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Cold Regions Research and Engineering Lab

Scientists participate in Arctic study

By Don Perovich
CRREL

A major scientific research project is underway in the Arctic Ocean, and scientists from the Cold Regions Research Engineering Laboratory (CRREL) are taking an active part in it.

The Arctic Ocean is a region of environmental extremes. In the winter there are months of darkness with temperatures as cold as minus 60 degrees Fahrenheit. Even during summer, when the sun never sets, temperatures seldom rise above 32 degrees. The ocean freezes under these harsh conditions, forming sea ice. This floating ice cover is in constant motion, driven by wind and ocean currents. On average, the ice is 10 feet thick, but ranges from as thin as a few inches to as thick as 100 feet.

On October 2, the Canadian Coast Guard icebreaker *Des Groseilliers* was deliberately frozen into this icy realm 900 miles from the North Pole. It will stay frozen in the Arctic Ocean for one year, serving as the base of operations for "Ice Station SHEBA."

SHEBA is a scientific research program studying the **S**urface **HE**at **B**udget of the **A**rctic Ocean, sponsored by the National Science Foundation (NSF) and the Office of Naval Research. It is the largest Arctic experiment ever funded by NSF, with a budget of nearly $20 million from 1997 to 2000.

The goal of SHEBA is to improve computer models of present-day and future climates by studying the Arctic sea ice. Current climate models differ -- some models predict that a doubling of carbon dioxide in the atmosphere could melt the Arctic ice cap in five decades. Others forecast less severe consequences. But all models agree on one point -- the Arctic sea ice will play an important role in climate change. SHEBA's mission is to find out what that role will be.

SHEBA will examine the melting and freezing of Arctic sea ice through field observations and theoretical modeling. The centerpiece of the observational program is the year-long field experiment at Ice Station SHEBA that started last October and will continue until next October.

This is the first time in more than 20 years the U.S. has operated a station in the Arctic pack ice for an entire year. Ice Station SHEBA allows researchers a rare opportunity to study the seasonal changes in the ice cover from winter through fall. More than 70 scientists from universities and government research laboratories will participate in SHEBA.

Sunlight and clouds are two topics of particular interest. Sunlight drives the summer melting of the ice pack and can thin the ice by one to two feet. The role of clouds is more complicated. Clouds shade the ice from sunlight, cooling the surface. But they also trap heat which warms the surface. SHEBA hopes to determine which effect is stronger.

Six scientists from CRREL were aboard the *Des Groseilliers* from mid-September to early November during the SHEBA deployment. Ed Andreas and Kerry Claffey helped build a 60-foot meteorology tower being used to study the temperature, humidity, and windspeed of the air near the ice surface.

This tower is the largest of its kind ever built on pack ice. It rests on a foundation of telephone poles frozen five feet deep in the ice. Observations made from this tower will help clarify how heat is transferred between the air and the ice.

The "CRREL Ice Team" (myself, Jackie Richter-Menge, Bill Bosworth, and Bruce Elder), initiated studies of the sea ice cover. We drilled more than 300 holes in the ice to install equipment that will monitor changes in the thickness during the year. We also made thousands of measurements of snow depth.

While the focus of SHEBA is on melting and freezing, the ice motion is also important. On Halloween, Ice Station SHEBA got a reminder that sea ice is in constant motion. A crack in the ice opened right through where the *Des Groseilliers* was moored and it began to drift away from the science huts on the ice.

Above, a crack in the ice has opened near the ship. Arctic ice is in constant motion. At left, the Corps scientists at SHEBA: (l-r) Bill Bosworth, Ed Andreas, Kerry Claffey, Jackie Richter-Menge, Don Perovich and Bruce Elder. This Corps flag has been on 11 Arctic expeditions, including to the North Pole. (Top photo by Don Perovich, left photo by A. Blouw.)

Quick thinking and some tugging by a bulldozer kept the ship and the ice camp together. CRREL instruments measured forces inside the ice during this event.

There will be CRREL people at Ice Station SHEBA for the entire year. All six of the deployment phase group will return at various times. John Govoni and Roy Belyea will each do tours at Ice Station SHEBA during the Arctic night from November through March. In the spring, Terry Tucker, Matthew Sturm, and Jon Holmgren will travel by snow machine and helicopter to study the ice and snow. The summer work will investigate the connection between sunlight and ice melting.

SHEBA represents a once-in-a-lifetime opportunity and CRREL researchers are sharing the experience. The data collected by CRREL scientists interest the modeling community, and collaborations have begun to ensure that climate models benefit from these observations.

Besides their research, CRREL scientists are involved in educational programs to bring SHEBA to local elementary and secondary schools. One joint experiment is comparing temperatures at Ice Station SHEBA to those in Hanover, N.H., where CRREL is located. There may be days when it is colder in Hanover than at the ice station. Another experiment is examining what causes ice to melt. These educational activities will continue throughout the year.

Vision commentary

*(**Editor's note:** This is third in a series of commentaries relating to various cultural aspects of the Corps vision. Each is the opinion of the writer and will hopefully provoke thought and discussions. Please write a letter to the editor if you feel strongly about a commentary's message or if you have suggestions for a future topic.*

The following essay won first place in a contest sponsored by Louisville District asking the question, "How can I reshape the culture of the Corps of Engineers?")

How can I reshape Corps culture?

Does the U.S. Army Corps of Engineers have a culture?

Sure it does! It started more than 200 years ago with the basics that we embrace today. The founders of the Corps began this organization with a clear, concise vision of what the country needed and how to do it. For more than a hundred years, those basic concepts and methods were enough to get the job done.

However, like everything else in life, time brings change. Changes in the environment, geography, and technology are forcing the Corps to face challenges daily, or fail in its negligence to do so.

Lt. Gen. Joe N. Ballard has a new vision for our culture. He wants to shape a quality culture that reinforces corporateness, customer service, core values, and the importance of investing in people as put forth in his Vision Statement. He wants to have a culture in which "behaviors, actions and decisions are consistent with a 'One Corps' philosophy." This is coupled with the virtues of developing a workforce with diverse attributes and talents.

That means me. I am part of Lt. Gen. Ballard's Vision Statement. So, how can I reshape the culture of the Corps?

I could point out a lot of things I feel could be changed, but I must be part of the change. I can initiate changes. I can help change attitudes that can lead to reshaping old, outdated methods of doing things which are counterproductive and waste untapped skills and talents from everyone at the Corps. Here's how I will do it.

