

MEETING MINUTES

NATIONAL COMMITTEE ON LEVEE SAFETY (NCLS): National Levee Safety Act, Title IX of the Water Resources Development Act of 2007 (WRDA)

MEETING #2

21 October 2008 – 24 October 2008

Gaylord Resort and Convention Center
Grapevine, Texas

EXECUTIVE SUMMARY

These minutes cover the proceedings from the second meeting of the National Committee on Levee Safety (NCLS, referred to as “Committee”), which took place from 21 October 2008 – 24 October 2008. The meeting was comprised of the Committee’s voting and non-voting members, other support and technical staff from the United States Army Corps of Engineers (USACE), facilitators from SRA International, Inc., and various presenters.

Voting Members in attendance:

- Mr. Eric Halpin, Committee Vice Chair, USACE
- Mr. Bill Blanton, FEMA (for Doug Bellomo)
- Mr. Don Basham, Private Sector
- Mr. Les Harder, Private Sector
- Ms. Karin Jacoby, Kansas City, MO
- Mr. Dusty Williams, Riverside County Flood Control District, CA
- Mr. Rod Mayer, State of California
- Mr. Mike Stankiewicz, State of New York
- Mr. Jon Sweeney, State of Arkansas
- Ms. Marilyn Thomas, Commonwealth of Kentucky
- Mr. Robert Turner, State of Louisiana

Non-voting members in attendance:

- Mr. David Garcia, City of Dallas, Flood Control District
- Ms. Sam Riley Medlock, ASFPM
- Ms. Susan Gilson, NAFSMA

Action Items

1. Backpack site
 - Sam Riley Medlock will send contact info to USACE’s Kathleen Tackach to get the product available to the entire Committee. Once Ms. Takach

receives information, can provide payment to allow the whole Committee to gain access.

2. Update list of resources on website – SRA/USACE
3. Send email to group about access and password to USACE site - SRA
4. <https://www.iwr.usace.army.mil/ncls>
5. Send out per diem and government hotel rates for New Orleans to Committee – K. Takach
6. Get PMP signatures from Committee members - SRA
7. Connect with Ms. Takach about payment for Backpack to add and send invitation to join to all Committee members – S.R. Medlock
8. Put copies of FloodSAFE laws and other California ordinances on website – SRA
9. Speak with Steve Stockton regarding the Vision Statement – E. Halpin
10. Update USACE levee universe chart for Review Team meeting to reflect other federal, non-USACE levees – E. Halpin
11. Post presentations from international tolerable risk conference on USACE website and Backpack – E. Halpin/SRA
12. Post ASFPM and CRS reports in the wake of Katrina-related litigation regarding community liability – SRA
13. Post USACE position paper on indemnification – E. Halpin/SRA
14. Provide draft of Review Team materials and agenda to Committee – SRA
15. Provide summary of Review Team meeting notes to Committee at New Orleans meeting – SRA
16. Email Review Team with materials (questions by goal, interim levee definitions) – SRA

TUESDAY, 21 OCTOBER 2008

Opening and Reflections from Meeting 1 – Eric Halpin, Vice Chair

Mr. Halpin first provided a brief introduction to the Backpack website, an online service that allows individuals to work collaboratively using a common space in which to communicate, share and edit documents, and otherwise organize information. Sam Riley Medlock introduced the service to Working Group 4, which has been using it with success. Ms. Medlock will send purchase information to Kathleen Takach, USACE administrative assistant, in order to provide the Backpack service to the full Committee.

Mr. Halpin told the Committee that he and Committee Chair Steve Stockton are “ecstatic” about how Meeting 1 went and the work that has been done so far, recognizing that this is a mammoth task. He recounted a recent meeting with Congressional staff members in which he and other Committee members explained the rationale for the call to action. According to Mr. Halpin, the Congressional representative do not want to micromanage this process and would rather get the Committee’s interpretation of what needs to be done to create a viable Levee Safety Program. The conversation on Capitol Hill focused on several topics: systems perspective – agreed that the Committee should go in that direction; levee certification – the Committee members made the point that this program this is not a safety standard and there should not be an inordinate emphasis on recertification; cost-share and inspections of levees – will require follow-up

conversations with Congressional staff members; and the Vision statement – the Committee is going to focus on specific issues related to levee safety and have not fully resolved the necessary sideboards.

Agenda Review, Review of Action Items and Approval of Minutes from Meeting One – Linda Manning, Facilitator

Ms. Manning asked members to review the minutes of Meeting 1 and offer any suggestions to make the minutes more accurate and/or helpful, as well as give their approval of the minutes. Mr. Halpin added that the idea is to put the minutes on the public part of the Committee’s website in order to maintain a high level of transparency throughout this process.

Ms. Manning walked through the purpose of Meeting 2. In the six-step process outlined in the Committee’s charter, this meeting is designed to address the first several steps. The product at the end of Meeting 2 should be a list of key questions that need to be answered in order to make recommendations tied to the nine goals in the Act, as well as the data needed in order to answer those questions. On 21 October, the Working Groups will report out clarifying questions about their respective goals and suggest any goals that need to be added. After receiving feedback from the Committee, each Working Group will meet to make any changes based on that feedback. On 22 October, the Working Groups will list questions for each goal and the data that is needed. Mr. Halpin said the idea is to keep these lists disciplined and provide an appropriate, but not inordinate, amount of detail. On 23 October, the Committee will prepare develop recommendations that will be discussed at Meetings 3 and 4.

The participants received the Committee’s new website address:
<http://www.iwr.usace.army.mil/ncls/>.

Background Piece. California’s FloodSAFE Program – Rod Mayer Assistant Deputy Director, FloodSAFE, State of California

Mr. Mayer described the origins, rationale, components, and functioning of California’s FloodSAFE program, which is a comprehensive flood risk management program designed to “buy down” risk in areas protected by levees. The program contains elements that apply to the whole state, but it primarily operates in California’s central valley. The program includes zoning, building codes, public outreach, evacuation plans, flood insurance and levees, as well as flood corridor easements, designated floodways, reservoirs reoperation, and forecast-based operations. Some aspects of the program are just starting, such as floodplain mapping and improved maintenance of specific stretches of levees. FloodSAFE is widely considered one of the most aggressive flood risk management programs in the United States.

