



Two cranes working side-by-side on the Bonne Carré spillway lift individual "needles" while spillway employees hook both ends of the needles and hang them between the concrete spans. The workers then use the needles as a platform as they work. (Photo courtesy of New Orleans District)

Divisions restructure

Lt. Gen. Joe N. Ballard, Chief of Engineers, has announced implementation of the plan released earlier this year to restructure the Corps of Engineers into eight divisions.

"The new structure of the Corps will ensure continued customer service," said Ballard. "It also ensures that the management of major watershed basins stays under a single division headquarters."

The major components of the new structure involve realigning the staffs of four current division offices into two divisions, each under the control of a single commander. The headquarters of North Central and Ohio River divisions are combined to form the new Great Lakes and Ohio River Division, with headquarters in Chicago and Cincinnati. North Pacific and Missouri River divisions are combined to form the new Northwestern Division, with headquarters located in Portland, Ore., and Omaha. A headquarters office is at all four locations to better coordinate and address regional issues.

Additionally, New England Division is converted to New England District and will report to the North Atlantic Division commander in New York City.

A number of districts will now report to different offices. St. Paul and Rock Island districts now report to the new Mississippi Valley Division. Alaska District now reports to Pacific Ocean Division based in Honolulu. Albuquerque District now reports to South Pacific Division in San Francisco.

The restructuring is in response to Public Law 104-206, Energy and Water Development Appropriations Act, 1997, which directs the Corps of Engineers to reduce the number of its divisions.

"The new structure does more than just meet the requirement to reduce the number of divisions," said Ballard. "It optimizes support to military forces, minimizes district realignments, and maintains geographical balance."

Corps flood fighters work upriver and down

Early this year, storms swept the Ohio River Valley causing severe floods. The rain began Feb. 28 and continued for two days, dumping three-to-13 inches across the Ohio River Basin.

Districts throughout Ohio River Division (ORD) and the Lower Mississippi River Division (LMVD) fought the floods.

Most of the rain fell below flood control reservoirs and flowed uncontrolled into the Ohio River and its tributaries. Communities with levees and floodwalls near the river scrambled to raise floodgates and pile sandbags.

The Ohio River hit flood levels from mile 165 near Marietta, Ohio, to mile 981 at Cairo, Ill., where the Ohio empties into the Mississippi. Some of the flood levels along that stretch were the highest in more than 30 years.

At Cincinnati, the Ohio crested at 64.7 feet, 12.7 feet above flood stage. Not since the 1964 flood has the city experienced such floods.

Flooding along the Ohio River is

blamed for at least 24 deaths in Ohio and Kentucky. It closed interstate highways and major bridges and more than 5,000 families were forced from their homes. Damage is estimated at more than \$350 million.

President Clinton declared 146 counties in six states disaster areas, including 87 in Kentucky, the hardest-hit state.

Huntington District

With the location and quantity of rainfall, mountain creeks and rivers were expected to overflow their banks and flood homes and roads. But a flashflood on the Ohio River was not expected. The gauge at Greenup Locks and Dam registered 26.01 feet at 6 p.m. on March 1. One hour later, it read 40.64 feet.

In Huntington District, five lakes in Kentucky and West Virginia reached record pools. They were Beech Fork (70 percent), Sutton (50 percent), Paintsville (61 percent), Grayson (69 percent), and Yatesville (98 percent).

Even though these dams held record levels, rain falling below them still caused flooding that could not be prevented. To ease public concern, 12 district lake projects held open houses in areas affected by flooding to explain how they work and why damages occurred downstream.

Navigation on the Ohio and Kanawha rivers was affected by high water. Locks and dams from Gallipolis, Ohio, to the mouth of the Ohio at Cairo, Ill. were closed. This is 702 miles of the river's 981 mile length.

At the Winfield main lock construction project on the Kanawha River, the river came within 18 inches of overtopping the coffer dam between the river and the project. Had the crest been inches higher, the workers would have flooded the project themselves to prevent significant damage.

Huntington District also received missions from the Federal Emergency Management Agency (FEMA)

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The left photo shows the original condition of family housing at Fort Irwin; the right photo shows a home after being rebuilt. (Photos courtesy of Los Angeles District)

LA District upgrades homes at Ft. Irwin

By Herb Nesmith
Los Angeles District

An assignment to the National Training Center (NTC) at Fort Irwin, Calif., is considered a hardship tour for Army families. But the Corps of Engineers is working to change that. In a \$10 million family housing project, old homes built in the early 1960s are being upgraded, pretty much from the ground up.

Family comfort is vital at Fort Irwin because it occupies thousands of acres in the Mojave Desert. There's enough room for brigade-sized units of soldiers and armored vehicles to maneuver in mock battles. With a tough, experienced opposing force, the Simulated Area Weapons Effects system, and the Multiple Integrated Laser Engagement System to record "kills," the NTC is the closest soldiers can come to warfare without blood.

But the remoteness makes Fort Irwin lonely. The nearest other activities are NASA's Goldstone tracking station, and the Navy's China Lake Naval Weapons Station. The small city of Barstow, Calif., is close, but not *that* close — some 30 miles away by two-lane road.

So making on-post housing comfortable for families has high priority.

"We're gutting the interiors and starting from there," said Phyllis Holley, a construction representative with Los Angeles District. She works out of the Fort Irwin Resident Office, an on-post activity of the district's High Desert Area Office in Lancaster, Calif.

The project is upgrading 120 existing two-, three-, and four-bedroom homes. Corps contractors are installing new insulation in walls and ceilings, patching and finishing drywall, doing stucco work where needed, painting new wood fascia, putting on new tile roofing, installing new heating and air conditioning (a must in the desert), building a garage for each home, and laying new carpeting and vinyl floor covering.

The post is installing new ranges, refrigerators, and dishwashers in kitchens.

Outside, the Corps is giving the homes drought-resistant desert landscaping, and installing three

"tot lots" in common areas. The equipment at the mini-playgrounds is made of recycled plastic.

"We're ensuring that the quality of life is being elevated at Fort Irwin," Holley said. "The community is really excited about the housing upgrade and can't wait to get families into the units."

But homes aren't the only thing the Corps is improving at the National Training Center. For recreation, The Fitness Connection, a new community activities center, just opened. Its star feature is a large rink for inline skating. Fitted with side boards, it is also a roller hockey rink, complete with bleachers and scoreboard. The area around the rink, between the sideboards and bleachers, is an indoor jogging track. The center also has men's

and women's weight and aerobics rooms, shower rooms, a child care center, video arcade, snack bar and patio with tables and chairs.

For other leisure time, soldiers can also go the new Corps-built enlisted club, The Outer Limits.

To expand medical care facilities, the district is managing construction of a new outpatient clinic which will work with the post hospital.

Also newly-built are three traditional company operations offices. (Veterans are probably more familiar with "orderly rooms" and "supply rooms.")

For soldiers and their families at Fort Irwin, the Corps continues to improve their homes, medical care, recreation, and workplaces. It's all about quality of life for soldiers, a top priority for the Corps.

Bronze Medal received 29 years late

By Linda James
Engineering and Support Center, Huntsville

The Army honored one of Huntsville Center's people recently for his actions of bravery during the Vietnam War 29 years ago.

Doug Rhodes received the Bronze Star with "V" Device for valor during a ceremony in March. The official award citation reads, "Specialist Five Rhodes displayed heroic actions by placing himself at risk by exposing himself to enemy fire to make possible the successful completion of a very dangerous mission."

Rhodes' own account of the events in December 1968 are much more modest. A 20-year Army veteran, he insists that "hero" and "valor" would apply to any soldier in a combat situation, and that he did nothing more than what many others did during Vietnam.

"In those situations, you don't have time to think; you just do what you have to do to get the job done," said Rhodes, who served as an ordnance and explosive specialist in Vietnam.

The "job" in this case was to place a pin in a land mine so it wouldn't explode. That's dicey enough,

but another soldier was also standing on the mine. If he lifted his foot, the mine would detonate, and Vietcong snipers were firing on Rhodes and his team leader as they made their way to the soldier.

Rhodes drew the sniper fire by moving to an open area while his team leader rendered the mine safe. Once the soldier could safely lift his foot off the mine, all three of them ran for cover and escaped the area by helicopter.

Rhodes had been assigned to the 184th Ordnance Battalion in Qui Nhon for only about six weeks before this incident. He finished a 12-month tour in Vietnam and re-enlisted to make his career with the Army.

Rhodes retired in 1988 and moved to Huntsville. He has worked for the Corps of Engineers in Huntsville since 1992 as a safety specialist with the Technical Review Team, Ordnance and Explosives Center of Excellence.

According to Rhodes, the fog of war is to blame for him not receiving his medal for 29 years. His company commander had begun the paperwork, but was soon transferred and the new commander didn't follow up. The team leader pursued it during the years, and finally succeeded in getting the recognition.



Transatlantic leads way in Bosnia

By Denise Tatu
Transatlantic Programs Center

U.S. troops have been in the Balkans for more than a year, serving as part of a NATO peace implementation force. Since the beginning, the Corps of Engineers has supported the operation (first known as Joint Endeavor, and now as Operation Joint Guard) by helping meet requirements for facilities, real estate, environment, and logistics.