I can start with self-evaluation. I can list my assets and make my supervisors and co-workers aware of my skills, abilities, and knowledge. I will volunteer my services in any and every capacity where they are needed, inside or outside the Corps. Since I have been here, my supervisor has helped me manifest my skills in several areas. I am anxious to branch out and challenge myself in areas of my department where my talents and capabilities may prove useful to my team members. I can change a culture of close-mindedness and cliques by leaving my clerical sphere and showing my team members how my skills can benefit them and their projects.

I will become people-oriented. By looking for the best in my co-workers and supervisors, I can help bring out the best they have to offer, and the Corps as a whole will benefit. I will support their ideas and help execute them by using my training, knowledge, and skills. Despite the battles that go on between management and labor, it is a common (if not loudly pronounced) fact that we need each other.

However, supervisors need to cultivate their clerical workers. I am fortunate that I have one who uses my knowledge and skills, and I support her 110 percent. In doing this, our department is productive and we make her boss look good. If he looks good, then he'll in turn do all he can to put the Corps in the best light possible.

I will seek training in both what I need right now, and for future challenges in my workplace. As downsizing continues to be a dark cloud over us, it behooves every conscientious employee to develop survival tactics. The employee who is well-prepared is one who will have the most quality value. To achieve my training initiative, I must monitor my department's needs and keep track of future trends in the Corps itself.

In all respects, however, I must be diligent in letting my superiors know that I am serious in my quest. I am not just a clerk typist with menial intelligence and skills. I am a viable employee who should be considered a valued member of my team. My plan is to change these musty attitudes and help develop an environment of true oneness. Everybody on the team has qualities that should be used to their optimum extent.

I will, to the best of my ability, maintain a positive attitude throughout my tenure with the Corps. No matter what the circumstances, and in spite of the attitudes of those around me, I will smile. I will be ready to assist in any way possible, as quickly as possible. Not only will I spot the problems, I will come ready with answers to help solve them. I will work with the mentality of teamwork. It's not about me, but we, because whether this ship sinks or floats, we are all aboard her. It takes all of us to keep it afloat. If somebody is needed to be the positive light in the dark, then it will be me.

The quality initiative of the Corps coincides with the vision that Lt. Gen. Ballard has outlined. Each of us is expected to respond with a plan on how to achieve the goal. I have a plan. I plan to start using my attributes to work closely with my teams and my superiors to make the Corps a force to be reckoned with — to draw customers worldwide to our doors because we solve problems and get the job done by using all our resources. I want my co-workers to understand that they are my customers, and their satisfaction is what my job is all about. I want no doubt in their minds that I will meet and conquer each challenge brought before me and, if I can't, I will get the training needed to fulfill these duties in the future.

I will work closely with our external customers to ensure their questions are answered and their needs taken care of by the most qualified staff member. My utmost duty is to maintain the reputation the Corps has attained during the years, and ensure that achievement can be continued through me.

How can I reshape the culture of the Corps? By helping the Corps invest in me. I am part of the Vision Statement.

Wanda C. Baldwin
Louisville District

LETTERS

Trusting God

As a new Corps employee at the Libby Dam in Libby, Montana, I wanted to write to you and personally encourage your outstanding efforts in publishing the *Engineer Update*.

My first exposure to this informative publication was the October 1997 issue and it was a pleasure to read. I especially appreciate the format as it helped me become acquainted with other Corps projects while highlighting the activities of Corps employees.

I especially appreciate your willingness to write about employees who endeavor to help their fellow man. It is refreshing to hear about the good deeds of others without editing out God's role in their motivation. I have often wondered, as I listened to news stories about heroic rescues, how much these individuals called on God to help them help others. I suspect that many times their comments about God have been edited out.

It is a shameful commentary on our society to realize that trusting God has become politically incorrect. Thank you for being brave. I look forward to reading the next issue. Thank you for your part in making this an organization to be proud of.

Barbara A. Beardsley

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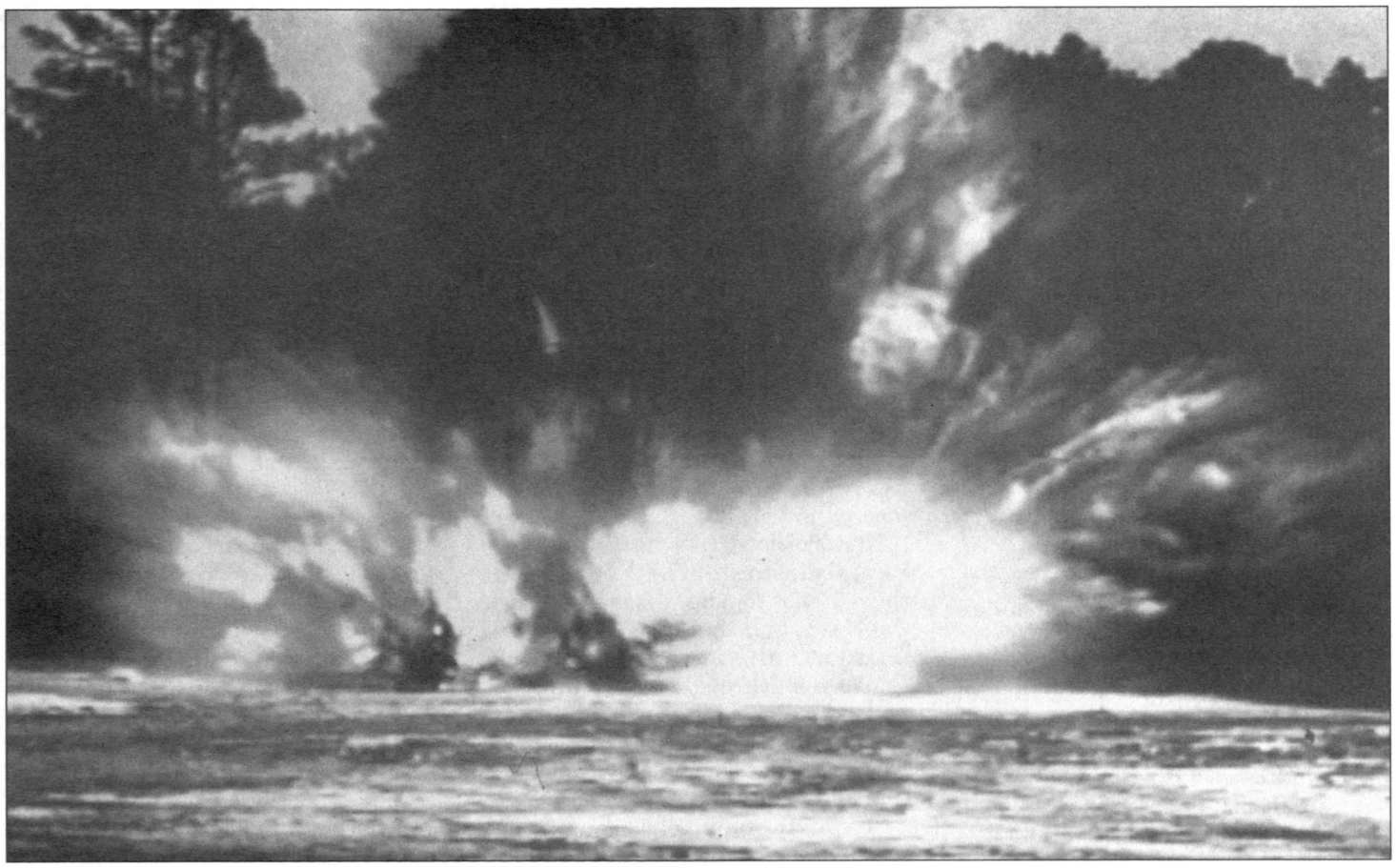
Corps lab takes Army's top honor