California’s levees were built from 1860 to 1960 and have faired poorly as they have aged. There are 1,600 miles of federal levees in the central valley from roughly Sacramento in the north to Bakersfield in the south. The valley’s federal levees protect 600,000 people, 1.5 million acres of land, and \$50 billion in property. There also are 730 miles of non-federal levees. Leading up to the implementation of FloodSAFE, the reliability of many of these levees was not well known. Key challenges facing the state were aging infrastructure, increasing development in the

floodplain, court decisions that increased state liability regarding levees, and decreased funding for levee operation and maintenance. The FloodSAFE program was borne of many factors. In 2003, the Paterno court ruling in California made the state liable for a failed levee that it had not built, but for which it had accepted responsibility. Also the state expected significant development in the 200-year floodplain while there were hundreds of documented erosion sites around levees. As state legislators were beginning to offer more support for flood risk management, the devastation caused by Katrina and serious central valley flood events in 2005 and 2006 offered local and state flood officials the momentum they needed to develop a comprehensive program. In 2006, California voters approved large bond measures totaling nearly \$5 billion to pay for a flood risk management program.

FloodSAFE, a 10-year effort, was developed to improve: emergency response, flood management systems, and operation and maintenance, as well as inform and assist the public. In urban areas, levees/communities must meet a 200-year minimum protection by 2015 or stop development in the 200-year floodplain. They can, however, try to prove they are making adequate progress towards that goal in order to get an extension of the deadline. However, if they have not reached the 200-year protection mark by 2025, then they cannot start new development behind a levee. Mr. Mayer said this represents the highest levee standard in the nation.

Questions and Responses

Question: Has there been negative feedback from communities that are included in the state's awareness of levee areas?

Response: Have not heard negative feedback from locals. Not necessarily levee areas, just where stream would go if stream hits 100-year mark. State has not documented how well the maps are being used; they just have anecdotal evidence that people are using them to make land-use decisions.

Question: Has the 200-year protection deadlines accelerated development in the floodplain?

Response: The meltdown of the housing market has mitigated that problem.

Question: How did California come up with 200-year standard?

Response: The state has a history of 200-year standard from the late 1980s and early 1990s when it was looking at building a dam to protect Sacramento from flooding. After Katrina, the debate ranged from a 100 year to 500 year standard. Our standard project flood is a 250-500 year flood; debate resulted in compromise at 200 years.

Comment: There was a lot of fear of a 500-year standard, which was in original draft. Communities and builders were dead set against it.

Question: Was there a consideration of tolerable risk?

Response: The standard was a political compromise, but there was precedent behind it. We were trying to come up with one standard for diverse area. It is a major miracle that legislation passed.

Question: How was the opposition overcome?

Response: Through compromises. Gov. Schwarzenegger made it clear that he was going to sign a flood bill. People could either participate or the legislature would craft something worse for them.

Question: If locals cannot take care of a levee problem, does the state come in and help with repairs?

Response: The state has critical levee repair program and Maintenance Area Law. If a local agency is unwilling or incapable of doing maintenance, then the state can take over and assess all the benefiting landowners for the cost of the maintenance. It is a disincentive and such a big sledgehammer, so we are also reticent to use it. There are times when we should, and we are reluctant to use it. We have 10 state maintenance areas right now; there was nobody there to do it. There have not yet been any hostile takeovers.

Question: Is the relationship between state and locals contractual?

Response: In many cases it is, and in all cases it should be. But we did not do a good job when the Corps turned over project to the state. When the state took it, the idea was to turn over to locals. It was such a big job in Sacramento that the state did not bother entering into contracts with locals, just passed a law turning it over. There are contracts in San Joaquin, however, which was built later.

Question: Does the Paterno decision apply to whole state?

Response: The local sponsor of a levee is typically a county flood control project, so the county has liability. In the Paterno case, the state was found liable for a small levee failure in 1986 because it had accepted the federal project as if it had built it itself. It was a \$1 billion verdict.

Comment: The state is considered the owner and liable for everything in the central valley. A lot of the FloodSAFE program was meant to mitigate that liability.

Comment: The existence of PAL agreements adds fuel to the fire in terms of flood risk because local communities use them to buy time from having to do improvements to levees.

Comment: Levee evaluations cost \$250,000/mile for urban levees. Erosion repairs cost \$4,000/foot. It would be cheaper to line the water with Mercedes than to do these repairs

Question: What is the definition of a levee? Are there are levees in California that have water in them? As we move forward, Working Group 1 will look at definitions.

Response: The Corps design manual makes a distinction that levees that hold back water most of the year should be defined as dams. We need an expanded definition of levee.

Mr. Mayer's full briefing is available at <http://www.iwr.usace.army.mil/ncls/>.

Review and Discussion of Revised Vision Statement – Eric Halpin, Vice Chair

Mr. Halpin presented a vision statement that he developed after the Committee's meeting of 7 October – 10 October 2008. It read as follows:

“A safe public and reduced economic losses by means of reliable levees – part of an integrated solution to flooding.”

The Committee members began a detailed discussion of this statement and offered several concerns about the language and ideas to change or amend the statement. Among the primary issues raised were:

- Concept of “solving” flooding as opposed to adapting to flooding.
- Definitions, meanings and public perceptions of the word “safe”
 - Several Committee members stated their concern that the public views the meaning of “safe” as “absence of risk.” They worry that the statement will give people a false sense of safety since there is no way to completely eliminate risk for individuals who live behind levees, many of which are unreliable. This could result in unintended consequences, such as additional development behind levees.
 - Other participants feel that it is beneficial to use the word “safe” in the vision statement, assuming that its definition includes the idea of residual or tolerable risk.
- Boldness/loftiness of the vision statement
 - Is the vision meant to be a bold statement that lays out where we hope to be one day, or should it be a vision that recognizes the challenges posed by the levee system and funding realities and stops short of “overselling” what a national levee safety program can achieve?