The Transatlantic Programs Center, Europe has led the way by working with the U.S. Army Europe (Forward) (USAREUR-F) and the 1st Armored Division to integrate the Corps' engineering and construction contracting expertise into the operation.

A significant portion of the engineering and logistics effort was met through the Army's Logistics Civil Augmentation Program (LOGCAP) contract. The LOGCAP contractor helped to establish, and then operate and maintain, an intermediate staging base in Hungary and more than two dozen base camps in Croatia and Bosnia. The contractor also provided life support services such as food and laundry.

Last summer, the Army tasked the Corps to provide more than two dozen personnel to beef up the Corps' Base Camp Coordination Agency (BCCA) in the 1st Armored Division at Slavonski Brod, Croatia, and to continue operating the Balkans Area Office to support USAREUR-F's engineering operation at Tazsar, Hungary.

The Corps included members of the Contingency Real Estate Support Team (CREST), engineers, environmental specialists, and several active duty military members. Maj. Gabriel Morgan, Transatlantic's director of security and law enforcement, was among those deployed. Morgan spent 90 days as chief of the BCCA's Base Camp Assessment Team (BCAT).

While the BCCA provides facility engineering planning and operations, environmental engineering, and real estate, and also oversees technical administration of the LOGCAP contract, the BCAT has a different purpose, Morgan said.

"The BCAT serves as the commander's eyes and ears on the ground," he said. "We develop and tailor standards for the base camps, and then assess the adherence to those standards."

Morgan said the job of developing and executing inspection programs was threefold:

- For sustainment of base camps that would remain open.
- For camps that were transferring from the 1st Armored Division, which was leaving the Balkans, to the 1st Infantry Division, which was taking over.
- For closure of more than a dozen base camps.

These inspection programs provided the Task Force Eagle commander with a continuous assessment and validation of task force standards in such areas as force protection, environmental, fire prevention, safety, ammunition storage and safety, physical security, real estate claims, and property accountability, said Morgan.

For instance, force protection standards cover such items as access control, towers, fencing, and security and perimeter lighting. Logistical standards include motor parking hardstands, dining facilities, graveled roads and parking areas.

While in the Balkans, Morgan and his team performed more than 30 sustainment inspections, 25 transfer inspections and 30 closure inspections, and provided daily updates to the Task Force Eagle commander.

"The assessment program was praised by both outgoing and incoming commanders and was critical in implementing and sustaining high base camp standards," said Lt. Col. Albert Bleakley, Europe Center's deputy for contingency operations



Maj. Gabriel Morgan, Transatlantic's director of security, examines an M-109 gun tube that misfired in Bosnia. (Photo courtesy of TAC)

and chief of the BCCA.

Morgan also prepared programs of instruction for risk analysis, physical security and arms, and ammunition and explosives, then taught these subjects at the camp commander's training course.

He was also selected to perform a complete security assessment of the 3,000-man Camp Sava North and its 13 satellite sites that comprise the Redeployment Staging Base at Slavonski Brod.

In December, the BCCA transitioned to a smaller organization as the number of U.S. troops in the Balkans stabilized. U.S. troops began leaving the Balkans in October and their number has since decreased to about 8,500.

In December, NATO commanders launched a new multinational mission. A 31,000-member Stabilization Force has replaced the Implementation Force and is working to solidify the peace that has held since the signing of the Dayton Accords in December 1995.

Morgan said the mission was a true challenge. "It was great to have a sense of purpose when I got there and a sense of accomplishment when I left," he said. "I was able to see results in a reasonable amount of time. My job, from a force protection view, was to ensure that no soldiers lost their lives while those camps were being turned over or closed."

His biggest challenge, Morgan said, was complacency by soldiers who were confined to their base camp.

"These are combat soldiers, and if you stick them in the mud for 10 months, they're going to start to get complacent, wondering why they are there. It's hard for them to stay focused," he said. "They are trained for action. I had to keep them focused, give them a sense of purpose."

Morgan said he was grateful for what he called "terrific support" from base camp commanders. "As a result of the Khobar Towers incident, the commanders saw the importance of what we were trying to do. We got the visibility we needed to correct any problems," he said.

Since his return, Morgan has received the Army



Soldiers load a tank with ammunition at the Sava River site. (Photo courtesy of TAC)

Commendation Medal and the NATO Medal for his service in the Balkans. Col. James Barry, Europe Center commander, said Morgan performed "superbly in a difficult and challenging assignment."

Safety tops at Sardis

By Karen Magruder
Vicksburg District

Five-and-a-half years without a drowning is definitely something for a project the size of Sardis Lake to brag about. However, Sardis personnel say the record is the result of a strategic water safety education plan.

Sardis Lake is a Corps of Engineers flood control reservoir in Northern Mississippi. The lake's water safety campaign recently won a National Water Safety Congress (NWSC) Regional Award of Merit. The Sardis Lake Field Office was the Region IV award winner, competing against nominees from Tennessee, Alabama, Mississippi, and Florida.

"This is a joint effort among several groups, plus our own staff," said Alton Pollan, resource manager at Sardis Lake. "The rangers intensely promoted water safety in the community, and the maintenance crews kept the beaches, buoys, and boat ramps in great shape."

Indeed, the persistence of maintenance personnel in critical safety areas, coupled with promotional efforts by the rangers, is the "one-two punch" of Sardis' water safety campaign.

Since the lake's last recorded drowning in 1991, park rangers have conducted water safety programs at project swimming beaches and picnic pavilions for nearly 17,000 summer visitors. They have expanded the project's water safety program in Northern Mississippi schools, carrying a water safety message to nearly 12,000 children.

Through their outreach efforts, the lake staff has distributed thousands of water safety book covers and developed water safety messages for grocery bags, ice bags, and 2.5 million milk cartons. The milk cartons, vividly displaying water safety reminders, were printed by a local dairy and distributed in 10 Northern Mississippi county school systems and communities around Sardis Lake.

According to park ranger Dave Dutton, Sardis Lake's water safety coordinator, "One of the things the rangers have excelled at is finding new and innovative ways to promote water safety."

For example, during National Safe Boating Week, boat patrol rangers distribute free six-packs of soft drinks (courtesy of a local bottling company) to boaters who pass random safety inspections. During patrols, rangers check for life-jacket use, fire extinguishers, navigational lights, visual distress signals, and other safety equipment. As the



Sardis Lake ranger Dave Dutton gives the Taylor children (l-r, Maribeth, Audrey, and Jake) a safety lesson at a lake beach. (Photo courtesy of Vicksburg District)

week ends, they become popular with enthusiastic boaters who actively pursue them looking for their chance to win free beverages!

Rangers also team up with the Coast Guard Auxiliary to rigorously inspect safe boaters. Many boaters proudly display the examination sticker they received at Sardis Lake, a testament that they passed a thorough going-over.

Sardis personnel have teamed up with a local paper and its writers to produce "The Sardis Lake Visitors Guide." This free publication informs visitors about personal safety issues, particularly water and boating safety. Thousands of copies are distributed at interstate welcome centers, bait shops, gas stations, restaurants, and other points of interest to travelers.

Lake staff have also written many water safety press releases, and frequently conduct TV and radio water safety interviews. They persuaded production crews from a TV station in Memphis, Tenn., to visit Sardis Lake and film water safety public service announcements (PSAs) for children. During the summer, the PSAs reach an estimated daily audience of 90,000 people in the region.

To recognize community awareness and support

for Sardis' water safety campaign, the lake staff has submitted 20 award nominations to the NWSC, and all resulted in awards. Recipients include local TV and radio stations, newspapers, the University of Mississippi, non-profit support groups, the Coast Guard Auxiliary, restaurants, businesses, individuals, and civic leaders.

The Sardis Lake Field Office has also been recognized twice by the NWSC (1990 and 1994) for their on-going efforts in promoting aquatic safety.

"One of the questions I'm often asked is how much of our drownless streak is due to our hard work, and how much is due to just plain luck," Pollan said. "I usually answer by saying it just didn't happen by chance, and if you look at the record I think you'll see that."

A brief look at Sardis' drowning statistics puts their achievement in perspective. Since 1940, when Sardis Lake opened, there has been an average of 2.7 drownings per year. There were 36 drownings 1960-69; in the 1970s there were 38.

There were 12 drownings 1986-1991, and there were no drownings 1992-96, despite rising annual visitation. In 1963 2.1 million people came to the lake; in 1996, 4.4 million came.

Lab forms 6,000-mile education partnership

By Marie Darling
CRREL

The Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, N.H., has established working partnerships or agreements with numerous educational institutions nationwide, including one 6,000 miles away in Barrow, Alaska. Recently CRREL officials traveled to Ilisagvik College in Barrow, taking the initial steps toward an educational partnership.

Ilisagvik College provides academic, vocational and technical education to the Inupiaq residents of the North Slope to prepare them for employment, while preserving and strengthening Inupiaq language, culture, values, and traditions. The school has about 700 students.

Ilisagvik (meaning "a place to learn") College is on the North Slope of Alaska where the Beaufort

and Chukchi Seas meet. CRREL people have worked here many years investigating the properties of sea ice. Ilisagvik students in science, math and computers can soon gain academic credits by working in real-life projects. They will help set up and maintain instrument sites in the Barrow area to monitor ice growth and temperature, take sea ice samples, and use computer-based data acquisition systems to record crucial information throughout the year.