By Jennifer King
Waterways Experiment Station

Troop protection and support, laboratory consolidation, environmental issues, and outreach programs helped the U.S. Army Engineer Waterways Experiment Station (WES) in Vicksburg, Miss., win the Army Research and Development (R&D) Organization of the Year Award for the second consecutive year.

WES was co-winner of the award, along with the U.S. Army Communications Electronics Command's Research and Development Engineering Center.

A number of military support projects were noted in WES' application for the award.



Explosive tests are conducted at Fort Polk, La., to examine the effect of terrorist bombings. Terrorist threat protection is one key area of WES research. (Photo courtesy of Waterways Experiment Station.)

Bosnia

WES gave timely support to a number of requests during Operation Joint Endeavor in Bosnia. In December 1995, WES received a phone call from Zupanja, Croatia -- the Sava River crossing site into Bosnia. A late December rain, coupled with melting snow, had caused the river to overflow its banks and extend the crossing from 300 to 800 meters (330 to 880 yards) in width, and anxious troops needed to get into Bosnia. Within 72 hours, WES experts marshaled the necessary expertise and correctly determined when the river would crest. WES also provided a daily situation report that gave a 10-day forecast at five separate sites on the Sava River, and set up a Sava River homepage to maintain current and historical information on the river.

"We helped the division leadership develop time-lines for passing soldiers across the river," said Maj. Rich Sands, who worked on the project. "With our forecast, they were able to predict when the float bridge would be emplaced for the original crossing. With this information, they could plan the movement of troops into Bosnia. Our forecasting also provided vital information for the float bridge company. If they saw the river was going to come out of its banks, they would break the float bridge in two and store it along the shoreline until the flood wave passed. This helped prevent damage to the float bridge."

WES still continues to support soldiers in Bosnia.

"We're still supporting Operation Joint Endeavor on a limited basis," said Tom Engdahl, a WES engineer on the project. "We're still answering questions from the field and continuing to produce a forecast on the river."

In addition, WES led a team to restore the war-damaged bridge over the river at Brcko.

"We at WES were part of an assessment team that came up with a plan to repair the bridge," said Dr. Paul Mlakar, an engineer in the WES Structures Laboratory. "I stayed in Bosnia to oversee the construction and repair of the bridge and was in daily communication with WES as we encountered special problems. The bridge is still in operation and has been turned over to the governments of Bosnia and Croatia to secure and control traffic."

WES also:

- Provided technical assistance for repairing the alternate runway at Tsazar Airfield.
- Sent Obstacle Planning Software to the Mine Warfare Center in Bosnia.
- Wrote the "Beat the Mud Handbook" to guide troops in building roads and storage areas in wet, muddy soils.
- Wrote the "Keep the Convoys Rolling" manual to guide troops in repairing and maintaining existing roads in Bosnia.

Saudi Arabia

After the terrorist bombing at the Khobar Towers complex in June 1996, WES led a team to Dhahran, Saudi Arabia, to collect information. The Defense Special Weapons Agency (DSWA) asked WES to experiment with a bomb similar to the one used at Khobar Towers. Within three days after the request, WES built a replica of the truck bomb and conducted the experiment at Fort Polk, La. The results were documented in Appendix C of Defense Secretary William Perry's report to the President entitled "Protection of U. S. Forces Deployed Abroad."

"We went back to Saudi Arabia after the bombing and surveyed the damage to the building," said Dr. Jim Balsara, an engineer in the Structures Laboratory. "We also advised the base commanders when they were moving from Khobar Towers about what measures should be taken to protect the troops."

WES also worked to determine the size of the bomb. "We provided analytical calculations to verify the size of the charge used at Khobar Towers," said Dr. John Ehrgott.

Other efforts

While military support is key to the WES mission, a number of other elements contributed to the R&D Organization of the Year Award. Great strides were made in reducing the operating costs of the facility. WES combined the Hydraulics Laboratory and the Coastal Engineering Research Center with the Coastal and Hydraulics Laboratory. This merger saved more than $1 million in overhead costs and increased the labs' efficiency.

"By combining the two organizations, we get a synergy between them," said Dr. James Houston, Director of the Coastal and Hydraulics Laboratory. "We now have a lab that can handle the whole water resources problem. We also reorganized and reduced our cost structure significantly, and we can do work at a lower cost."

WES customers often show their satisfaction in WES' R&D work. During fiscal year 1996, WES received more than 250 letters from sponsors that included the Army, Navy, Air Force, Coast Guard, Marines, DSWA, Border Patrol, the Environmental Protection Agency and others.

Robert M. Walker, Assistant Secretary of the Army (Installations, Logistics, and Environment), commended WES for "your outstanding efforts to increase security in federal buildings following the Alfred P. Murrah Federal Building bombing in Oklahoma City."

Maj. Gen. Clair F. Gill, former commander of the U. S. Army Engineer Center and Fort Leonard Wood, wrote that "(The) working relationship established between WES and the 101st Airborne Division is an outstanding example for all research laboratories of research being conducted which has warfighting relevancy."

Breakthroughs

WES also made numerous research breakthroughs during 1996, including:

- Three new nonlinear material models to improve the capability of computer codes which predict weapons effects during simulations.
- Developed peroxone oxidation for cleaning up groundwater at contaminated sites.
- Developed and demonstrated a new sand-fiber stabilization technique that can support military trucks and C-130 aircraft.
- Research in alternative treatment technologies for metals-contaminated soil. This research has revealed that applying electromagnetic forces can remove more than 90 percent of lead from contaminated soils.