Action item: Group of five Committee members will gather in the evening of 21 October to attempt to develop a revised version of the vision statement.

Discussion about the vision statement continued on 22 October 2008. The Committee members who gathered to develop a revised vision offered the following:

“An informed public and well-managed levee systems working as part of an integrated approach to protect people and property.”

The participants who worked on this statement offered the rationales behind it:

- Includes informed public engaged and responsible; Shared accountability
- Well-managed systems “better than reliable”
- Does not perpetuate myth that you are safe behind a levee
- Sets a high, but achievable bar
- Includes relationship with integrated flood risk management
- Ties back to Act language

The participants went on to address several issues and concerns with the revised statement:

- Absence of the word “safe”
 - Some participants said they did not want to perpetuate myth that you are 100 percent safe behind a levee
 - Others countered that there are millions of people who are safe behind levees, in that they are living with tolerable risk
 - Mr. Halpin offered the Corps’ definition of “safe:” the infrastructure that protects people is reliable and the risks are tolerable

- Use of the phrase “well-managed”
 - Many levees are not “well-managed” and we would be saying that they are
 - Others support “well-managed” because goals in the Act refer to that task
 - Some participants preferred the phrase “well performing” or “sound” to capture several components, such as quality of construction
- Overall boldness/loftiness of the vision statement
 - Some participants voiced the concern that a vision statement with more limited goals would sell the program short; they advised against focusing on possible budget constraints while developing this language because that could restrict the long-range vision that the Act calls for
 - Others said there is danger in developing too optimistic a vision statement because it could give people the impression that they were safe simply because the Act passed

Agreements in principle

- Safe = infrastructure is reliable, risks are tolerable
- The Committee fears the public has a different definition of “safe” = “free from risk”
 - public is not a homogenous group, includes decision makers, laymen, etc.
- a lot of factors have to align for “tolerable risk” to be achieved
- if we say “the public is safe” behind a levee, or can be in the future, you could have an unintended consequence that people will develop behind levees before constellation of events comes together before tolerable risk is achieved

The Committee deferred their deliberations to Mr. Stockton regarding how to move forward. That conversation would help determine how to present a vision statement, and which would be used, before the Review Team at its 30 October meeting.

Thought Piece. How Dams Differ from Levees – Les Harder, Senior Water Policy Advisor, HDR, Inc.

Mr. Harder provided the Committee with a brief background on how early dam failures in the United States led to dam safety policies that were developed in the 1960s and 1970s. Primary responsibility for dams rests with states, though the Federal Energy Regulatory Commission regulates dams that also provide power. Dams are currently considered very safe, and most claim 10,000 year flood protection standards or higher. While there is no accurate inventory of levees across the nation, extrapolating from the figures from California, can estimate that there are probably between 100,000 and 300,000 miles of levees in the United States.

There are several critical differences between levees and dams:

- Ownership – most dams have clear ownership; levee ownership is often unclear
- Structural footprint – dams are limited; levees run for hundreds of miles
 - implications – less managed property with dams
 - dams can be cited based on best conditions, levees are subject to river

- Levee systems share same space as water conveyance, critical habitat, aesthetics, recreation, transportation
- Duration of water retention – dam stores water year-round; levees are part-time
- Age – most dams were built after WWII; most levees are legacy systems, some up to 150 years old
- Regulatory measures to reduce risk – can restrict reservoir if dam does not meet high standards of safety; with levees, it is impossible to restrict river systems and there is no consistent regulation across the nation. There is, however, some limited ability to restrict development.
- Controversy/transfer of risk – with levees, must evaluate impacts if improve one side. Sometimes, cannot proceed unless you fix both sides, which is a higher cost.
- Performance expectations – expect dams to perform well and be reasonably safe for extreme events; we cannot rely on levees to perform well during even minor events

Looking ahead

- huge numbers of old, substandard, aging levees
- do not have policies or institutional systems to fund or maintain them
- flood risk is a sustained continues effort over time
 - Example: levees in New Orleans are now incrementally better. It cost \$15 billion to move New Orleans to a 100-year protection by year 2011-2012. There are few cities where the government will do that. It took a disaster to get that kind of funding

Comment: The biggest improvements in New Orleans also include better evacuation methods, which dramatically reduces consequences of levee failure.

Mr. Harder said that flood risk can be calculated by multiplying the probability of flooding by the consequences of flooding. He said the national levee safety plan must strive to attain the highest risk reduction with limited resources and develop strategies for long-term system improvements over generations. That would include use non-structural measures as well as flexible approaches that can be adapted to maximize flood risk reduction.

Mr. Harder's full briefing is available at <http://www.iwr.usace.army.mil/ncls/>.

Working Group Report Outs and Discussion on Steps One and Two – Clarifying Questions and Any New Goals

The Committee members reported out their initial ideas on what questions they need to ask in order to make recommendations to Congress.

Working list of clarifying questions

1. What should we say about new levee construction?
 - a. Limit to technical standards?
2. What is the extent of mitigation? Flood risk management vs. levee safety?
3. What role, if any, does P&G play?
 - a. Areas of reinforcement? Tweak? Additions?

4. What are average annual flood losses behind levees?
5. General condition or inspection would include performance history?

Working Group 3 – Program Development

Question: To what extent should the national levee safety program include hazard reduction and mitigation beyond the levees themselves? Three options to consider are: 1) not at all; 2) only to the extent that there is a strong relation to the levee and the floodplain protected by the levee; and 3) to the extent that there is any connection to the levee and the floodplain protected by the levee.

Agreement: Option 2 was the most popular, but should set sideboards for event that could be broadly interpreted. Need to articulate the difference between options 2 and 3.

Question: Is the national program envisioned to be 1) applied consistently throughout all of the states, with some aspects delegated to qualified states or 2) applied at a modest level throughout all of the states, with qualified states that receive delegated authority adding some aspects that are not otherwise occurring?