Other benefits to the college include equipment use and the possibility for faculty and students to work at the lab in Hanover. CRREL staff will be available as mentors and to assist in teaching and course development.

One ice researcher who will be a mentor/instructor is Dr. Debra Meese. Meese was in the official party that visited the college, and a force behind

the partnership. She is a veteran of numerous field trips to Prudhoe Bay, about 225 miles south-east of Barrow, and has first-hand knowledge of ice research in the area. Meese views this relationship as both feasible and beneficial.

CRREL benefits from the partnership in many ways. The most important is that a work force is being created on the North Slope. Travel is costly; the trip to Barrow from CRREL takes 17 hours. CRREL can augment its work force and save time and money with academic working relationships like the one with Ilisagvik College.

"The Inupiaq way of life makes them uniquely suited to assist us in investigations related to their environment," said Gerald Bettis, the Partnership Program Manager. "It just makes good sense to formally include Ilisagvik College in our Arctic research program."

NY District faces controversy head-on

Article by Vince Elias
Photos by Pete Shugert
New York District

New York District people took to the road during February and March in one of their biggest and most successful community outreach programs. Their mission — to explain in layman's terms the Corps' Dredged Material Management Plan (DMMP) report released last October.

New York Harbor is naturally shallow and must be dredged to maintain safe channel depths for port navigation and commerce which generates \$20 billion annually. Each year more than 4,100 ocean-going vessels dock at the Port of New York and New Jersey.

Last fall, New York District prepared the DMMP interim report which offers 53 options for disposing of material dredged from the port.

There were negative reactions to the report, and the poster board sessions were designed to counter this.

Not typical

These were not typical public meetings where Corps people state their case from a podium, then take questions from the audience. This fosters an us-versus-them situation.

Instead, colorful, easy-to-understand posters were set up and manned by district experts. Those who came to the sessions could learn quickly from the posters, then ask the district people questions.

This removed the circus atmosphere, let the district people be seen as friendly and approachable, and allowed low-key discussions instead of public shouting matches.

Sessions were scheduled in areas of high opposition to elements of the DMMP. The public outreach initiative was implemented by district biologists, scientists, public affairs specialists, and others from the Environmental Assessment Section. Staff from Operations Division and Regulatory Branch also participated.

Editors, congressional representatives, key state agencies, community boards, and the general public were notified that the district was sponsoring six information exhibit sessions in New York and New Jersey.

The Public Affairs Office and Planning Division's Environmental Branch created 20 posters, each 3x6 feet, that depicted the options. The first session was held in familiar territory on Staten Island, one of the five boroughs of New York City.

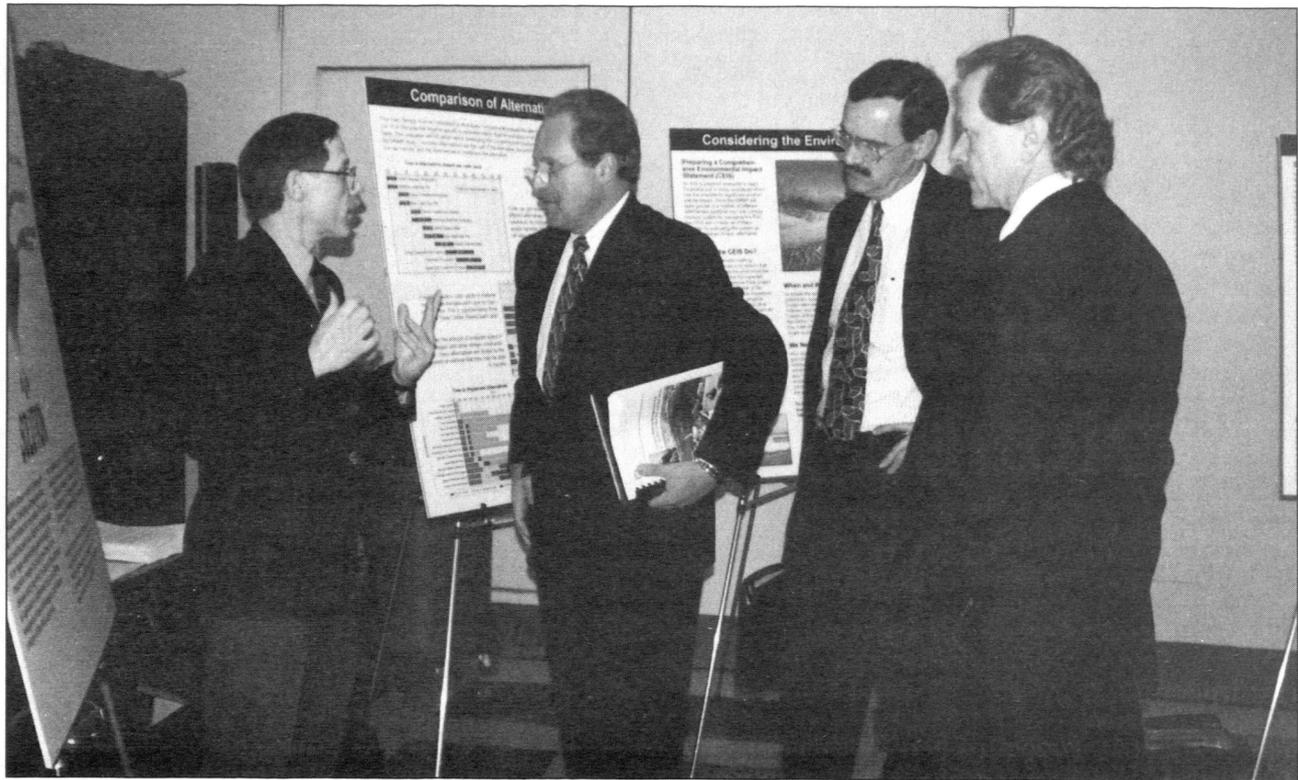
Baptism by fire

A crowd of more than 150 people attended the first session at the College of Staten Island. The DMMP is unpopular with many residents because Staten Island is already home to the world's largest landfill. Any proposal to dispose of dredged material there was greeted with skepticism, if not outright hostility. Staten Islanders have a general mistrust of government, feeling that their borough is the "dumping ground" of New York.

Praise from those with an interest in the port's commerce and its future was matched by the negative views of commercial fishermen and recreational boaters led by uncompromising environmentalists.

The public's concerns had been exacerbated by community flyers that had been distributed during the weeks before the Staten Island session. Many citizens were steamed by distorted information and inaccurate press reports and there was a need to put the dredging options in perspective.

Corps representatives simply presented the scientific facts, allaying fears and misperceptions cir-



Robert Kurtz explains the dredged material disposal plan to a group of businessmen.

culated by environmental lobbyists. Citizens were assured they had a voice in what dredge disposal methods would be selected.

More sessions

Additional sessions followed at Brooklyn and Manhattan, and in New Jersey at Newark, Woodbridge and Leonardo. Every subsequent poster session was the subject of media scrutiny. One local TV station ran a three-minute spot round-the-clock that portrayed the disposal problem while announcing the exhibits. Hundreds of opinionated people attended the exhibits and asked many questions.

The weather cooperated. No community sessions were canceled despite heavy rain, wind and sleet. By the last session, the Corps people could dismantle and pack their posters and easels in less than five minutes.

Opposition

In a rally held by a local Congressman in a room next to a Corps session in New Jersey, a notorious environmental activist made an appearance to whip up community wrath.

Environmental leaders told their followers to engage Corps representatives in groups of two, and small groups converged on district representatives.

Attendees ranged from T-shirt clad environmental activists displaying "stop the dredge island" slogan, to neutral citizens. Corps representatives, anticipating controversy, remained poised and calm and simply presented the facts.

Results

For some citizens, perceptions were clarified. Others chose not to listen. The poster board sessions achieved a personal dialogue, making facts available to set the record straight while reducing fears in many cases. The sessions precluded shouting matches and provided an open forum for an intelligent exchange of ideas.

Based on the many written comments, public support for certain options emerged. Those who attended the sessions became more knowledgeable about the Dredged Material Management Plan and the facts behind the 53 options.



Karen Vanderwall explains dredging disposal at an exhibit session.

Kathy Mak, Vice President of Global Terminal at the port, phoned the district to say, "I'm impressed with the information, format, and method of presentation. I have more than 600 employees at Global, and I have asked them each to attend at least one of your exhibit sessions."

Jeff Cusano, from Planning's Environmental Branch said the public came to the sessions with a lot of questions. "Quite a few questions and comments on the information on displays were received," he said. "They liked the format of the presentation and the information given. People were positive about us being out there conveying a message."



Building Bridges To The Future

Hard work, cooperation builds first-of-kind bridge in North Carolina

By Richard Scieford

On Jan. 20, engineers placed the center section of a new bridge over Pamlico Sound in Hobucken, N.C. It is the first post-tensioned, segmental box girder bridge in North Carolina to be cast in place.

Thanks to a vigorous partnering effort between the Corps of Engineers and others involved, the center section of the Hobucken Bridge Replacement Project was placed nearly a year ahead of the date predicted.

The approach span to the bridge deck was finished in February. The rest of the work, including the roadway, should be finished in a few months. Traffic should be able to cross the new span by summer.

Bridge needed

The bridge carries traffic between Goose Creek Island and Pamlico County mainland. Since the early 1930s, the mainland and the small island towns of Hobucken and Lowland have been linked solely by a steel swing-span bridge. The bridge is old and has weight-limited spans, making a new bridge necessary.

