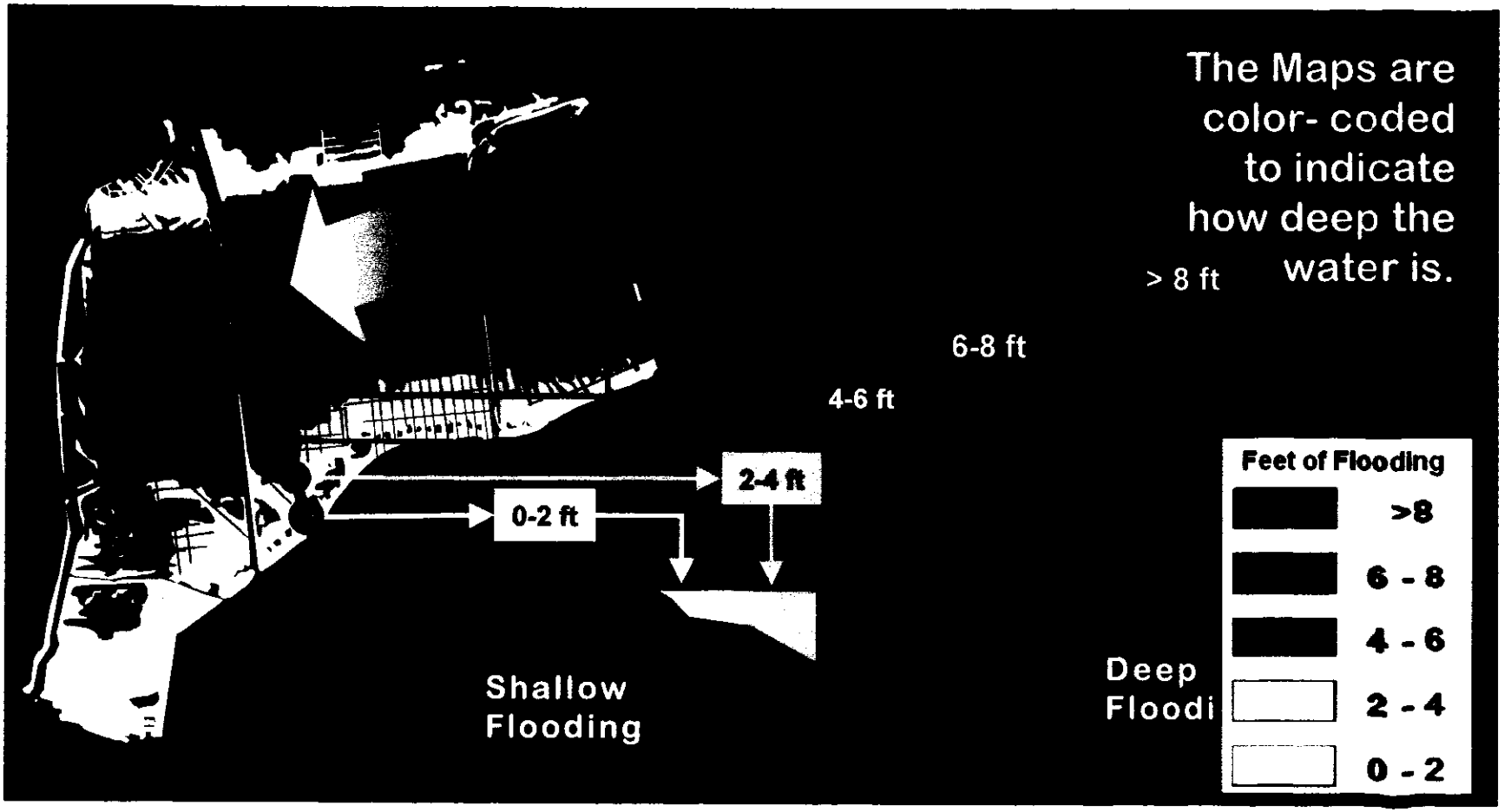
The Public Said:

- We know we are at risk
- This is not forward – looking
- What we need to know
  - Our impacts
  - What's currently being done
  - What will be done to mitigate
- Looks like you have errors in data, check and correct
- Gave suggestions to improve product format
  - Color changes
  - Word changes
  - Slide style changes
  - Graphics changes

We Responded:

- Changed focus from highlighting risk to highlighting system-wide capability to identify & manage it
- Interactive internet-based products so public can use
- Links to ongoing work and to future work
- Verified model inputs
- Used suggestions
  - Colors from Green to Red to shades of Blue
  - Consequences expressed in percent improvement
  - "Blackboard" slides
- More animations / less words

Example of Public Product



US Army Corps of Engineers

Click Mouse For Animation

Probability in Perspective

Recurrence Interval	Probability of Occurring in any year		% Chance of Occurring In:		
"X Year"	"1in X"	"%"	30 years (mortgage)	78 years (Average US lifespan)	100 years
500	1 in 500	0.2 %	5.8 %	14.5 %	18 %
100	1 in 100	1 %	26 %	54 %	63 %
50	1 in 50	2 %	45 %	79 %	86 %
25	1 in 25	4 %	64 %	96 %	98 %
10	1 in 10	10 %	96 %	99.9 %	100 %

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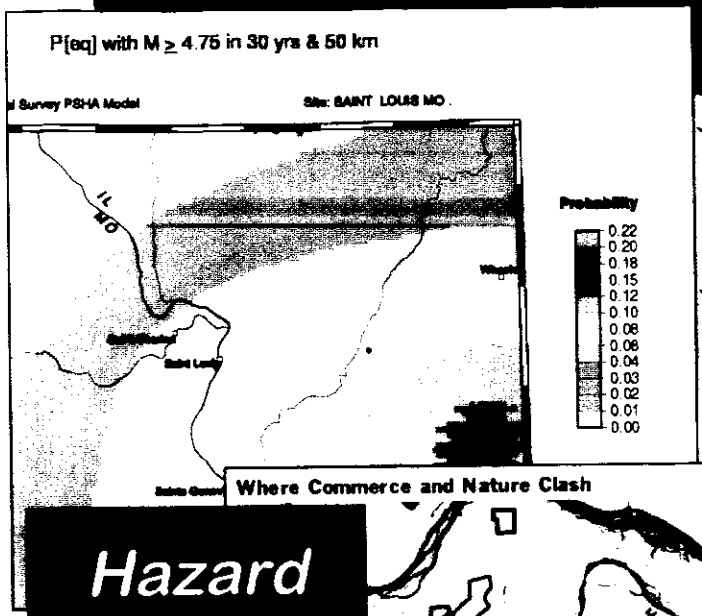
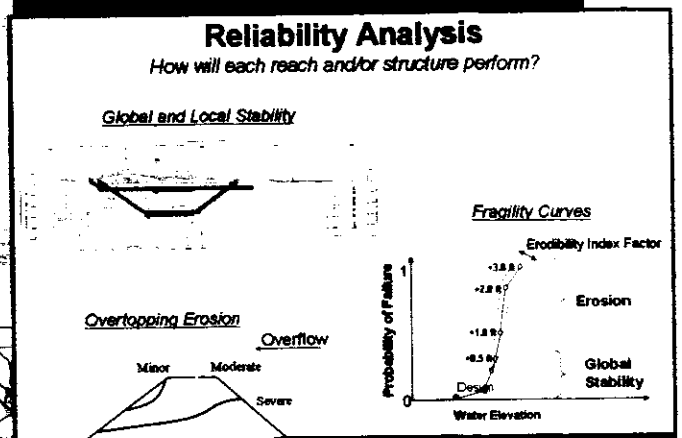
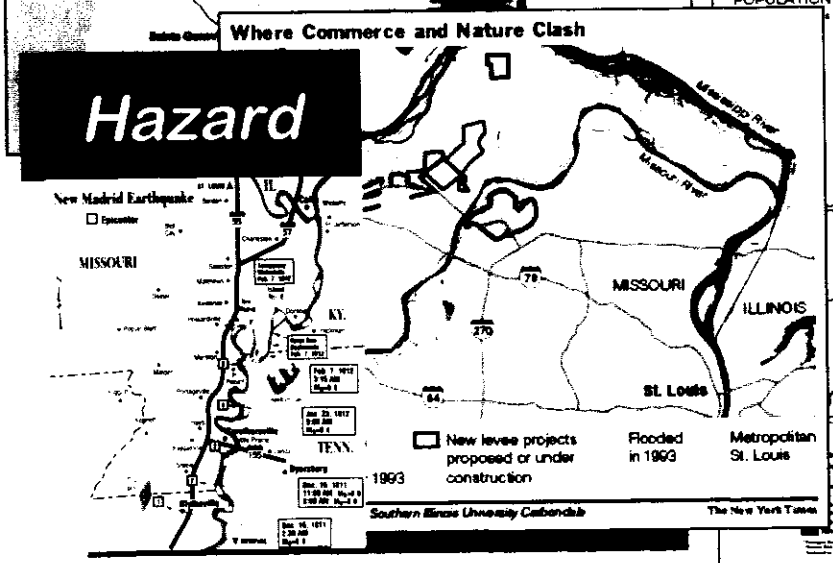
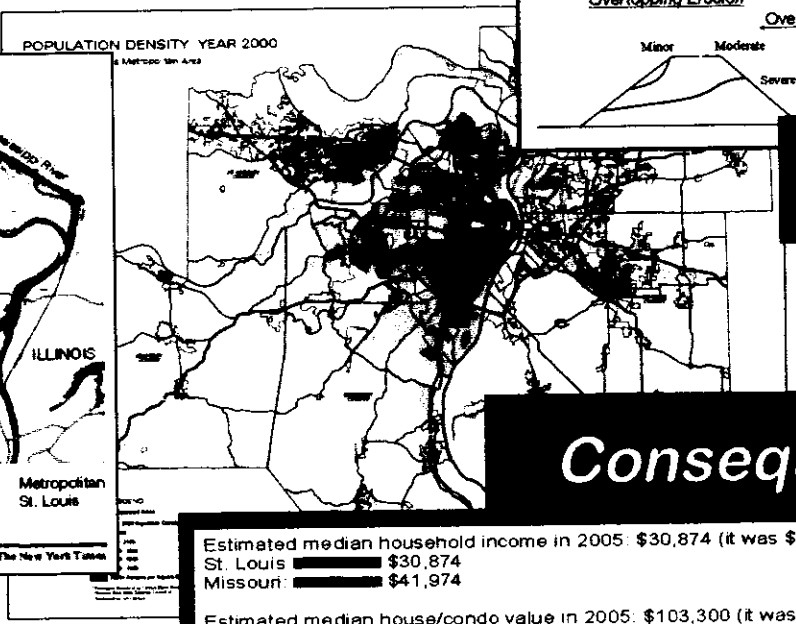
Applying to Other Areas









Hazard

System

Consequences

Estimated median household income in 2005: $30,874 (it was $27,156 in 2000)
St. Louis $30,874
Missouri $41,974

Estimated median house/condo value in 2005: $103,300 (it was $63,900 in 2000)
St. Louis $103,300
Missouri $123,100

Median gross rent in 2005: $567
Percentage of residents living in poverty in 2005: 25.4%
(15.1% for White Non-Hispanic residents, 34.4% for Black residents)

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Summary

- Risk Assessment Modeling is possible
  - Collaborative interaction – common operating picture
  - Use in New Orleans shows benefits
- Based on Science & Engineering
  - Communicate Facts
- Empowers Risk – Based Decisions by stakeholders

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