Agreement: If you live behind a levee, you should have the same minimum standards in all states (minimum requirements).

Question: What is meant by mitigation? Is it limited to flood hazard mitigation, or could it include environmental mitigation?

Agreement: An environmental enhancement that does not provide for increased public safety related to a levee is not included in this Committee's scope.

Other discussion

What is the relationship between the federal dollars put out and loss of life compared to federally owned or turned-over levees, vs. the universe of all levees out there? Might be good data to have in a report, but likely do not have enough information to calculate.

Question: Is it within the purview of the national levee safety program to attempt to provide for environmental permitting streamlining and/or possible limited exemptions from environmental laws in order to protect public safety?

Agreement: Yes

Other discussion

Committee members said that environmental groups will violently disagree with this idea, but that the group wants to be in a position to say the Committee considered this and decided which way to go. Also, they recognized that if communities perceive that levee safety projects are coming at the cost of the environment, they may not agree to support the program. Several Committee members said it is imperative that communities recognize that there will not be harm to the environment, and that the NLCS may even provide environmental benefits.

Clarification Statement: We believe the responsibility of Working Group 3 is to identify the national program – which will include all levels of government, and are thinking that Working Group 4 will determine how the program and various program elements may be delegated to states and possibly to local governments. Agreed.

Question: The term “inspection” is used. From Title IX, we understand that inspection means simply a visible inspection and reporting any visible problems such as vegetation, rodent burrows, cracking, slumping, over-steepened slopes, unauthorized encroachments, etc. “Inspections” typically do not include performance history investigation, surveys, geologically/geomorphological studies, geotechnical investigations (such as drilling, sampling and testing), or engineering analyses. Such activities, typically called evaluations or assessments, can be several orders of magnitude more difficult and expensive than “inspections.”

Agreement: Typically, an “inspection” program includes those things mentioned with perhaps the addition of performance history investigations. That said, merely an inspection program does not go far enough to make people safe.

Clarification Statement: Working Group 1 will come up with what is included in an inspection, a more thorough review, and the component parts of each. Working Group 3 will address policies and implementation of inspections under Goal 4.

Question: Is the intent to have a one-time inventory?

Agreement: Act currently provides for a one-time event, but recommendations from this group could include an ongoing program.

Other discussion

To fulfill this goal, we need to understand which levees are and which levees are not being included in the USACE national levee database and ensure that all levees falling under the definition of “levee” will be included. Mr. Halpin explained that the database will include all USACE owned and operated levees, USACE built and turned over, as well as the 84-89. All federal levees.

Working Group 4 (Implementation)

Question: To whom can the federal/national program delegate?

- Bottom line – precedents exist that give great flexibility to delegation to nearly any level of government (state, local, regional, district). National programs can delegate to states, locals and districts (ex: Clean Air Act) that act as regulating communities, while regulated communities are an emitter of a jurisdictional source (ex: factory); or through states to locals, agencies and districts (ex: National Pollutant Discharge Elimination System, Office of Surface Mining and Reclamation) where states are regulating community and locals, etc., are the regulated community (ex: a metropolitan sewer district).

Question: Can a delegated state further delegate?

- Probably. Where a national program can be delegated to any qualifying entity, the above questions may be less relevant, since it would likely be most streamlined to have all oversight flow from a single federal regulatory agency. However, if it is determined that the **NATIONAL LEVEE SAFETY PROGRAM** should be delegated only to states, then those states should be able to further delegate oversight activities to the most qualified entity operating in their jurisdiction. The Committee may consider evaluating what would be retained at state level and why, etc.

Question: Could federal levees be regulated under delegated programs?

- Yes. There is precedent under NPDES for just such a situation.

The Committee discussed the concept that where political systems wholly capture physical systems, political systems could be likely delegated entity (e.g. river wholly within a state). However, regarding river and levee systems that cross political jurisdictions, as it often the case, then regional commissions could govern.

Resource: Interagency Council on Water Policy (icwp.org) – information on interstate river commissions, authorities, etc. that talks about authorities, funding, etc.

Question: What functions can be delegated, and what functions should be delegated?

- Depends on Working Group 3 products on components/programs with the levee safety program.

Question: What is a qualified state?

- States that meet the following criteria:
 - Legislative authorities to implement delegated national levee safety program
 - Technical
 - Public education and awareness
 - Programs as identified by Working Group 3
 - Approved implementation plan (regulations, etc.)
 - Funding and appropriations
 - Reminder – does not have to be a state

Agreement: Committee should recommend funding – all groups will consider funding estimates and sources as they develop recommendations.

Question: What does “may be delegated” mean?

Agreement:

- Delegation is optional, that it does not have to be delegated but could remain in an undelegated state of being where some (yet undetermined) governance structure would have been created. “May” also means a decision process on whether or not delegation should occur (link with qualification definition).
- Delegated is a loaded word, but generally can be taken to mean “a conscious and official transference of responsibility, duty, and/or action from one entity to another.” “Delegated” implies an authority “to delegate” which in terms of levee safety might be debatable. Delegation also assumes there is a definable “thing” to delegate – which likely are the “programs” addressed in Working Group 3.

Working Group 1 (Technical Assistance)

Agreement: Working Group will make an effort to define levee, levee system, and different categories of levees (the latter will likely be considered interim).

Working Group 2 (Public Awareness)

Question: Who will be the target audience?

- General public; people who live, work or travel to areas where they would be behind levee systems; also includes Congress and state legislatures; and those who live outside of those areas.

Question: How can the program be funded?

- Assume that national levee safety program will require some mechanism at the national level. Consider tying to or benefitting from existing public education programs, like FEMA and Corps projects – this could be added to those programs as opposed to being a separate program.

Question: Who within the national levee safety program should develop public education and awareness projects (subcommittee of national levee safety board)?

Question: Who can best administer (what level of government)?