The replacement project for a new 2,538-foot bridge began in May, 1995. Typically, supporting bridge columns would be set in the water with fenders protecting them from river traffic. In this case, however, no columns would go in the water and the bridge would be supported by piers built on land only. This was due to Coast Guard regulations for safety and navigation, and for reduced maintenance costs.

"This meant that the unsupported length would require an innovative solution," said Ramon Sundquist, the district's engineer in charge of the project.

Innovations

The center section of the new Hobucken bridge (800 feet long and 65 feet above the waterway) was built using cast-in-place, post-tensioned cantilevered box girders.

Each "box" in the girders was built from concrete cast in place, and measured 15.5 feet long. Twenty-two box girders were placed atop each support, forming a hollow box-like structure shaped like a "T." Each "arm" of the "T" extends 200 feet from the column, forming a 400-foot clear center span.

To balance the construction, each element was alternately cast, first one side then the other, as the center section took shape and reached over water. As each section of the concrete had cured, the cables were stretched with a hydraulic system to compress the section and give the concrete more strength.

"Imagine that you're strapping a line of matchboxes together with rubber bands," said Sundquist. "For the first two you use two rubber bands. To strap on the third you use two more rubber bands, for the fourth two more, and so on. By the time you get to the last matchbox, you've used a lot of rubber bands. The last bands are under a lot of tension, and the whole line of matchboxes is pretty strong."

"That's basically what we did with this bridge, but we did it with internal cables," Sundquist said. "There's about 200,000 pounds of steel cable in that bridge, and it's under so much tension that the last cables we put in stretched about 30 inches."

When the two "T" structures were built up, a steel center piece 8.5 feet wide closed the bridge structure over the waterway. This milestone was originally scheduled for Jan. 15, 1998.

Once traffic is routed over the new project roadway and bridge, the contractor will remove the old swing-span bridge and related structures.

Partnering

According to Sundquist, the speed and nearly flawless execution of the project is a tribute to the success possible when everyone works to



The new bridge replaces this old steel swing-span bridge. (Photo courtesy of Wilmington District)

keep communication open.

The parties met for a two-day partnering seminar in May 1995, to discuss goals and plans. The meeting included representatives of the Corps, Coast Guard, the North Carolina Department of Transportation, the communities, and the contractor hired by the Corps — The Hardaway Company of Columbus, Ga.

"The outcome of this meeting was a charter that outlined our goals, and we signed a promise to try to achieve these," Sundquist said.

The goals included a commitment to minimize the project's environmental impact, to conduct all work safely, and to keep lines of communication open. In the end, the ultimate goal was a project well done, and a community that was happy with the results.

According to Sundquist, the speed of the project has been enhanced by no lost-time accidents for more than 540 days. There are also no outstanding claims by either the contractor or the Corps. And, despite 18 modifications to the project, the final price grew less than one-half of one percent.

"We all agree that the partnering has been the stronghold of the project," said Sundquist, who also served as administrative contracting officer for the needed modifications. "It's been an agreement that



Cast-in-place concrete boxes are the basic building block of the new bridge. (Photo courtesy of Wilmington District)

we all kept up, especially the open communications, so that as problems occurred, we tried to resolve them rather than pointing fingers.

"It's really a matter of establishing and maintaining trust, which can be one of the hardest things in a large project involving a contractor and the government," said Sundquist. "Sure, there were some heated moments, but as long as there was honest communication, we were always able to work things out."

Sundquist also said that he couldn't have done the job without

Roger Bullock, project engineer, and Gloria Cliff, their administrative assistant.

"The project has been fascinating and definitely a technical challenge," said Sundquist, pointing to the post-tensioned segmental box girder. "That was the main challenge, and it was interesting."

(Richard Scieford is a contract writer for Wordwright Communications in Wilmington, N.C. Bernard Tate of HQUSACE also contributed to this article.)



Deanne Strauser, a civil engineer in St. Louis District, demonstrates tension and compression to students at Sullivan, Mo., Elementary School. (Photo courtesy of St. Louis District)

Engineer, school kids build bridge

By Claude Strauser
St. Louis District

The engineers of the next century are in grade school today. How can we bridge the gap between the engineers of today and the engineers of tomorrow?

Deanne Strauser has found an effective and enjoyable way to bridge the gap. She and grade school children literally "build a bridge" — a real bridge. Strauser is the mother of two grade school boys, and is a civil engineer in the Ordnance and Technical Services Branch of the Engineering Division in St. Louis District.

On her own time, she goes into local elementary schools and teaches children how to build bridges. In many instances, this is the first formal contact the students have with the engineering profession.

The program's objective is to introduce children in kindergarten through fourth grade to how bridges are designed and built. The program was developed by Douglas R. Carroll, Ph.D., P.E., in the Department of Basic Engineering at the University of Missouri-Rolla.

The presentation begins by having the children work together to build a bridge. There are 29 major pieces of the bridge. For a typical grade school class that means each

student will get to put a major piece into the bridge.

Building the bridge starts with two floor beams connected by two truss members which makes a square on the floor. Other floor beams are then placed, making a two-foot-by-six-foot rectangle on the floor. Next, the trusses are erected, and then the lateral braces and decking are added. The completed bridge is six feet long and two feet wide. Chairs are used as abutments to raise the bridge off the floor. The children are told to imagine a river running under their bridge.

Next, the students are allowed to crawl across their bridge twice. It takes about 30 minutes to build the bridge and give everyone two opportunities to crawl across. The children are asked, "Do you think this bridge is strong enough for your teacher to crawl across?" Most teachers are willing to give it a try.

Up to this point there has been a lot of activity, which interests the students in learning more about bridges. This is when the lecture part of the presentation begins. First, the children learn to identify different types of bridges. Pictures are shown of some famous bridges from around the world. They identify stone arch, steel arch, truss, concrete girder, cable stayed, and suspension designs.

They are then introduced to the

concepts of tension (stretching the truss members) and compression (squeezing the truss members). The children are shown that some members in the trusses are in compression and some are in tension.

Chains are used to illustrate the concepts. The chains are very strong in tension, but weak in compression. First, one compression member is replaced with a chain. The children can see that the bridge will collapse under even a small load. Then a tension member is replaced with a chain and they can see that the bridge is still as strong as before.

After the lecture, the students are allowed one more chance to crawl across. This time the chain is used to give a "hands-on" feel to the forces generated in the truss members as the bridge is loaded. Then the children help take the bridge apart and pack it up. The entire presentation takes about an hour.

This program translates engineering concepts into a real-life physical experience that a child can understand and appreciate. And, more importantly, it creates a desire to learn more. Through programs such as this, today's children will become tomorrow's engineers.

(Claude Strauser is the chief of Potamology (the study of rivers) Section in St. Louis District. Deanne Strauser is his sister-in-law.)

Aurora helped win Cold War in less than a second

By Joseph Murphey
Fort Worth District

It simulated the end of the world by simulating nuclear explosions. They named it Aurora — “after the dawn.” It was a technological marvel born in the Cold War when the survival of people depended on the survival of machines if the unthinkable happened.

When defense planners decided to dismantle Aurora after determining it was no longer needed, they called the Cultural Resources Section of Fort Worth District’s Planning Division to evaluate its historical value, under the National Historic Preservation Act of 1966.