WES continues to support outreach programs, including:

- Exceeding, for the sixth consecutive year, the Historically Black Colleges and Universities and Minority Institution contracting goals set by the Corps, the Army, and the Department of Defense.
- Eighty-two engineers and scientists judged in local, regional, and state science fair competitions.
- Researchers gave lectures during the school year in the predominantly minority Vicksburg-Warren County School District and covered all areas of WES expertise.

Norfolk creates shoreside refuge

The bridge at Salt Marsh Park, designed by Norfolk District for Norfolk Naval Base, Va., is made from recycled plastic. The seven-acre park began as a shoreline stabilization project. (Photo courtesy of Norfolk District.)

By Amy Goebelbecker
Norfolk District

Steve Massey, who is stationed on the *USS Sanjacinto*, likes to fish in the lagoon at Norfolk Naval Base's new Salt Marsh Park. "There are no hassles here," he said. "I don't have to worry about anybody, and the fishing's good. It's a good retaining pond for bait fish."

Massey has caught bluefish and flounder in the lagoon. The seven-acre park, located in the northeast corner of Norfolk Naval Base, Va., opposite the aircraft carrier piers, has about one acre of planted, vegetated wetlands.

Most folks probably would not think of a park as a Norfolk District project, but the district designed Salt Marsh Park as part of an environmental enhancement. "Navy personnel came to us (for this project)," said Mark H. Hudgins, hydraulic engineer in Hydraulics and Hydrology Section. "They planned to do something with the shoreline with the environment in mind."

According to Hudgins, the project began as a shoreline stabilization project, then evolved into a recreational area with a jogging trail, barbecue grills, a footbridge, picnic tables, a sand volleyball court, and three gazebos. The bridge, benches, and trash cans are made out of recycled plastic.

"We tried to incorporate environmentally-friendly construction materials wherever we could," said Gary Szymanski, civil engineer in the Civil Section of Engineering Division, who worked on the storm water management parts of the project.

Szymanski and Philip E. Gundel, landscape architect in Civil Section, worked on the landscaping and included trees, shrubs, and a butterfly garden. The park faces Willoughby Bay and the Hampton Roads Bridge-Tunnel. During most afternoons, park visitors can see peeps, gulls, and herons, said Szymanski. He also said that a wildlife observation platform will be installed soon.

Volunteers from the Navy, the Youth Conservation Corps, and the Elizabeth River Project helped plant the marsh grass and trees which make up the wetlands at the park. Coastal Design and Construction of Gloucester installed the dune system and amenities.

A salt marsh lagoon sits in the center of the park. According to Szymanski, the water inlet was lowered one foot to improve the tide range and aid tidal flushing. "It was an industrial lagoon," he said. "The plants purify the water."

Norfolk District's team consulted the Virginia Institute of Marine Sciences, the Alliance for the Chesapeake Bay, the Navy, and the Norfolk Wetlands Board while designing this project.

"We went through a lot of minor revisions to incorporate comments as best we could for the project," said Hudgins. "Everybody's happy with the final outcome."

"I'm extremely pleased with the Corps' service on the project," said Francine Blend, the Navy's project manager for the park. "I was very pleased with the attention the district paid to the project. They were very stringent with the contractor, which made my life a lot easier."

But the park wasn't only designed to attract wildlife and manage storm water. "Everyday I see people out in the park," said Blend. "People eat lunch there and play volleyball. It's been getting a lot of use."

"Whenever you go to the park, there are one or two aircraft carriers docked," said Hudgins. "The Navy wanted the park to give the sailors something to do while they are in port, rather than have to go into town."

Gerald Perez, a retired civilian worker, often walks in the park around lunch time. "I come here when I have some free time to look at the place and meet my friends," Perez said.

Sailors also use the park for physical training. Michael Lugar jogs in the park with shipmates. "We'll probably use the park a lot while we're here," said Lugar, who is stationed on the *USS John C. Stennis* docked at the base. "It's great that something is being done with this area."

"Even in the wintertime people come and sit around," said Derek Oglesby who sat under a gazebo to check out the park as a possible picnic spot for his commanding officer. "You can come here to sit and relax. It has a great view."

Sonny Camat, a civilian worker, plays a Chinese board game with three friends every day at lunch time in one of the gazebos. "It's a great place to play and relax after working on ships," said Camat.

"The Navy has already come to us and asked to work on another 2,000 feet of this project," said Hudgins. "This is significant for the district. It's unusual for another agency with its own in-house design and contracting capability to approach the Corps for its expertise."

The Elizabeth River Project, a grass roots, non-profit agency organized to restore the Elizabeth River, recently commended the Navy and their partners on their success with the restored salt marsh.

Three Corps districts take on public works functions in test

The Department of the Army is considering assigning public works functions at some Army installations to the U.S. Army Corps of Engineers. The idea has its practical roots in the reality of downsizing and its theoretical roots in the Force XXI modernization, which calls for reengineering the support base. The Army Materiel Command (AMC) has the lead for testing, and AMC chose three Corps districts and three installations as test sites.

Little Rock District is partnering with Pine Bluff Arsenal, Ark.; Rock Island District is partnering with Rock Island Arsenal, Ill.; and New England District is partnering with the Soldiers Systems Command (SSCOM) at Natick, Mass.

Under the partnership, the districts take over the day-to-day operation of most functions performed by the installations' Directorate of Public Works. The installation commanders retain responsibility for planning, programming, budgeting, funding, and setting priorities for public works requirements on the installation.

The partnerships officially took effect on Oct. 1 and will continue on a test basis through fiscal years 1998 and 1999. During and after the test, audits will be conducted to determine whether the partnerships are generating the projected cost savings. If successful, all installation public works functions could be permanently moved to the Corps.

The partnerships at Little Rock and Rock Island districts are currently in operation. In New England, both SSCOM and the district are seeking funds for the cost of executing the plan. The funding requirement is under discussion at higher commands.

Rock Island District

According to Dan Holmes, Rock Island District's primary liaison with Rock Island Arsenal, the district will perform nearly all of the functions of the arsenal's Public Works Directorate. These functions include management, contract oversight and engineering support in building, renovating and repairing buildings, roads, grounds, and other real property assets; utilities; snow removal; environmental compliance; historic preservation; janitorial services; and pest control.

"We already do all those things, and now we will do them at the arsenal as well as at other sites in the district," Holmes said. "In general terms, the arsenal commander will decide what needs to be done, set priorities on when it should be done, and provide funding. The Corps will have responsibility for carrying out those decisions."