- Need some administration at the national level. Go below the state level, to levee owners? Some Committee members said that the people who have most credibility with the public are those who walk the levees and maintain them.

Question: What is the most effective way to disseminate the information to target audience?

- Idea: National Ad Council

Question: What existing successful public awareness programs might be leveraged to assist or complement this effort (FEMA, USACE, states, NGOs?)

- Create an advocacy group for levees, like the Association of Dam Safety Officers

Question: What are the shortcomings of the national levee safety program and how do we avoid them?

Question: How do you measure success?

Question: Are you trying to get people to accept national program or change behavior?

- To accept the program. That needs to come before people will change their behavior.

Question: What is the definition of residual risk (in terms that a layman can understand, ex: high/moderate/low?)

Question: Who will determine the level of residual risk for people living within a particular levee system?

- For federal levees, perhaps it should be USACE
- What about non-federal levees – require states or locals to hire people to determine that?
- Working Group should work on developing a definition for residual risk for review team, even if we do not have a calculation.

Other discussion

The Committee members agreed that this Working Group has to define risk and determine how to communicate that to the public. These definitions may be different, depending on whether the information is being communicated to the public or to policymakers. In addition, the Working Group was asked to consider expanding Goal 6 to include residual risks associated with living and *working* in levee protected areas, or even just being in those zones.

WEDNESDAY, 22 OCTOBER 2008

(The day began with the discussion of the revised Vision Statement, as described on pages 5-7)

Background Presentation. Dam Safety Program Structure, Governance and Program Scope Overview – Eric Halpin, Special Assistant for Dam and Levee Safety, USACE

Mr. Halpin described the history of dam safety efforts in the United States, which began in the 1960s and 1970s after several significant dam failures. In 1979, FEMA issued Federal Guidelines for Dam Safety (FEMA 93) and, in 1980, the Interagency Committee on Dam Safety was formed. The subsequent National Dam Safety Program was created with this vision: “a future in which the public safety, economic strength, environment, and national security of the United States are not threatened by the risk from dam failure.” Mr. Halpin explained the various components of the program and offered several “lessons learned” that could benefit the national levee safety program:

- Give Congress a compelling state-of-the-infrastructure argument
- Have a strong outreach and education program
- Ensure the effectiveness of grants given to state and local entities
- Require commitment from program leaders to participate in regular meetings
- Establish a strong training and inventory program
- Develop excellent technical materials
- Ensure rich federal participation on planning boards
- Have a professional organization (i.e. ASDO for dams) that can serve as a conduit for issues and implementation and improve the cohesiveness of states.

Questions and Responses

Question: Who does the training programs?

Response: There is a standing work group by law within the national Dam Safety Board that is focused on training programs. FEMA funds their participation, develop outlines and agendas, pulls in instructors, etc. Most programs are geared around current issues (ex: EAPs); FEMA money is used to attend that training at no cost.

- There is a national, state and local training strategy
 - National: Emmitsburg Conferences – annual on topic of national interest, multi-day training for state program representatives
 - State: training grants to put on regional seminars that are more geared to regional needs
 - Local/individual: small training amounts to states to send people for specialized training where there is not a national or regional need (ex: finite element analysis)

Committee members asked several questions about the training component. The NCLS Technical Assistance Working Group can ask Committee Member Mike Stankeiwicz for more information on the training programs. The National Committee on Dam Safety steering committee develops training materials and the board gets experts from government, industry and academia to conduct relevant aspects of the training.

Question: What are the components of the NDSP that are most beneficial/transferable to the NCLS?

Response: All of the components have value, perhaps not how they are currently implemented. Most deficient – states do not fund their safety programs well. How can we get more money to the states? The NCLS act includes much of what is in the dam program, which is meant to provide only general guidelines. The issue of governance and funding are more complicated with levees, so framework for dam safety program will not go far enough

Question: If the Corps is reluctant to be a granting agency, what it would take to get the Corps to do that?

Response: We will have to save conversation for another time.

Comment: We should come up with recommendations to Congress as to where this program should live and how the levee safety program will relate to the dam safety program. There may be real value in having both of those programs live within the same agency as much as possible. If it is the USACE, several Committee members said that it would be critical to place the program in the right location within the organization so that it has credibility and does not get buried. The program should also have its own dedicated staff, not voluntary, part-time employees.

Comment: We need to get appropriations to go along with that authority. Look at history of appropriations for dam safety – they are even lower than authorizations, which are already too low. We need to try to influence the process enough to have authorizations to be appropriated.

Mr. Halpin's full briefing is available at <http://www.iwr.usace.army.mil/ncls/>.

Report Out. Presentation by Goal.

Each group went through the exercise of further considering their interpretations of the goals and developing a list of questions the Committee needs to answer to make recommendations on these goals. The results of this exercise will be a document of interpretations and questions that will be presented to the Review Team at its 30 October meeting.

Goal 1 (Working Group 3)

Question: What is most important to include or address in a national levee safety program?

- Get information from subject matter experts (Oct. 27 meeting in Denver)

Question: What should not be part of a national levee safety program?

Question: What components lend themselves to regulation vs. incentives/disincentives?

- Would want to have close coordination and input from Work Group 4

Question: Is there any low-hanging fruit?

Question: What funding options exist or should become available?

- Information source: joint committee staff of Appropriations (Roger Cockrell, Ryan Hunt)
- Also recommend someone outside the Committee staff, outside of Appropriations
 - Water Infrastructure Networks Report -- PA Consulting
 - Highway Trust Fund
 - Going to appropriators at early stage might not be useful; perhaps a former appropriator

Goal 2 (Working Group 1)

Question: The Committee has decided that the definition of a levee should be expanded and that it should establish classifications to help define/describe policies. What should these expanded definitions and classifications be based on?

Question: What is the best approach for encouraging the use of best engineering practices: developing general guidelines or developing and adopting a single set of “national” engineering policies, procedures and criteria (specific vs. loose/general)?

Question: Who would be required to use national engineering policies/criteria and what would be the consequences of not using it, and/or incentives for using them? (ex: How to get USACE to accept them?)