Vulnerable circuits

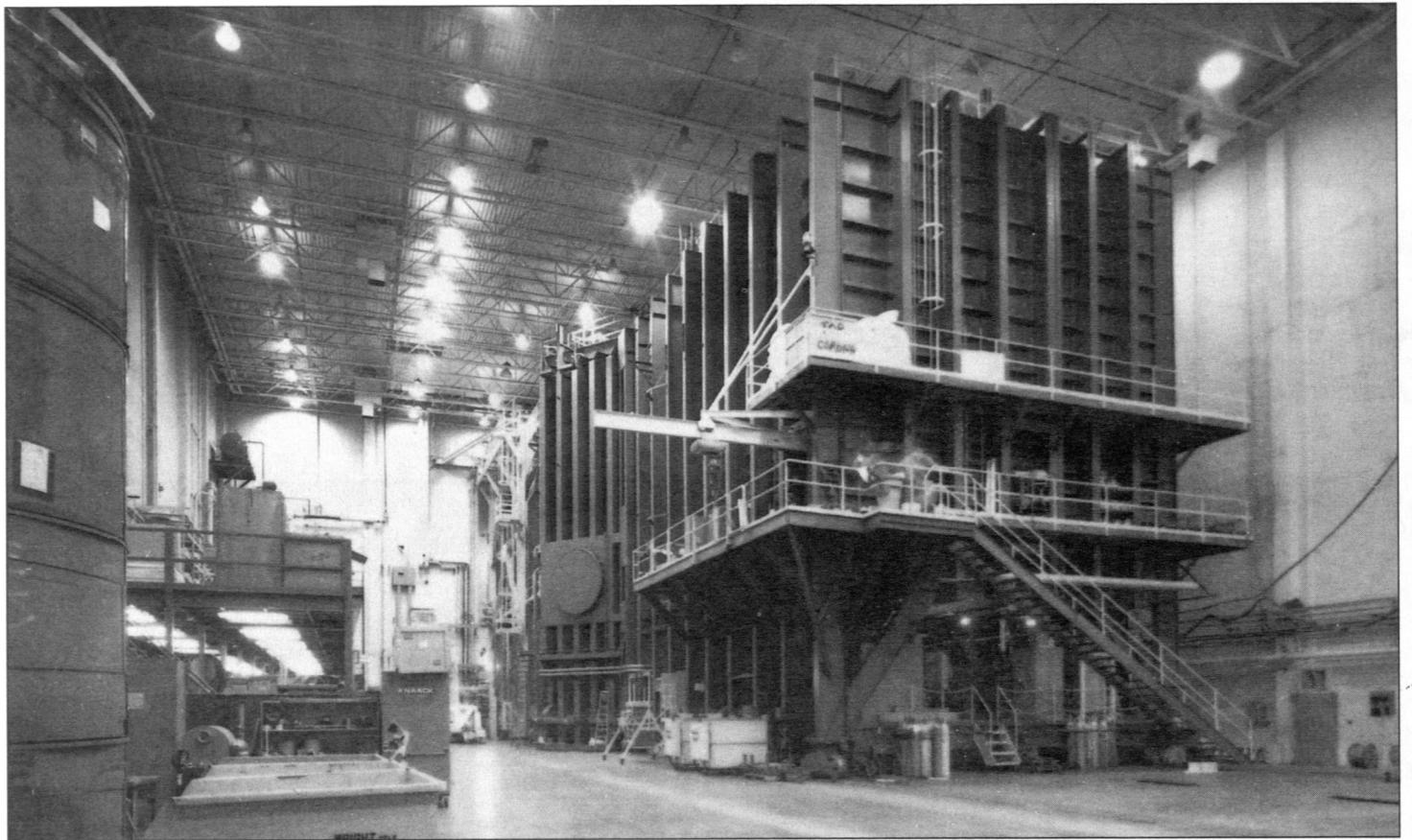
Built in 1972, the phased-pulse gamma ray simulator gave the Army a controlled, economical way to test the effects of the X-rays and gamma rays created in the first fraction of a second of a thermonuclear explosion.

During nuclear tests in the South Pacific in the late 1950s, defense planners learned that electronic circuits are even more vulnerable to radiation than flesh. The massive radiation from just a few Soviet nuclear warheads would wreak havoc with almost every electronic device in the U.S. Every television and radio would be fried. More importantly, so would the circuitry in military computers, satellites and missile guidance systems.

Without protection, victory would belong to the nation that struck first. Previous wars were fought in years, but World War III might be decided in nanoseconds (a billionth of a second). Aurora was needed to help us design electronic circuits which could withstand nuclear radiation.

Historic value

Fort Worth’s cultural resource personnel are experts in assessing exotic Cold War relics such as missile silos and biological weapon factories. They found Aurora an



Aurora was a phased-pulse gamma ray simulator that stood seven stories tall and weighed 7,000 tons. (Photo courtesy of Fort Worth District)

excellent example of a military property that displayed typical characteristics of the Cold War — secrecy, high technology and coping with the threat of nuclear weapons.

Because of Aurora’s enormous size, they decided to document it for the National Archives as a historic property, rather than preserve it as a Cold War artifact. During a 10-month period, the architectural plans, along with photographs, oral histories of key scientists, and a written narrative, were produced to tell Aurora’s story in a format that addressed laymen and scholars alike.

Raw power

Aurora was essentially the world’s largest X-ray machine — six stories tall, half a football field long, and 7,000 tons of high technology sitting on rails in a concrete bunker at the Army Research Laboratory (ARL) in Adelphi, Md.

The science to make Aurora work was at the forefront of the particle physics field, and everything was built on a big scale. A million-gallon oil-filled tank was crammed full of capacitors. These capacitors stored 20 times the electrical generating capacity of the entire U.S. When fired, they released a burst of energy at the speed of light through four separate firing tubes, and down aluminum tentacles four feet wide.

These tentacles reached into a 3,000 square-foot test chamber. Each 150-nanosecond burst of energy sounded like a lightning-strike and delivered 10,000 times the radiation it would take to kill a man, although living things were never tested in Aurora.

Protection

Like medical X-rays, the test area was safe the instant the test firing was over. Ironically, the tomb-like test chamber was a major fallout shelter for ARL. It was an ideal place to be during a nuclear war for the same reasons it was not the place to be during a test. Steel plates lined the chamber’s 12-foot-thick reinforced concrete walls, and a gigantic 30-ton steel door contained the deadly flash.

Targets

Aurora could fire twice a day. After each firing, civilian and military scientists in white lab coats scurried about inside the chamber preparing for the next test shot.

During tests, the chamber held gadgets best kept under a cloak of secrecy. Sometimes even the operators did not know what they were testing. Entire satellites were rolled through the big steel door, which just happened to be the same size as the payload doors on the space shuttle. Small components the size of a hand were positioned on a cart containing a special material created to focus the energy on the component tested. The scientists called the material “flubber” after the Disney movie about a material with magical properties.

Soviet shortfall

Aurora was a simple idea, yet profoundly complex to execute. So complex, in fact, that the Soviets could not match the technology it took to build Aurora. The key lay in 20-foot-diameter plastic rings that acted as insulators during the firing. The high-tech manufactur-

ing required to produce the special rings eluded Soviet scientists and was a milestone in the technology race of the Cold War.

The Soviets went broke trying to do what Aurora did. They spent about \$75 million per shot to detonate real H-bombs to test their weapons, while America did it for under \$10,000 for each test. The Cold War was won, not by missiles, but by dollars.

While the things that Aurora tested were top secret, Aurora itself was widely known in the particle physics community. America wanted the Soviets to know that we were working to protect the integrity of the machines we rely on for national defense. Carefully composed photographs were included in articles occasionally appearing in various professional trade publications throughout the years.

Sunset

The sun finally set on Aurora at 10:53 a.m. on Sept. 27, 1995 when it fired shot number 9,113, after 23 years of winning the Cold War. The final entry in the log book read, “Aurora, you served your country well.”

Incredibly, 9,113 firings, multiplied by 150 nanoseconds, adds up to a total operating time of less than a thousandth of a second.

Aurora was cut into tiny pieces of scrap to be made into anything from bridges to plowshares. The plastic rings that eluded the Soviet scientists were broken up with a sledge hammer and unceremoniously tossed into a dumpster. The bunker was converted into offices for Army planners who are now working on the challenges of military preparedness in the post-Cold War era.

Corps investigates Civil War battle site

By Dr. Kenneth Ashworth
New Orleans District

Someone once said that if you want to be a Civil War archeologist in the South, just go in the back yard and turn over a rock. Traces of the war are almost that common, and Corps of Engineers construction projects sometimes bump into them. Recently New Orleans District has been investigating Springfield Landing.

The landing, on the east bank of the Mississippi River above Baton Rouge, was a primary Union staging and supply center for the 1863 siege of Port Hudson. Control of Port Hudson meant control of the Mississippi — important to both Union and Confederate strategists.

Since 1994, the district has conducted test excavations at Springfield Landing because it is close to the proposed Comite River Diversion Channel Project in East Baton Rouge Parish. Comite River overflows have caused serious flooding in Baton Rouge. The project will divert floods to the Mississippi River through a series of structures and a diversion

channel.

The National Historic Preservation Act requires federal agencies to consider how proposed projects will affect cultural resources. The act requires federal agencies to conduct background research and field investigations to identify and inventory cultural resource sites.

In this case, plans indicated that the west end of the project was close to where historic maps and records place the landing. Since 19th century maps also show the riverbank there hasn't changed much in the past 100 years, it appeared likely that evidence of the landing might still exist.

In 1863, New Orleans and Baton Rouge surrendered to the Union army, which then turned to Vicksburg. To disrupt Union advances up the Mississippi, the Confederates fortified Port Hudson and the bluffs above the river. They hoped to maintain control of the Mississippi and Red rivers and prevent Union forces in Louisiana from linking up with Grant's forces at Vicksburg.

Federal troops departed Baton

Rouge for Port Hudson on March 13, accompanied by Admiral David Farragut's naval forces. The following day, Union gunboats opened fire on Port Hudson's fortifications. The resulting naval engagement proved disastrous for the Union. One vessel was sunk and three others seriously disabled. Several skirmishes occurred on land, but after the naval battle was lost, the troops returned to Baton Rouge.

On May 14, three divisions of Union troops moved on Port Hudson. One of the divisions disembarked at Springfield Landing and moved into position across the southeastern portion of the Confederate line.

The first major assault on the Confederate earthworks did not occur until May 27. This and later assaults failed to dislodge the Confederates. However, following the surrender of Vicksburg on July 4, Port Hudson was no longer strategically important. The Confederates surrendered on July 9, ending the 48-day siege.

Throughout the Port Hudson campaign, Springfield Landing served as the primary resupply and storage terminal for the siege. On one occasion, Confederate cavalry raided the landing and burned millions of dollars

worth of supplies. Nonetheless, Federal troops remained in control of the landing throughout the campaign.