No employees were displaced from their jobs as a result of the partnership. In fact, most detailed employees are still doing the same jobs at their desks in the same building, and still have the same phone numbers and e-mail addresses.

"We wanted to complete the transition with a minimum of disruption, and we wanted to make it transparent to our customers," said John Ruble, the arsenal's former Director of Public Works. Procedures for calling in work orders and reporting problems with services have not changed, and messages will continue to be sent by the

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Partnering sped Superfund cleanup

By Ann Marie Reyes
New England District

New England District (NED) and the Environmental Protection Agency (EPA) joined public officials and citizens of Stratford, Conn., on Nov. 3 to celebrate the cleanup of the Raymark Superfund Site.

The Raymark site was one of the largest, fastest cleanups in the Superfund program's history. NED oversaw the cleanup, but the project was a massive partnering effort with EPA, Stratford residents, a potential developer, and federal and state agencies.

For about two years, NED, working with its partners, planned, coordinated, and executed design and construction of an $83 million project which included the environmental remediation and restoration of a 36-acre industrial complex and 46 residential properties.

Future redevelopment of the property should create 1,000 permanent jobs, 600 construction jobs, $1 million in local taxes (not including federal, state and sales tax) and act as a catalyst for future area development and renovation.

The 34-acre Raymark Superfund site was known as Raymark Industries. Between 1919 and 1989 Raymark manufactured friction products and other products containing asbestos, lead, PCBs and 60 other hazardous chemicals. During those years, Raymark disposed of its waste on the property resulting in accumulations of up to 24 feet thick over 34 acres. The company built 15 acres of buildings on the property, most of them on top of the waste.

A worker takes a soil sample at the Raymark Superfund site. Managed by New England District, it is one of the largest, fastest cleanups in Superfund history. (Photo courtesy of New England District.)

Besides disposing of waste onsite, Raymark also discarded hazardous waste at 46 residential properties, numerous commercial and municipal properties, and wetland areas in Stratford.

"This is a big day in Stratford, and a big day for all of us who care about cleaning up Superfund sites," Senator Joseph Leiberman told the audience. "This project proves that we can correct some of the mistakes that were made in the past by companies that disposed toxic waste into the environment. We've made the right choice by cleaning up the old Raymark site and making it safe again."

"The cleanup of the Stratford site has been one of the quickest and most successful in this country," said Senator Christopher Dodd. "It's a shining example of how effective the Superfund initiative can be. The completion of this work means great things for our region -- a cleaner environment, business development, jobs, and an added boost to our economy."

The cleanup involved decontaminating and demolishing 15 acres of buildings and placing an impermeable cap over the demolished buildings and the remaining 20 acres of property. Under the cap, a pump and active gas collection system will remove hazardous gases and solvents from the groundwater and soil.

Two buildings on the property will collect solvents pumped out of the groundwater. The gases collected beneath the cap will be treated in the buildings.

The cap was built so the property can be redeveloped without being impeded by the underlying contamination.

Building the remedy required 41,000 dump-truck-loads of clean fill material, placing 36 acres of synthetic liner materials in three layers, installing 70 wells for ground water monitoring and extracting solvents and gases from the ground, building two treatment buildings, and installing storm drainage and gas collection systems.

Extensive effort was required to prepare the subsurface for future development, including dynamic compaction, steel bearing piles, and several large surcharge piles to compress peat and waste under the site.

Building at the site was particularly difficult since it had to accommodate storm drainage, utility corridors, unloading zones, building pods, roads, traffic control, landscaping, and other development-related features.

The cleanup began in 1994. The $13 million design and construction contract required about 15 months to complete. It included excavating more than 44,000 cubic yards of Raymark waste from the properties. The waste was hauled and stockpiled at the Raymark site where it was later spread out and compacted beneath the cap. The residential properties required relocating 11 families and restoring the sites.

The cleanup contractor was Foster Wheeler Environmental Corporation. About 200 local construction workers were involved in the project. Overall, more than 1,000 individuals and 150 companies, agencies, and firms participated.

The Stratford project is the second Superfund site completed by NED and the EPA in 1997. During the summer, the incinerator at the Baird and McGuire Superfund site in Holbrook, Mass., was permanently dismantled after successfully burning 248,000 tons of contaminated soil.

Corps tests new concept

Continued from page 4

arsenal's public works staff informing employees of bridge closures, planned power and water outages, and other items.

Holmes added that the ultimate test would come in how the partnership is received by customers. "If the people at the arsenal are happy with the services they receive, then we'll know we've succeeded."

Little Rock District

After several rounds of personnel reductions and other cost reduction programs, Pine Bluff Arsenal had reduced capability to design and build small projects in-house. At the same time, Little Rock District's military workload has declined.

"We believe this will be a true partnership between the district and the arsenal," said Ken Carter, deputy district engineer for Project Management. "Each will provide key services to the other and will work toward efficiently sharing resources and services."

A time-line for the test has the level of support by both organizations gradually increasing to a peak by October 1998. During this time, the district will establish on-site support at Pine Bluff Arsenal and will eventually assume operational control of designated functions at the installation.

The types and areas of work that will be shared have been identified by representatives from the arsenal and the district. But all parties realize the 49-item list is not all-inclusive. The support tasks that the district can do for the arsenal are practically endless. Advertising and awarding contracts, handling real estate transactions, providing design and consultation for construction projects and GIS support are just a few of the possible jobs.

And the partnership is not one-sided. Pine Bluff Arsenal has many services that can benefit Little Rock District. For example, the installation has an on-site, fully-equipped machine shop. In the past, the machine shop has gotten the district out of a few binds.

"They helped us when we had a brake failure at Dam 5," said Bill Gray of Maintenance Engineering Section. "While a local machine shop was trying to manufacture a new line shaft assembly, Pine Bluff Arsenal's machine shop was trying to straighten the damaged one in case we needed it."

The shop also recently repaired wheels and shafts for tow haulage equipment and manufactured a part for DeQueen Dam.

The arsenal also has several industrial hygienists who could inspect work areas since the district's industrial hygienist position has not been filled.

By using the partnership to get needed work done, both organizations will be able to offset current vacancies, enhance career paths for employees, and save money by not having to contract out some services.

The partnership also benefits the Army by retaining all levels and areas of expertise which otherwise would have been hard to keep on staff. "This partnership is an excellent example of 'outside the box' thinking that will enable the Army to gain new efficiencies and to remain relevant, responsive and ready," said Gene Thomas, Pine Bluff Arsenal's Director of Public Works.