Question: Until national engineering policies/criteria are developed (~ 5-10 years), what should be used in the interim?

Question: How should the National Levee Database currently being developed by the Corps be expanded beyond a voluntary basis for non-federal levees?

- Information: talk to those who extract data out of states for the National Inventory on Dams

Information needs

- Legislative history of the National Levee Safety Act
- Legislative history for the National Dam Safety Act
- Federal (USACE, FEMA, USBR) current authorities with regard to levees across the nation
- Lessons learned regarding the National Dam Safety Act
- Information on delegated programs (ex: NPDES, CWA)
- Potential use of grant or pass-through programs by USACE
- Engineering maintenance/Emergency Action Plan, engineering policies/criteria for levees in Netherlands, UK, Australia, and Hong Kong with those use by the Corps, USBR, California
- Current USACE plans and schedule for revisions to engineering procedures and implementation of toolboxes

- Current FEMA plans to revise CFR 65.10 and/or implement USACE procedures on engineering
- Application of tolerable risk concept in addressing societal risks, i.e. developing policies, how it is used now or is proposed to be used
 - Greg Beacher (University of Maryland) and David Bowles (Utah State, dams)

Goal 3 (Working Group 4)

Question: What are possible incentives and disincentives (for effective implementation) and how could they be used?

Question: Where should the National Levee Safety Program reside?

Question: What do we mean by “ownership” of levees? (For responsibility purposes; application of requirements, and in the absence of an identified real property owner or an entity that is accepting and performing operations and maintenance tasks.)

Question: What are the implications where those responsible parties cannot be identified, from a legal and governance standpoint? How do Work Groups 3 and 4 craft programs around that unknown to ensure the program is applied to all levees?

Question: What options may be available to fund program activity, especially beyond inventory?

Information needs

- How incentives/disincentives have worked successfully/unsuccessfully in other delegated, voluntary programs
- How are desired actions achieved
- Academic sources (what are incentives and disincentives, motivations, reactions)
- Nicole Carter, CRS (Sam Riley Medlock has contacted)
- Tracy Mehan will discuss delegated programs, funding for aging infrastructure, trust funds, voluntary programs, incentives/disincentives, and governance

Goal 4 (Working Group 3)

Question: Will an authority like California’s Maintenance Area Authority be needed to ensure the ability to provide operations and maintenance? What if nobody is doing operations and maintenance, or the entity responsible is doing a poor job? If yes, how would it be modified from its form in California?

Question: What will it take in time and money to inventory all the jurisdictional levees (those that fall in the definition established by Working Group 1)?

Goal 5 (Working Group 2)

Question: What message do we want to get out using public education and awareness programs?

Question: Who is best suited to develop public education and awareness programs and why (i.e. agencies, level of government)?

Question: Who is the targeted audience of the public education and awareness program?

Question: Who is best suited to deliver the projects based on the audiences involved?

Question: How should we sequence execution of the program?

Goal 6 (Working Group 2)

Question: What is the definition of residual risk (look at entire system making up levees)?

Question: What constitutes a levee protected area?

Question: Do we know what people already know about living in levee protected areas? How do they already understand/perceive their risk?

Question: Who should determine the level of risk in particular levee protected areas? Risk changes over time, who will measure it so that it can be communicated to the public?

Question: What will you communicate when you do not know what the risk is?

Question: What actions are we trying to drive (i.e. actions on the part of the public)?

Question: Who can best implement a public awareness program to communicate the reality of risk of living in a levee protected area?

Question: What criteria should be used to determine who we should communicate that risk to first?

Question: Should the public awareness program apply equally to all categories of the levee system?

Question: What existing public awareness programs successfully communicate risk to the public and how are they structured?

Assumption: building awareness = communicate risk *and* recommendations for actions to handle that risk

Data sources

- conference call with someone from FEMA to talk about public awareness program
- Peter Mitchell presentation to Committee
- Pre-brief before site tour in New Orleans to include USACE lessons on risk communication

Goal 7 (Working Group 1)

Question: What topics should be covered in a levee safety program?

Question: Who is best suited to develop, maintain and periodically update the requirements for and/or technical assistance materials for state and national levee safety programs?

Goal 8 (Working Group 1)

Question: How can the federal government best provide technical assistance (not training or conferences, but how to help directly)?

Goal 9 (Working Group 1)

Question: What are the best delivery methods for providing technical assistance materials and guidance?

Question: What topics should be covered in this type of technical assistance?

Question: What does physical integrity mean?

Other discussion

Now that the Working Groups have carefully considered questions for each goal, Ms. Manning said they no longer had to conceive of their ideas by goal but rather should develop their recommendations across goals; they should be “smart,” logical recommendations.

Question: By establishing these state levee safety programs, are states acquiring liability where they did not have it before? (ex: Paterno decision in California. That may be a fear of the states, and make them reluctant to implement a program.)

Comment: The Committee discussed whether there is a model for the extension of a federal “shield” from suits, mostly for states and local entities. Some members suggested looking at some reports that were done post-Katrina on litigation that focused on community liability.

Question: Many private firms are withdrawing from levee firms work out of fear, which means fewer firms doing the work, less competition, and potentially poorer quality work. If we are trying to have the best engineering practices, how do we address/solve that issue? Do we give partial or full liability to private firms?

Comment: The Committee will review an American Council of Engineering Companies (ACEC) position paper on liability as well as a Corps position paper on indemnification.

Question: What are the competencies needed to support a national levee safety program? What is the source of competencies we can rely on to do these new things? Who are the people in the government or private sector with the appropriate knowledge, skills and abilities (KSAs)?

Question: Should the Committee develop/support the development of a professional organization for levees, similar to ASDO? What role would they assume?

THURSDAY, 23 OCTOBER 2008

Background Piece. Tolerable Risk 101: The Key to Public Safety – Eric Halpin, Vice Chair

Mr. Halpin defined tolerable risk (TR), offered visual conceptualizations of TR, and explained why the concept of TR should be applied to decisions involving issues of public concern, such as levee safety. He also shared with the Committee findings from the International Tolerable Risk Workshop, which was held in March 2008 and included representatives from several federal agencies, including USACE, FEMA, EPA, U.S. Bureau of Reclamation and FERC.