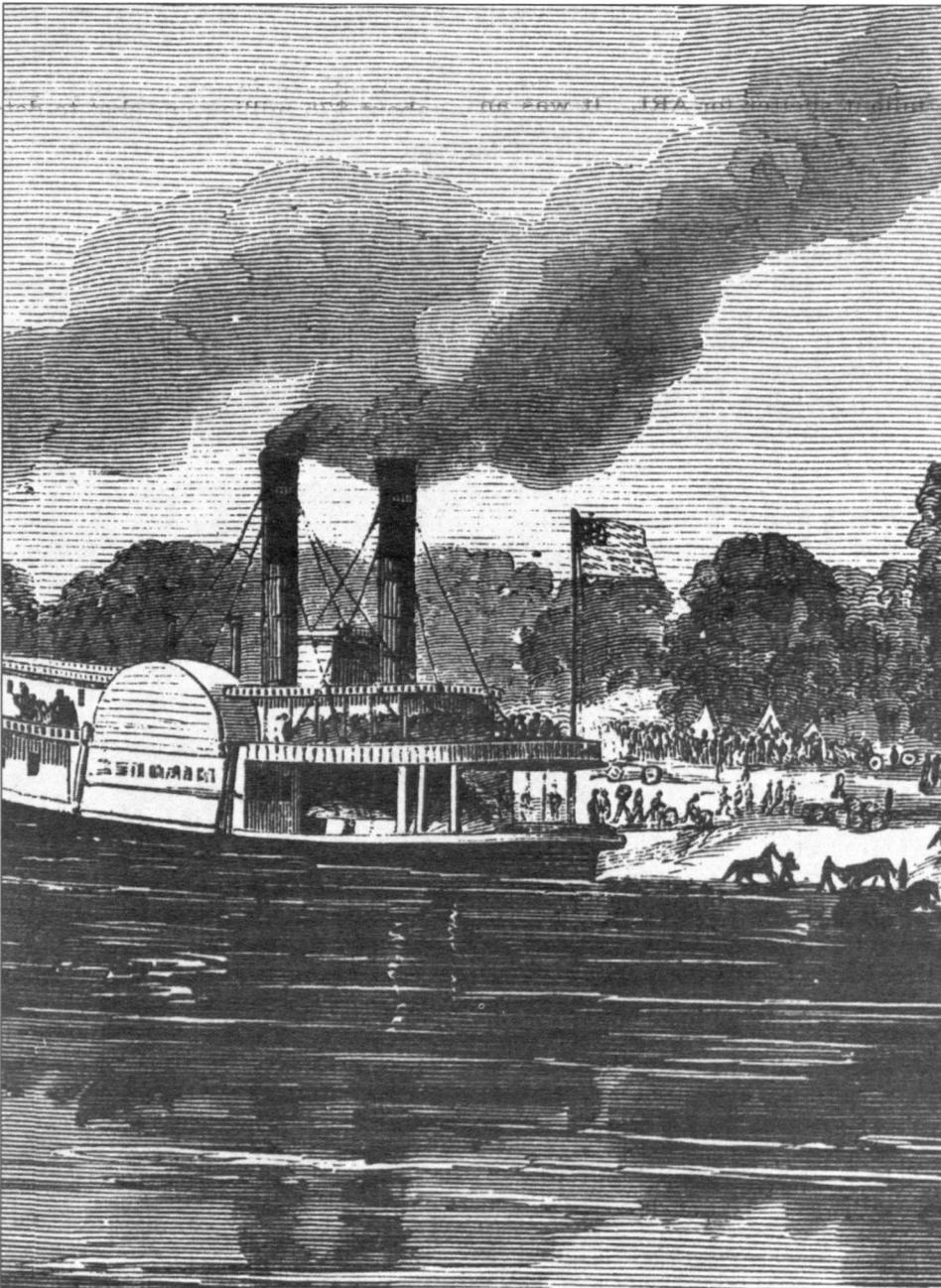
District archeologists have interviewed local collectors, confirming that Civil War artifacts have been found close to the Comite project right-of-way. For this reason, district archeologists have performed a reconnaissance survey to locate evidence of the landing. This investigation found several Federal canteens, a kepi badge (a kepi was a cloth hat with a bill), and assorted campfire irons south of the right-of-way.

Additionally, a significant amount of charcoal and burned earth was observed in a wide area. While we can only speculate, the extensive burning may be associated with the Confederate cavalry raid and the burning of Federal supplies.

Archeologists from R. Christopher Goodwin and Associates (one of three professional contractors used by Planning Division to conduct cultural resource field investigations) were hired to excavate a series of backhoe trenches in the Comite project right-of-way to search for archeological materials. As a result of this investigation, we determined that no portion of Springfield Landing exists in the project right-of-way.

"We didn't find a great preponderance of evidence, but we did find tent platforms on the edge of the riverbank and a wonderful Civil War canteen," said Ann Markell, an archeologist with Goodwin and Associates. "There's been a lot of erosion, as much as 1,000 feet of bank may have eroded, which makes these findings significant. People were never really sure of the landing's location, but we found enough evidence to determine the landing was there."

(Dr. Kenneth Ashworth is an archeologist with the Planning Division, Environmental Analysis Branch, in Vicksburg District.)



(Left) An 1863 etching shows Springfield landing during the siege of Port Hudson. (Right) This is one in a series of backhoe trenches that were dug along the Mississippi River. (Photos courtesy of New Orleans District)



A rusted canteen found at the site. (Photo courtesy of New Orleans District)



Jacksonville business goes Caribbean

By Christina Plunkett
Jacksonville District

The word is out that Jacksonville is the Caribbean district. Recently, Jacksonville District made its presence known in both Haiti and Jamaica. Venturing into the Caribbean area could open new Support For Others (SFO) frontiers for the district and the Corps of Engineers.

Jacksonville District environmental engineers are scheduled to visit Port-au-Prince, Haiti, early this month to obtain field information to develop an environmental assessment required for future dredging of the city's harbor. This new work follows Jacksonville District's first SFO Program project in Haiti. That project, completed last November, used the district's surveying expertise to assist the U.S. Atlantic Command (USACOM).

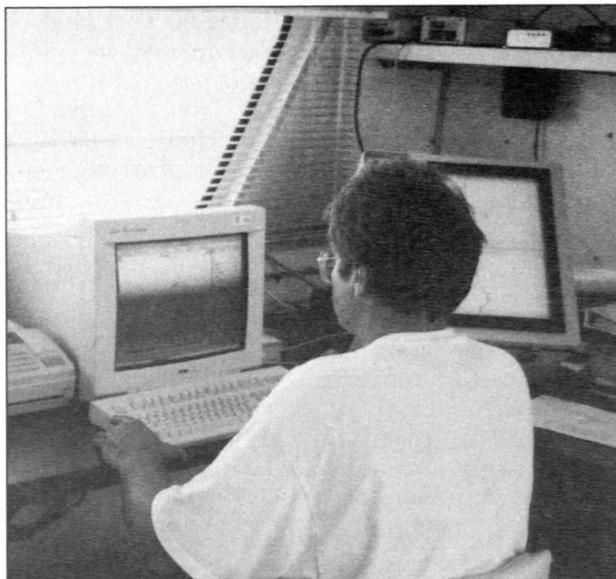
Because USACOM is a water-borne command, such work would normally be performed by the Naval Facilities Command (NAVFAC), but NAVFAC lacked the necessary sophisticated equipment. When USACOM called SFO Branch Chief Jim Boone and asked for help, Boone saw it as both welcome new work and an honor to support U.S. troops in Haiti.

"It was not a surprise to receive a call from USACOM, since Jacksonville District has been nurturing a relationship with them for more than two years," said Boone. "I knew it was only a matter of time before our SFO Program would extend to Haiti."

In this instance, the Corps was asked to perform hydrographic surveys of Port-au-Prince Harbor's channel conditions. U.S. vessels navigating through the area since Operation Uphold Democracy have relied on surveys dating back to the 1970s.

When Boone got the call from USACOM, Jacksonville District's survey boat, the *Florida*, was surveying the St. Johns River in northeast Florida. One of the Corps' primary missions is to support the military in combat and peace, so the USACOM request became a top priority.

Immediately work began to mobilize the survey boat to Haiti. A four-person crew scrambled to complete the paperwork, and departed on a familiar



Survey technician William Rentz Jr. checks the computer-generated survey program which records channel information on Port-Au-Prince Harbor. The information is being plotted by the fathometer at right. (Photo courtesy of Jacksonville District)

mission to an unfamiliar place for the Corps.

To expedite the mission, the crew slept and worked aboard the *Florida*. Their state-of-the-art survey equipment made it possible to provide the hydrographic reports quickly and precisely, along with navigation charts showing plotted points of significant areas. In just a week they successfully accomplished their main goal, and found time to train members of the Haitian port authority and the U.S. military, and even assisted the U.S. Coast Guard in locating sea buoys.

In spite of tropical storms and rough seas, the Jacksonville crew got the job done on time.

Although the district's SFO program is thriving, marketing SFO throughout Florida and the Caribbean is a goal for Boone. Jacksonville District's quick response to USACOM's request accomplished more than supporting U.S. troops. It also established a working relationship with USACOM, and Jacksonville District now gives USACOM envi-

ronmental assessment support in the same area.

Another opportunity to make the district's SFO capabilities known in the Caribbean occurred at an international symposium in Jamaica. Ron Hilton, chief of the Hydrology and Hydraulics Branch, and Dr. Emilio Colon, project manager for the Antilles office, attended the "International Symposium on Hydrology in the Humid Tropic Environment" at Kingston.