While the benefits are obvious, and support for the project comes from all levels in the Army, there are still hurdles to overcome. On the Corps' side, the installation partner will need access to the Corps of Engineers Financial Management System to research costs and track expenditures. On the installation side, commanders may feel that they have less control.

"No one said this would be easy," said Margaret Morehead, the district's project manager. "But this is something that we all need to support, because it really is for both commands."

The tests themselves also cause an extra level of work for participating installations and districts. Both groups must maintain an increasing amount of accounting requirements to document the tests.

Little Rock District and Pine Bluff Arsenal working together is nothing new, but this formal agreement builds on what has been done in the past. "There's a lot of knowledge in the district," Morehead said. "I'm hoping that by raising awareness of this mutual support program, some additional ideas and suggestions for ways to use Pine Bluff Arsenal capabilities in the district will surface."

(Jennifer Wilson of Little Rock District, Paul Levesque of Rock Island Arsenal, and Robert Gauvreau of New England District all contributed to this article.)

Engineer plays pure Americana

By Jennifer King
Waterways Experiment Station

Its name means "sweet song."

The mountain dulcimer is a uniquely American instrument straight from the heart of the Appalachian Mountains. Its strings can spin a murder yarn, court a lover, praise God, or tap feet at a hoedown. And a U.S. Army Corps of Engineers employee is the National Mountain Dulcimer Champion.

Hollis Landrum, an information systems engineer at Waterways Experiment Station, plays the mountain dulcimer. He also plays a number of other instruments including the hammered dulcimer, banjo, guitar, harp, Irish flute, Native American flute, American flute, and Japanese flute. However, it was the mountain dulcimer that brought him national recognition.

Landrum initially bought a dulcimer just for looks.

"I had been to Mountain View, Ark., and was playing the guitar up there," he said. "I went by the dulcimer shop and decided to buy one because they were pretty. I hung it on my wall and it stayed there for years. Then I heard classical music being played on a dulcimer, and that's when I knew that it had more possibilities than the traditional Appalachian mountain music, which I learned later."

Landrum won his honor at the 1997 National Mountain Dulcimer Championship at the Walnut Valley Festival in Winfield, Kan. The 27-year-old competition attracts the highest level of musicians from North America. Landrum, a past winner of the Texas State Dulcimer Championship, two-time former finalist at the Southern Regional Mountain Dulcimer Championship, and a former finalist at the Grandpa Jones Old Time Banjo Competition, is no stranger to competition. He takes a different approach to music when competing.

"I enjoy playing jazz," Landrum said. "There are lots of fast, good flat pickers and they can play fiddle tunes really well. I wanted to do something a little different and I've usually been somewhere in the finals by doing so. The judges have been amazed by what I do, but it comes down to what appeals to a particular judge. It's little subtle differences that make a difference at the competitive level. I'm glad that I was able to win playing what I enjoy playing."

The soothing sounds of the mountain dulcimer also lured Landrum into playing.

"It's very relaxing," he said. "You can forget the stress. You can't think of anything else while you play, and it's not very physical. And it's got a gentle, sweet sound."

In addition, it is a very social instrument and rather easy to play.

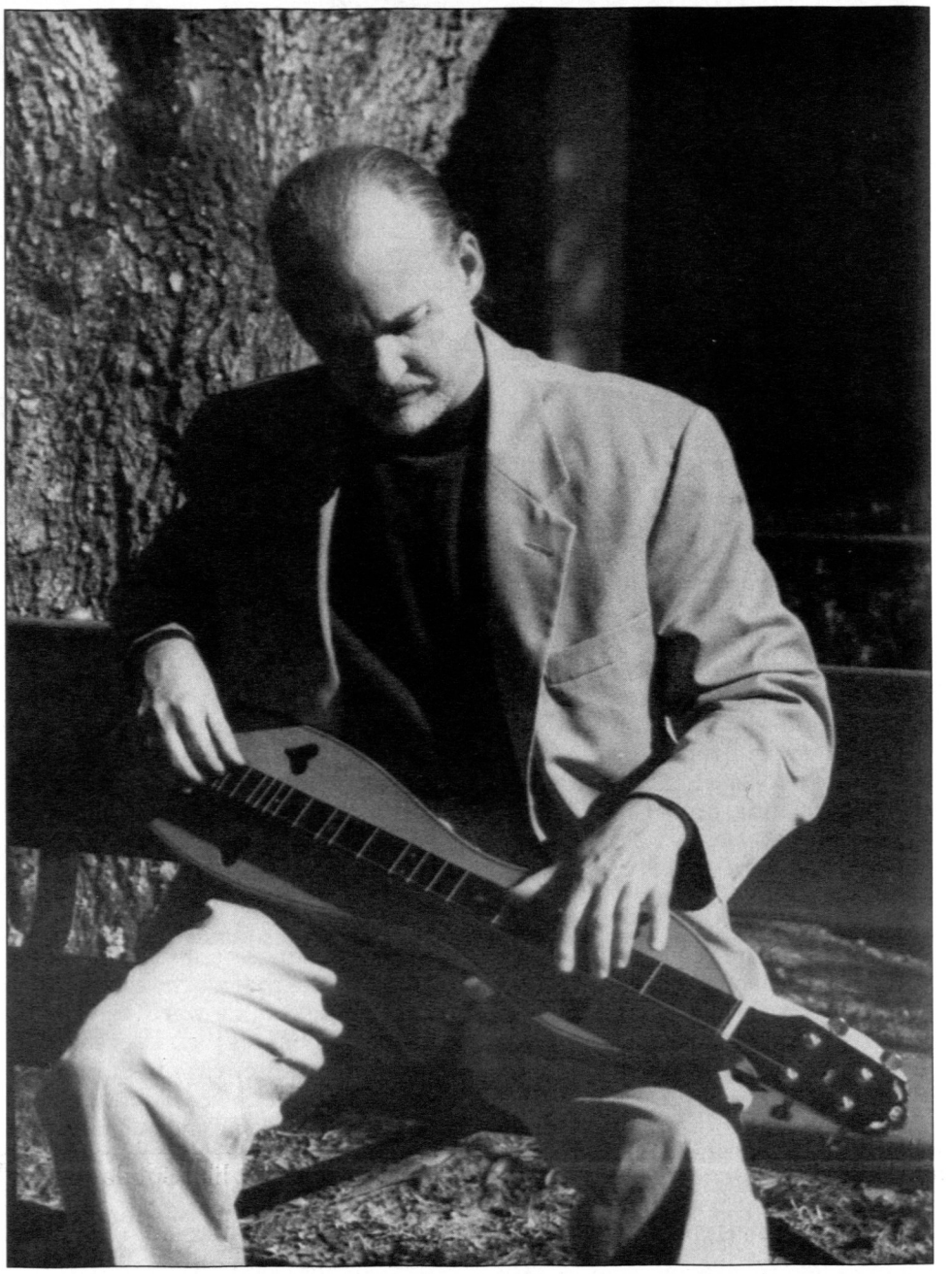
"Most of the players I know play for recreation," Landrum said. "You can get 50 players together and talk while they're playing. The dulcimer is popular because of this. It's an easy instrument to learn how to play, but difficult to master."