According to Mr. Halpin, incorporating concepts of risk can justify priorities but also contribute to better decisions as well as an informed, contextualized risk analysis. There must be an understanding of what is unacceptable, tolerable and acceptable, as well as what is achievable (key concept: “as low as reasonably practicable” ALARP). Risk reduction is limited by the options available.

Definitions of TR:

1. Risks society is willing to live with so as to secure certain benefits (ex: speed limit when driving a car)
2. Risks society does not regard as negligible or something it might ignore. (If speed limit is 65mph, **does not** mean you are without risk. There is residual risk that is not negligible.)
3. Risks that society is confident that are being properly controlled by the owner (ex: state departments of transportation keeps roads safe).
4. Risks the owner keeps under review and reduces still further if and as practicable. (Risk changes over time, so one must be nimble in how it is viewed. What is tolerable one day may not be 10 years from now.)

Why TR? Begin with the end in mind:

- Identify levees that pose greatest risk
- Risk is good in determining a list of projects
- To what extent do levees need to be modified (tolerability)
- Which should be modified first (priority/sequence)
- How to balance the desire to reduce risk with availability of resources (urgency)

Example: Decision makers in New Orleans opted not to put gates on mouths of city canals. A TR analysis may have been able to put the risks of action or inaction in better context by allowing engineers and others to look at each gate and determine what was tolerable. Mr. Halpin said that choosing not to use TR means you make tradeoffs, as is common practice, but in a non-rigorous way.

Q: What if engineering experts are not able to put numbers on those choices?

R: The U.S. engineering community is sitting back and demanding a 98 percent answer before they are comfortable using the new methodology. Other industries have blazed past us in using

risk. They know their risk estimates are imperfect, but they still are part of better decision making. The U.S. Bureau of Reclamation, as well as engineers in Australia, England, and the Netherlands, have been using TR for 10 years. Why are they comfortable, and we are not?

Q: You have to have components of education and training to apply TR.

R: It is out there in our profession, though it is a small group. What makes people uncomfortable with risk analysis is that not all disciplines are well advanced, and where it is not, we are using other methods to establish baselines.

Mr. Halpin noted several reasons why people shy away from using TR, and why they should not: the concern is that it conveys a notion of a single objective decision framework (decision based on one number), when in actuality TR is *risk-informed*, not *risk-based*; fear that some may game risk in order to get the answers they want; concern that TR would complicate communication, when concepts of risk can provide solid parameters that aid stakeholders in making decisions; worry that there is too much uncertainty with risk estimates, when TR identifies uncertainties so that managers can make informed, credible decisions; and the concern that TR will replace traditional deterministic engineering standards, when in fact they are complementary and not exclusive. According to findings presented at the International Tolerable Risk Workshop, TR is broadly used in decision making. Also, there is some movement to build a joint federal approach to TR.

Mr. Halpin presented a diagram that showed an inverted triangle that represented risk, with the wide portion (high level of risk) at the top, and the narrow point (broadly acceptable, safe) at the bottom. He then added further descriptive elements, which are represented in the following chart.

Level of Risk	Risks	Boundaries
Unacceptable, unsafe	Risks not justified, with few exceptions	1 in 10,000 (public trust)
Tolerable	People accept risks to secure benefits	ALARP principle and safety case
Broadly acceptable, safe	Risks negligible, further effort not justified	Annualized life loss = 0.001 societal risks (how many lives per year lost would be acceptable)

There was a discussion of the lower level of risk associated with dams as opposed to levees. The structure of dams can take risks from an intolerable zone down far into the range of what is tolerable; by using structural risk reduction, they are designed to such a high standard that they will not fail in the probable maximum flood. Levees, on the other hand, remain above the line of tolerability, where the structure itself cannot get you to acceptability. Instead, levees require a much larger component of non-structural risk reduction, such as evacuation plans, building codes, and land development rules. The Corps is trying to incorporate TR into its principles and guidelines regarding floodplain planning. However, a TR analysis could reveal that there is too

much reliance on non-structural means to make a particular levee worth building; there is some agreement that we should probably not be building most levees.

Comment: In California, there are levees designed so that they will not fail until they overtop, which buys time for evacuation. Design can buy down risk, and support the need for design standards. Also, when you armor structures or make them more resilient, you affect both sides of the risk formula.

Mr. Halpin outlined three primary principles of TR:

- Equity: the interests of all are to be treated with fairness (individual level)
- Efficiency: how much further beyond that are you willing to go to protect society to prevent mass casualty (societal level)
 - you have options that limit you (how well can something be designed, built, operated and maintained)
- ALARP (as low as reasonably practicable): a way to address efficiency aspects in both individual and societal TR guidelines
 - risks lower than the TR standards are tolerable only if further risk reduction is impracticable or if the cost is grossly disproportional to the risk reduction

Mr. Halpin presented a chart that plotted annualized risk of loss of life with the probability of levee failure. The chart showed the lines above which more action is justified, and below which additional action is not justified. TR analyses consider both societal and individual risks as an integral part of the framework for managing risks.

Comment: The **NATIONAL LEVEE SAFETY PROGRAM** must have requirements that deal with structural and non-structural methods of reducing risk. Also, there must be a cost-sharing, partnering program that develops levees with a high degree of reliability along with a matching evacuation plan. However, when it comes to using TR, it may be up to the federal government to compel reluctant engineers to engage in this analysis.

Q: Is there similar development around looking at economic risk, rather than just loss of life? Most losses are at societal level and there **has not** been any analysis about equity/personal loss of property, which insurance can mitigate.