The symposium was convened by the International Association of Hydrological Sciences; the Latin America/Caribbean Region of United Nations Educational, Scientific and Cultural Organization; and the Water Resources Authority of Jamaica. It brought together international specialists, scientists, engineers and water managers to exchange experiences and theories on hydrology, the environment, conflicts, and solutions in the tropics.

"This symposium provided another opportunity for the Corps to support and get to know our Caribbean and Latin American customers," Boone said.

With representatives from 19 countries at the symposium, it seemed that Corps participation might further enhance the reputation of the district's SFO program in the Caribbean. And that is what occurred. The Port Authority of Jamaica is now considering the district's SFO team to do ship simulator studies for port development in Kingston Harbor. If the Jacksonville District gets this project, it will be the first work the Corps has done in Jamaica.

While in Jamaica, Hilton and Colon met with Capt. Hopeton DeLisser, Vice President of Harbours and Port Services for the Jamaican Port Authority. They briefed DeLisser on Jacksonville District and Waterways Experiment Station capabilities, and gave him a draft Memorandum of Agreement signed by the Minister of Water and Transport of Jamaica and the Department of the Army. The authority document is "on-hand" in case DeLisser chooses to work with the Corps.

Also during the Jamaica trip, Hilton attended a seminar on the International Hydrological Program where 30 representatives from 13 countries examined surface and ground water resources of the Caribbean.

Drillers brave a sea of mud

Article and Photo
By Jim Pogue
Memphis District

It's a deafening 10-minute ride, clinging to the back of a slow-moving piece of heavy equipment just to get to your work site. Once there, you try to move around and your boots sink into the mud up over your ankles. You have to keep a wood-fire burning to help you do your job, and hopefully provide a little warmth.

Sound like pretty miserable work? It's just another day for crew leader Louis Dyche, Richard Mann, and Johnnie Combs, the men of Memphis District's geotechnical drill crew.

"It rained all day and all night, and we got about four inches all together, but it takes more than that to stop us," said Dyche as he and his men tromped through what seemed to be a sea of mud.

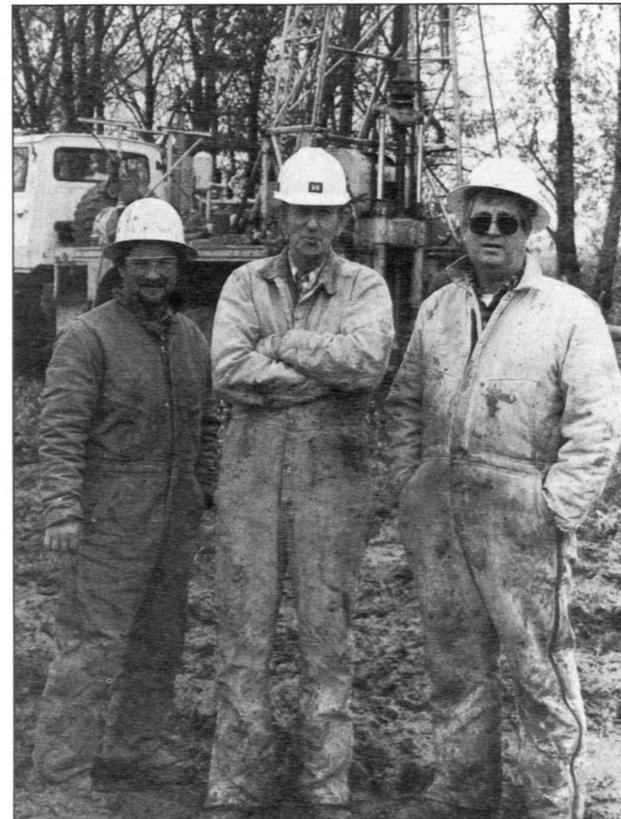
The crew was taking soil samples for work at St. Johns Bayou Main Ditch in Southeastern Missouri. Their work will allow the Corps to enlarge and realign an important flood control ditch near New Madrid, Mo., that helps protect the city of East Prairie, Mo. The work is part of the East Prairie phase of the St. Johns Bayou-New Madrid Floodway project.

The process involves boring down into the ground with the truck-mounted drill rig, and retrieving samples. The samples are taken back to the Soils Lab in Memphis for analysis.

"Sometimes our holes go deeper than 200 feet," Dyche said. "This one is going to about 70 feet. It takes us about one full day to drill that much. We take a sample every three feet when we're drilling through clays, and about every five feet when we're going through sands."

The importance of the work the men on our drill crew do can't be overestimated. "All of our design begins here with these guys — levees, revetments, bridges, you name it," said project engineer Darian Chasteen. "If we don't get high-quality samples, our designs may not be any good."

In spite of the conditions they work in — cold and wet of winter, and heat and humidity of summer — Dyche and his men say they enjoy their jobs. Dyche has worked for Memphis District for 24 years, and in private industry for 13 years before that. "The biggest change I've seen in that time is that the work we used to do with five or six people, we now do with three," Dyche said. "We're doing the same work with the same effort. Now, we're just doing it smarter."



Richard Mann, Louis Dyche, and Johnnie Combs are proud of the work they do for Memphis District.

Around the Corps

Corps vision progress

On Feb. 14, the Chief of Engineers announced a Corps vision and strategic plan to accomplish the vision. Deputy commander Maj. Gen. Albert J. Genetti is spearheading implementation efforts in headquarters and throughout the Corps, and he sees the plan's congruity as the key to its success.

"In the past, we have not had one strategy for the entire Corps; we've had 38 or 40 all patterned after one, but we weren't focused on one," Genetti said. "And I think that's the big difference in this plan. The other big difference is in the implementation process itself, which is much more interactive."

Since Feb. 14, eight headquarters implementation teams formed and met frequently to pull together the headquarters campaign plan, released March 14. (You can access it electronically off the Corps' homepage at <http://www.usace.army.mil>).

Headquarters teams are now focused on developing more specific action plans, with the goal to have them complete and posted on the web by Apr. 14. Also on Apr. 14, divisions will have their campaign plans ready, while districts will have campaign plans ready on May 14.

Interpretive award

Walla Walla District's interpretive program recently received two national-level awards for excellence from the National Association for Interpretation (NAI).

The natural resources staff at McNary Lock and Dam received a second place in the "Interpretive Skills Training" category for the *McNary Training Manual for Interpreters*. Park rangers and guides use the manual during their training when they arrive at McNary Dam and Lake Wal-lula, near Umatilla, Ore. The manual gives them background on the organization's natural and manmade resources, and the fundamentals of interpretation.

The district also received a third place in the "Exhibits" category for its Traveling Columbia and Snake River Waterway Interactive Navigation Exhibit.

"The task force developed the portable display which was built for us by a contractor," said Dave Dankel, chairman of the district's interpretive task force. "The purpose of this exhibit is to stimulate interest in and build appreciation for navigation on the Columbia and Snake river system and emphasize the role this has played in the development of the Northwest."

Permit violator prosecuted

Score one for the Yuma clapper rail, an endangered bird populating wetlands in California and Arizona.

The Corps of Engineers stepped in when a developer destroyed clapper rail habitat by clearing wetland vegetation from Colorado River banks, then dumping the material in the water. The

Corps, through the U.S. Attorney's Office, prosecuted the violator and received a \$65,000 judgment from the U.S. District Court.

The defendant, Dan Riley, was charged with dumping pollutants into the Colorado River and its adjacent wetlands without a permit. The court's penalty took into account that Riley ignored repeated requests by the Corps to cease the unauthorized work at Rio Loco and Glades Hidden Valley developments.

Best audit office

The Audit Office of the Engineering and Support Center, Huntsville, was recently named the best small audit office in the Army for fiscal year 1996 (FY96).

The Internal Review Award of Excellence recognizes Army internal review offices which provide outstanding auditing service to their commands.

The team distinguished themselves by demonstrating significant value to the command. For example, the office generated savings of more than \$6 million with 18 audit reports during FY96.

The staff was also recognized for helping develop Huntsville Center's new management philosophy, which is centered on the Army Performance Improvement Criteria.

Navigation innovations

By 2000, more than half of the lock structures in the nation will have reached or exceeded their design life, yet current budget constraints limit construction of new locks.

In response, a new civil works research program called Innovations for Navigation Projects (INP) is scheduled to start in fiscal year 1998. INP will investigate innovations to reduce construction costs without exposing users to poor service or hazardous conditions.

Eleven navigation projects at an estimated construction cost of \$9 billion are currently proposed for construction or replacement. In 1992, a Corps task force was formed to identify new technologies and methods building navigation projects. It identified numerous concepts with the potential for more efficient construction and with the potential of saving about \$1.5 billion for the proposed projects.

In 1994, a Regional Navigation Design Team with members from North Central, Ohio River, and Lower Mississippi Valley divisions was formed to implement task force recommendations.

As part of the development plan, a workshop was held in December at the Waterways Experiment Station (WES) to identify the needs of Corps personnel who are implementing some of the proposed concepts. A follow-up meeting will be held at WES April 30-May 1 to review and recommend proposed research.

A significant goal of the program will be to get the research results to the field quickly and in an easily-accessible manner. Methods will include newsletters, interim reports, seminars, and over the Internet.

Some of the innovations being considered include float-in modules, in-the-wet construction, precast stay-in-place formwork, and non-traditional materials such as lightweight material for float-in construction and high-strength material for lift-in designs.

