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**Move Beyond Sound-bites and “Armchair” Theories to Make the
Nation Safer From Disaster, Engineers Say**

Lessons from Katrina Studies Can Benefit Communities Nationwide

Reston, Va.—Almost two years have passed since Hurricanes Katrina and Rita devastated New Orleans and the Gulf Coast. The nation has invested millions of dollars in research conducted by the world’s leading engineers and scientists. Do we now have definitive answers to what went wrong and, more importantly, can that knowledge make us safer?

In a report issued today by the American Society of Civil Engineers (ASCE), experts who have studied the disaster make public their opinions about what went wrong in New Orleans—and why.

“It’s so easy to react to armchair theories and colorful sound-bites,” said David Daniel, PhD, P.E., president of the University of Texas at Dallas and chair of the ASCE Hurricane Katrina External Review Panel. “Few people have the time to sort through 7,000 pages of technical data. Unfortunately, people sometimes end up making policy based on headlines, not science. In our report, we offer a rational basis from which the nation can move forward.”

With the start of another hurricane season upon us, experts from the External Review Panel say that the findings from the research efforts conducted after Hurricane Katrina in some cases challenge conventional wisdom. The conclusions of the research also hold important lessons that extend beyond New Orleans and the Gulf Coast to affect:

- Areas protected by levee systems throughout the U.S.;
- Hurricane-prone coastal communities;
- Population centers located in areas at high risk from natural disasters including flooding, wildfires, and earthquakes; and
- Large-scale and complex engineering projects or agencies responsible for major infrastructure.

The ASCE External Review Panel was established at the request of the U.S. Army Corps of Engineers (USACE) to conduct real-time expert peer review of the USACE’s Interagency Performance Evaluation Taskforce (IPET). The IPET has published a nearly 7,000-page report documenting its findings. In addition, reports have been issued by research teams organized by the University of

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California, Berkeley, with funding from the National Science Foundation, and by Louisiana State University.

Taken together, these reports represent a body of scientific research that can provide clear direction for national and local authorities charged with protecting communities from natural and man-made disasters. The External Review Panel warns, however, that science may be overshadowed by lingering misperceptions and unsubstantiated theories.

Separating Fact from Fiction

Examples of some of the commonly held misperceptions related to Hurricane Katrina and its devastating effects on New Orleans include:

PERCEPTION: Hurricane Katrina was only a Category 3 hurricane at landfall—how could it have overwhelmed the levees?

REALITY: Hurricane Katrina was one of the largest and strongest storms to hit the coast of the United States. As Hurricane Katrina crossed the Gulf of Mexico from Florida, it rapidly gained strength and grew to a Category 5 hurricane offshore creating a tremendous storm surge that was carried onshore. **The surge level in coastal Mississippi exceeded that of the Indian Ocean tsunami of December 2004.**

As Hurricane Katrina approached land, it weakened to a Category 3 hurricane. However, the storm remained very large, and the surge from the offshore Category 5 was immense. The storm surge was the cause of the widespread flooding and damage in New Orleans.

PERCEPTION: Without the levee failures, New Orleans would not have been devastated.

REALITY: During Hurricane Katrina, parts of New Orleans—a bowl partially below sea-level—were inundated with 13.6 inches of rainfall in 24 hours. The storm surge along the Lake Pontchartrain lakeshore was about 12 feet above sea level.

The IPET developed models to compare deaths and property damage caused by the breaches in the hurricane protection system to scenarios in which the floodwalls and levees remained intact but overtopping occurred, though the pumping system did not operate.

The conclusions? Even without breaching, Hurricane Katrina's rainfall and surge overtopping would have caused extensive and severe flooding—and the worst loss of life and property loss ever experienced in New Orleans.

As of August 2, 2006, 1,118 New Orleanians were confirmed dead and 135 people were still missing as a consequence of Hurricane Katrina. By comparison, the IPET estimated that approximately

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686 people would have died—even if system had not breached. The IPET estimated that approximately \$21 billion in property damage occurred as a result of Hurricane Katrina. By comparison, \$17 billion worth of property damage would have occurred even if the hurricane protection system had not breached.

PERCEPTION: The Mississippi River-Gulf Outlet (MRGO) is a “Hurricane Highway.”

REALITY: The myth that MRGO, a rarely used shipping channel, is a hurricane highway was widely reported after Hurricane Katrina, and continues today. It goes something like this: during a hurricane, storm surge from the Gulf of Mexico is amplified within the long section of the MRGO and funneled straight toward New Orleans.

Not so, according to complex computer models that re-created storm conditions. The reality is that for large storms, the channel of the MRGO simply cannot carry enough water to cause flooding. On the contrary, the modeling indicated that following Katrina, the MRGO enhanced the post-storm drainage of surge waters from flooded New Orleans back out to the Gulf.

The computer modeling did indicate that for smaller hurricanes, the geometry of MRGO and nearby canals might have the effect of increasing the storm surge by a small amount (less than half a foot).

While there may be valid reasons for and benefits to closing the channel, the false perception that MRGO is a hurricane highway should not influence that decision.

PERCEPTION: The hurricane protection system failed, in part, due to malfeasance during construction.

REALITY: “Malfeasance” in the construction industry refers to intentional unlawful acts such as substituting inferior materials or using substandard construction techniques.

The engineering studies performed by the IPET and others were not criminal or forensic investigations. However, the researchers found no indication of malfeasance in the constructed projects for those sections of levee that were carefully investigated. On the contrary, actual conditions (called “as built” conditions) were consistent with the design and construction specifications.

“The flaws that led to the system’s failure,” says Daniel, “can be primarily attributed to questionable engineering and management decisions resulting from external pressure, cost concerns, and flawed system management—not construction malfeasance.”

Lessons Learned

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During the course of its work, the External Review Panel developed a deep understanding the underlying issues that led to this tragedy. Recognizing their obligation to share these findings so others may learn from this tragedy, the Panel developed a list of lessons learned and associated calls to action. This report is published today, in its entirety, on the ASCE Web site (www.asce.org).

“The lessons we have learned from the devastating tragedy in New Orleans will have profound implications for other American communities, and should serve as a sobering reminder to people nationwide that we must place the protection of public safety, health and welfare at the forefront of our nation’s priorities,” Daniel says.

Organizations must be structured to enable, not to inhibit, the focus on safety, according to the External Review Panel, and engineers must continually evaluate the appropriateness of design criteria, always considering how the performance of individual components affects the overall performance of a system.

Specific recommendations included in the External Review Panel report are:

- Keep safety at the forefront of public priorities by having all responsible agencies reevaluate their policies and practices to ensure that protection of public safety, health and welfare is the top priority for infrequent but potentially devastating impacts from hurricanes and flooding.
- Encourage Congress to establish and fund a mechanism for nation-wide “Levee Safety and Rehabilitation” program, as is done for major dams.
- Determine the level of acceptable risk in communities through quality programs of public risk communication in New Orleans and other areas threatened by hurricanes and flooding.
- Upgrade engineering design procedures to place greater emphasis on safety.
- Engage independent experts in high-level reviews of all critical life safety structures, including hurricane and flood protection systems.

“The first Fundamental Canon of ASCE’s Code of Ethics states that ‘Engineers shall hold paramount the safety, health, and welfare of the public...,’” said Daniel. “This canon must be the guiding principle for rebuilding the hurricane protection system in New Orleans. And it must be applied with equal rigor to every aspect of an engineer’s work—in New Orleans, in America, and throughout the world.”

Founded in 1852, the American Society of Civil Engineers represents more than 139,000 civil engineers worldwide and is America's oldest national engineering society. For more information, visit www.asce.org.

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