R: The chief economist for the Corps is very cautious about coming up with tolerable economic risk guidelines, in part because some of the existing risk cost-benefit work is well developed. The only concept on tolerable economic risk relates back to life risk – cost per statistical life saved. When we build a levee for \$15 billion, we choose not to say what kind of dollar we are spending per statistical life saved. That is an economic marker that OMB and others look at closely. That concept drives many federal agencies.

Mr. Halpin's full briefing is available at <http://www.iwr.usace.army.mil/ncls/>.

Report Out. Working Groups Report to Full Committee and Changes to Questions by Goal

Goal 1

The Working Group created a chart listing programs that would comprise the **NATIONAL LEVEE SAFETY PROGRAM**.

Goal 2

Question: How should the concepts of tolerable risk and risk-informed analyses be used in establishing engineering policies and criteria?

Question: How should core engineering competencies be encouraged, developed and maintained?

Question: Should the **NATIONAL LEVEE SAFETY PROGRAM** provide some type of liability relief to the private sector? If so, should this also be given in on form or another to state and local agencies as well?

Goal 3

Question: What qualifications should be met to receive a delegated levee safety program?

Question: What program elements should/should not be delegated?

Question: Should levee safety program be mandatory or optional?

Goal 5

Clarifying statements: Will have to include elements of public awareness about every program listed in the program components chart. Also, it will be necessary to look across all activities and see what aspects can be incorporated into communications material that will assist in decision making by all target audiences.

Goal 7

Question: What elements go into and what technical assistance is needed to establish and maintain levee safety programs?

Goal 9

Question: What expertise is associated with and what technical assistance is needed relating to the physical integrity of levees?

Discussion. Levee Definitions and Classification – Les Harder, private sector

As was determined earlier by the Committee, an expanded and clarified set of definitions regarding levees is required to inform the Committee recommendations. Mr. Harder and other members of Working Group 1 developed a draft document outlining proposed guiding principles, definitions and classifications.

Proposed levee hazard classifications

A. High Hazard Levee – a levee which, should it fail with a water surface elevation at the top of the levee, would inundate 10,000 people or more to a depth of 3 feet or more

B. Moderate Hazard Levee – A levee which, should it fail, would inundate 10,000 people or more but with less than 10,000 people inundated to a depth of 3 feet or more

Or

A levee which would inundate less than 10,000 people but with some to a depth of 3 feet or more. (Note – the “10,000” standard comes from California’s FloodSAFE definition of an urban area.)

- C. Low Hazard Levee** – protecting less than 10,000 people and no one is subjected to a depth of 3 feet or more

Jurisdictional levees and canal structures

- In order to be exempt from the requirements of State or National Level Safety Programs, levees and canal structures must meet ***all*** the following criteria:
 - o not part of a federal flood control project
 - o not an accredited levee by FEMA
 - o not greater than 3 feet
 - o not protecting a population greater than 50 people
 - o not protecting an area greater than 1,000 acres(all values are tentative)

The Committee discussed whether the high/moderate/low classifications are the correct terms, and the possible utility of modifying the classifications with the word “potential” in order to communicate that idea that the risks represent the upper limit of what could happen. Some suggested that to align the categories more consistently with the life-risk categories in the dam safety program, we could use “very high,” “high” and “significant” may be useful. Some indicated that the more extreme risks associated with levees might necessitate a category above “high.” Committee members also engaged in a debate about what should and should not be considered a levee, especially appurtenant works and floodwalls, highway and railroad embankments, natural channels, dikes, coastal structures and other lines of defense that are often called into duty during a flood event but may not technically be part of a levee system. The Committee focused on whether setting the dividing line at 10,000 is appropriate and whether the figures should be adjusted to account for people who engage in activities behind levees, such as working or driving, but do not live in the consequence area.

Mr. Harder’s full briefing is available at <http://www.iwr.usace.army.mil/ncls/>.

FRIDAY, 24 OCTOBER 2008

Discussion. Revision of Levee Definitions and Classifications – Les Harder, private sector

As per the Committee’s discussion from the previous day regarding possible modification and amendments to the levee definitions and classifications, Mr. Harder and other group members offered revisions to the outline presented on 23 October.

The team recommended that the definition of levee be expanded to include: embankments and floodwalls that provide flood protection to lands below sea level and other lowlands and that may be subject to water loading for much, if not all, portions of the year, but that do not constitute barriers across water courses or managed as dams.

The definitions would be expanded and modified as follows:

- Levee - A manmade barrier (embankment, floodwall, or structure) along a water course for the purpose of flood damage reduction or water conveyance.
- Levee Feature - A structure that is critical to the functioning of a levee. Examples include embankment sections, floodwall sections, closure structures, pumping stations, interior drainage works, and flood damage reduction channels.
- Levee Segment - A discrete portion of a levee system that is owned, operated and maintained by a single entity. A levee segment may have one or more levee features.
- Levee system – Comprises one or more levee segments which collectively provide flood damage reduction to a defined area. A levee system is an example of a type of flood damage reduction system. Failure of one feature within a levee system constitutes failure of the entire system. The levee system is inclusive of all features that are interconnected and necessary to ensure protection of the associated separable floodplain. These levee features may consist of embankment sections, floodwall sections, closure structures, pumping stations, interior drainage works, and flood damage reduction channels. Levee systems include all flood, storm, and hurricane damage reduction systems with any of the major levee features listed above. This definition does not apply to shore line protection or river bank protection systems such as revetments, barrier islands, etc.

The types of structures covered by the national levee safety program would include:

- Levees and appurtenant works
- Canal Structures
- Other Man-made Structures that may function as part of Levee Systems
 - Highway embankments
 - Railroad embankments
 - Coastal barriers

The Committee agreed to put the revised set of definitions and classifications before the Review Team for comment; Mr. Harder will conduct the presentation at the 30 October meeting. The Committee further discussed the logistics and agenda for the Review Team meeting.

Discussion of Components of Step 6 and Working Group Homework

Meeting 2 closed with a discussion of the Committee's "homework" – each Working Group will prepare one or two draft recommendations for presentation at Meeting 3, which will be held from 5 November to 8 November, 2008, in New Orleans, LA.