Implementing the new technologies could reduce the cost of future navigation improvements by 15 percent without decreasing the system's reliability.

Deer fed at Chief Joseph Dam

Article and Photo
By Judy Perkins
Seattle District

An abnormally harsh winter has driven deer herds to lower elevations near the town of Bridgeport, Wash., including one herd that is making its home on the terrace just below Chief Joseph Dam.

Thirty-seven inches of snow fell in December, followed by rain and freezing temperatures that turned the powder into a ground-cover resembling concrete. With normal winter feed unreachable, deer resorted to haystacks, orchards, and landscaping trees and shrubs in town, much to the annoyance of some property owners.

Although winter naturally takes its toll on deer herds, this year's extreme conditions threatened to decimate the population. This, combined with pressure from local residents, led the Washington Department of Wildlife to begin a supplemental feeding program for the deer.

Department of Wildlife set up feeders below Chief Joseph Dam to provide meals for about 100 deer who are also enjoying the shelter of nearby trees for bedding. The animals are eating about 500 pounds of feed daily — high energy pellets made from alfalfa, corn, barley, and nutrient supplements.

The dam's wildlife biologist, Bob Fischer, has been coordinating much of the effort. He and other project employees have been keeping the feeders full during the week, and project volunteers are taking over feeder duty on weekends. Feeding will continue until natural vegetation becomes available, probably sometime in April.

In the meantime, employees and visitors are enjoying the opportunity to watch the deer up close. Visitors have good viewing opportunities from the project entrance road and often line the road armed with binoculars.

Employees can frequently look up from their



A deer enjoys a feeding station set up near Chief Joseph Dam by the Washington Department of Wildlife.

work to find inquisitive deer peering in the window or browsing on shrubs nearby. The deer seem to be enjoying their winter accommodations at Chief Joseph Dam, courtesy of the Corps of Engineers and Washington Department of Wildlife.

(Judy Perkins is a ranger at Chief Joseph Dam.)

Flood

Continued from page 1

for technical assistance in Ohio. The district provided:

- Eight damage survey report inspectors and three environmental engineers to evaluate water and wastewater treatment facilities.
- Two inspectors to evaluate damage in parks belonging to the Ohio Department of Natural Resources.
- One person to work with the Ohio Department of Education to evaluate damage to schools.
- Two real estate specialists to clear mobile homes and establish temporary housing.
- A team of three engineers, a real estate specialist and contracting officer for a mobile home and debris removal mission.

Louisville District

More than 11 inches fell in the Louisville area in 24 hours. Louisville District opened an emergency operations center (EOC) in Louisville, sent people to the state EOC in Frankfort, Ky., and the FEMA field office in Indianapolis.

Flood damages were estimated at \$230 million. In Jefferson County where Louisville is located, 40,000-50,000 homes were affected.

FEMA gave several missions to the Corps. The district received a \$10 million temporary housing mission, a \$1 million debris removal mission, and \$350,000 for Preliminary Damage Assessment and Damage Survey Reports. The Corps contracted for 100 trailers for temporary housing in Falmouth, Ky., where flashfloods destroyed part of the town. Another mission had Corps contractors removing debris from the right-of-way in Butler County.

The district has 20 flood control reservoirs to retain flood waters, which lowered flood levels about six feet in Louisville. Two Kentucky lake projects showed a massive rise in storage levels. In 24 hours, Taylorsville Lake rose 22.56 feet and Rough River Lake rose 24.1 feet. Taylorsville Lake reached a record pool of 586.1.

The Metropolitan Sewer District serving Louisville and Jefferson County closed most of its floodwall gates. Buckhorn Lake personnel provided ferry services for citizens.

The access road to the Louisville Repair Station and Louisville Gas and Electric were flooded, so the Corps provided ferry service to and from Shipping Port Island.

Locking operations at Ohio River locks and dams at Markland, McAlpine, Cannelton, Newburgh, J.T. Myers, Golconda and Smithland were suspended due to the floods.

Construction at Olmsted Locks and Dam was halted. The district did a controlled rewatering at the Olmsted construction site to prevent flood damage. This rewatering may delay construction about three

months.

Throughout the disaster and recovery period, the district's EOC received more than 4,250 telephone inquiries from the media and others wanting information. The EOC operated 24 hours a day, seven days a week starting March 1 and continued until all regions of the Ohio River had crested.

ORD is computing the benefit of their reservoirs and local protection projects. The estimate of damage prevented for Cincinnati alone is more than \$106 million.

Memphis District

Two weeks after the floods hit ORD, they reached LMVD. Even with the Mississippi barreling south at 10.6 million gallons per second, New Orleans and nearby communities still had their hands full.

Where the Ohio and Mississippi rivers join near Cairo is a major bottleneck. The gauge at Cairo topped the 44-foot floodstage mark on March 1, and climbed until it reached 56.2 feet on March 11.

On March 3, floodfighters from Memphis District headed north. They set up field offices in Cairo; Caruthersville, Mo.; and Dyersburg, Tenn. More than 50 people were soon in the field. Their first job was to monitor the federal flood control works — levees, flood walls, and pumping stations.

They also contacted local officials, offering technical assistance and supplies. The Corps provides portable pumps and hoses, sandbags, and plastic sheeting to protect levees from wave wash.

One of the district's greatest concerns was possibly operating the Birds Point-New Madrid Floodway. The floodway is a 200-square-mile area circled by a frontline levee along the Mississippi River, and a setback levee several miles west. If the Cairo gauge reaches 62 feet and continues rising, the emergency plan calls for the Corps to cut 1,000-foot gaps in the front levee to divert water into the floodway.

It has only been operated once, in 1937. Today, unlike 1937, more than 1,000 people live on farmland in the floodway. Preliminary work for cutting the levee had begun, but the rise of water slowed and emergency managers stood down from the plan.

New Orleans District

With the nod from Maj. Gen. Robert Flowers, president of the Mississippi River Commission and LMVD commander, New Orleans District opened the Bonnet Carré Spillway on March 17 for the first time in 14 years.

Bonnet Carré was designed to pass 250,000 cubic feet of water per second (cfs), diverting floods



Ripley, Ohio, is inundated by the flood. (Photo courtesy of Huntington District)

through Lake Pontchartrain into the Gulf of Mexico and lowering stages on the Mississippi at New Orleans to acceptable levels.

The Bonnet Carré Spillway, the southern-most floodway in the Mississippi River and Tributaries system, has historically been the first floodway in the Lower Mississippi River Valley opened during floods.

The district's hydraulic engineers rely on discharge and gauge readings at Red River Landing, about 200 miles above New Orleans, to determine when to open the spillway. The discharge takes two days to reach the city from the landing. As flows increase, bays are opened at Bonnet Carré to divert them.

The district has opened 298 bays since March 17. About 240,000 cfs were being channeled at the end of March from the Mississippi into the spillway.

Diverted river water will impact Lake Pontchartrain and adjoining Maurepas and Borgne lakes. District biologists are studying the situation. It is expected to benefit the crawfish harvest in the spillway and the white shrimp harvest in the lake. Spillway flows will also provide needed nutrients to the coastal marshes, and above-average yields of shrimp and oysters are expected next year.

Opening the Bonnet Carré was just one action taken by the district. Inspection teams mobilized on March 11, patrolling 961 miles of levees in the district. They looked for erosion, seepage, and overtopping.

Projected river crests along the Mississippi and Atchafalaya rivers caused concern. The district awarded an emergency contract to raise a 4,500-foot stretch of levee about 40 miles below Baton Rouge at Marchand, and advised Baton Rouge officials to construct a three-foot sandbag ridge on 500 feet of levee protecting downtown.

To the west, the Atchafalaya River also threatened to flood Morgan City, Berwick, and Stephenville. Louisiana Gov. Mike Foster requested assistance and the Corps

provided sandbags, sand, crushed stone, riprap, barges and pumps.

Another threat occurred at the maximum-security Angola State Prison northwest of Baton Rouge. Non-federal levees around the prison were being undermined by more than 90 sandboils, one more than 10 feet in diameter. A district team provided guidance and technical expertise while prison inmates built seepage relief berms and piled sandbags in rings around the sandboils.

Vicksburg District

In Vicksburg District, the Corps is mostly in an advisory role, said Michael Logue, public affairs officer.

"Even though we've got record stages approaching the 1927 flood on some parts of the river, there's no problem with the flood control system," Logue said. "It's so stable the local officials are able to handle the flood."

According to Logue, the district advised the levee boards, parish officials, and citizens on flood-fight techniques and management, and water control issues. They also responded to requests for flood-fight materials like sandbags and pumps, and worked with the levee boards and civil defense to establish a public information network.

But district people still did some hands-on work like 24-hour levee patrols. When slides or sandboils appear, the patrol reports them to the Fifth Louisiana Levee District which manages the problem.

Global Positioning System units in vehicles allows patrols to pinpoint the problem within a few meters, type a message on the unit, and send the information automatically to the home office.

(Contributors to this article were Todd Hornback, Louisville District; Cathy Schuchter, Ohio River Division; Steve Wright, Huntington District; Julie Aitken, New Orleans District; Jim Pogue, Memphis District; Karen Magruder, Vicksburg District, and Bernard Tate, HQUSACE.)