A mountain dulcimer usually has four strings, and is usually hourglass shaped. Although there are a number of ways to hold and play it, the dulcimer is traditionally played by holding it on the lap and simply strumming the strings with a finger or a pick. Tunes are created by depressing one, two or three strings with a finger or stick and sliding it up and down. At least one string is played "open" and creates a background drone which gives the dulcimer its unique sound.

Besides being appealing in sound, the mountain dulcimer also has an important cultural role. "The dulcimer is one of the unique American instruments," Landrum said. "The dulcimer, the banjo, and the Native American flute are the only instruments that can claim to be truly American."

The mountain dulcimer differs from the better-known hammered dulcimer, the forerunner of the piano, whose strings are tapped with strikers and is so old that it is mentioned in the Bible.

The mountain dulcimer appears to have originated in the Appalachian Mountains in the late 18th century. It resembles some European instruments, especially the German scheitholt.



Hollis Landrum, from the Waterways Experiment Station, shows off the picking skills which won him the National Mountain Dulcimer Championship. (Photo courtesy of Waterways Experiment Station.)

Landrum's jazz versions of "Ain't Misbehavin'" and "Just a CloserWalk withThee" were the tunes that appealed to the judges...

"We believe that when the Pennsylvania Dutch, who weren't Dutch but German, came down the Shenandoah Valley, they brought memories of the scheitholt," said Pat Maden, former president of the Bays Mountain Dulcimer Society in Kingsport, Tenn. "When they built their own, they adapted to native materials and simple tools, and it evolved into our dulcimer."

Tradition says the mountain dulcimer developed primarily as a woman's instrument. Women were not allowed to play a stringed instrument while standing in front of men, so the dulcimer was suited to the female style of playing. That changed over time and the dulcimer is now a unisex instrument, as Landrum's championship proves.

His competition instrument can truly be called unique.

"I had seven dulcimers, but I'd been looking for an instrument to match my style," Landrum said. "A dulcimer maker in Indiana worked with me and built one to my specifications. I've been told that dulcimer was one of the best-sounding in the competition."

Even if he hadn't won the championship, Landrum would still be well-known in the dulcimer community. He has performed and taught workshops at music festivals around the country. His Civil War music was featured on the Arts & Entertainment Network Civil War Special *The Divided Union,* and he has taught Civil War and traditional music for a number of elderhostel groups visiting Vicksburg, Miss. He also writes a column that appears in 15 different publications from California to New Jersey.

At the national competition, Landrum was up against 12 other dulcimer players for the title. Each player performed two pieces. The judges narrowed the field to five, then those five played two more tunes each.

Landrum's jazz versions of *Ain't Misbehavin'* and *Just a Closer Walk with Thee* were the tunes that appealed to the judges at the Walnut Valley Festival. After winning the national championship, he cannot compete again at the festival for five years, but that's fine with him.

"I'll play and enjoy," Landrum said. "Now, I can relax and have fun."

Irish music resonates to writer's roots

By Bernard W. Tate
HQUSACE

Most people listen to Irish music about once a year and don't think about it much otherwise. But the music of Ireland got a grip on the heart and soul of Kevin Quinn and never let go -- so much of a grip that he has been playing and recording it for 20 years, and recently began leading tour groups to Ireland.

"I came to love Irish music in 1977 when I went to visit my Dad in Chicago for two weeks during Christmas," said Quinn, public affairs officer of Omaha District. "I bought him seven LP records of Irish music, the Clancy Brothers and Irish Rovers. After listening to them for two weeks I realized this was *great* music, much like the '60s folk music I grew up singing and loving."

Quinn has been a musician almost all his life. He started playing folk music at the age of 10 and grew up playing Bob Dylan, Simon and Garfunkel, Cat Stephens, James Taylor, and Harry Chapin. "The similarity of the ballads and message songs was phenomenal. They had universal messages that transcend heritage and radiate positive feelings. I found that admirable, since the Irish have suffered as slaves in their own country for 800-plus years. The humor in the music was also appealing for that reason."

Quinn began learning and playing Irish music almost immediately after that Christmas in 1977. "I've performed Irish music either solo or with various bands for the past 20 years," Quinn said. "I sing lead and harmony vocals, play six- and 12-string guitars, banjo, bodhran (goatskin drum) and I'm learning to play the bouzouki, which looks like an eight-string mandolin on steroids."

Quinn has also played in three Irish bands. The first was "Celtic Wind," an Irish trio he founded in 1984. With Quinn as lead singer and jester, the band was twice invited to perform at the world's largest Irish Fest in Milwaukee.

"We played traditional folk instruments, but we came off like a Celtic rock band," said Quinn. "Celtic Wind" did 80-90 percent Irish and Scottish music and the balance involved some of the "wildest, craziest songs you ever heard. Our show was highly energetic, frenetic, symbiotic, and even chaotic, in a very organized way. Ah yes, we were much younger then!" "Celtic Wind" disbanded in 1995. "It was time," said Quinn. "I couldn't keep up the pace!"

In 1994, Quinn joined the "Turfmen," the popular house band at Omaha's renowned Irish pub *The Dubliner*. "We do 99 percent Irish and Scottish traditional pub songs, ballads, ditties, and sing-alongs," said Quinn. "The 'Turfmen' have performed since 1982 and they have great voices and musical ability, great chemistry, and as large a fan base as any band in Omaha." According to Quinn, "Turfmen" CDs are routinely played on folk radio shows throughout the U.S. and Ireland.

Then there's "Donnybrook," a trio Quinn founded in 1991. "That's my traveling band," he said. "We do festivals seven weekends a year, and then play local pubs and do concerts on off-nights, like Sundays, Wednesdays, and Thursdays. We do everything from country-and-western to bluegrass to American folk to Irish to Scottish to Canadian to Russian to parodies."

Irish music has become a family affair for the Quinns. His wife, Beth, and daughter Hilary, 16, have both danced in Irish dance troupes for the past 10 years. His son Jarrod, 13, plays guitar a little and is drawn to different types of music, including the Irish and Scottish folk-rock. "All three have recorded songs with me on albums and the CD, and all three perform with me on occasional concert dates," said Quinn.

Yes, Quinn has also produced and marketed his own recordings. "Celtic Wind" recorded two 90-minute cassettes in the 1980s. In 1989, Quinn produced his first solo effort, featuring his favorite folk music from all over the world, including several originals. In 1995, he recorded a compact disk of Scots-Irish music, including four original songs and a poem.

The passion for Irish music eventually led Quinn to retrace its roots to Ireland, and led him to his own roots as well. His ancestors lived in Ireland as far back as anyone can trace, and his great-grandfather brought his family to America in 1847 on a "coffin ship" during the potato famine.

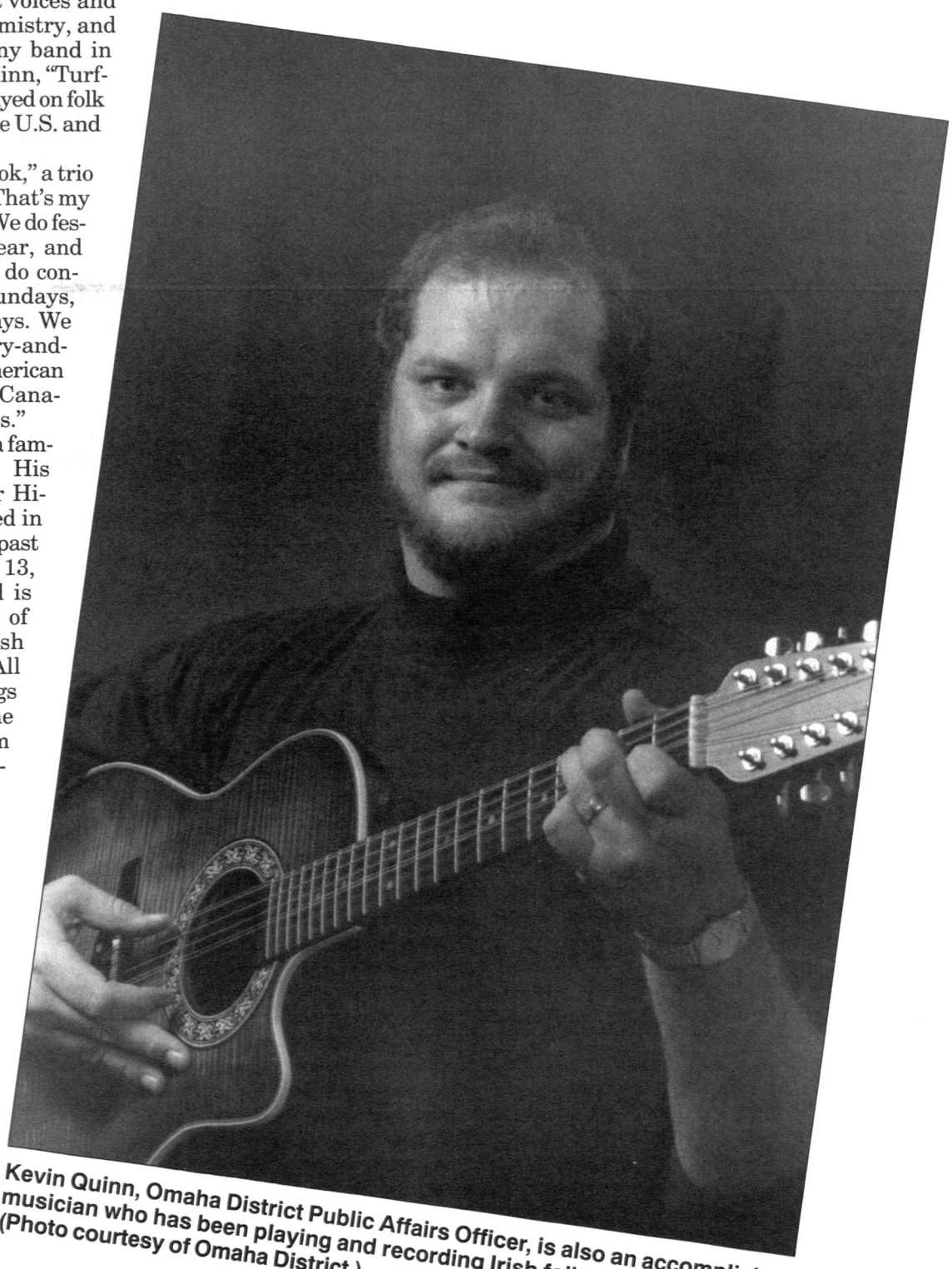
"After my first two visits to Ireland with my wife in 1991 and 1994, I decided to lead tours there, but had no idea how I would do that," Quinn said. "Then, one day in 1995, a distant cousin called, met with me, said he'd been to Ireland 35 times and he owned a travel agency. He said he'd heard of my bands and wanted to know if I'd be interested in leading tours to Ireland. Talk about serendipity!

"I led my first tour to Ireland in 1996, and I plan to take one every year," said Quinn. "I took 15 people through Dublin, Northern Ireland including Belfast, cross-country to the west coast to see Galway, Mayo, Connemarra, Clare, Bunratty Castle, and so on."

The Irish people are known for having a mystical streak, and Quinn is no exception.

"What motivates me to keep going back is a deep sense that Ireland is my home," he said. "My first day there in 1991 I *knew* I'd been there before. I recognized many places and felt totally familiar with and comfortable in so many settings. I've always felt a special bond with the music of Ireland and, most importantly, with the people of Ireland. I've made great life-long friends there, including a group of teachers/musicians from County Antrim and County Derry. They play in a band called "Roguery," and I've helped bring them and their wives to the states for visits and musical engagements four times. Likewise, they took care of Beth and me when we went over in 1991 and 1994.

"The music of Ireland and its people have changed my life for the better and helped me define who I am," said Quinn. "Both influenced me to focus only on what is meaningful and pursue it with new-found vigor."



Kevin Quinn, Omaha District Public Affairs Officer, is also an accomplished musician who has been playing and recording Irish folk music for 20 years. (Photo courtesy of Omaha District.)

Oldest lock heralds 125 years

Willamette Falls Locks once served as the main transportation route for Oregon's fertile Willamette Valley...

By Matt Rabe
Portland District

The list of U.S. Army Corps of Engineers projects with a service record of more than 125 years is short. But, as of Jan. 1, the list grew by one.

It was a cold New Years' Day in 1873 (it says so in the original lockmaster's logbook) when the Willamette Falls Locks opened for business, providing safe portage around the 40-foot-high Willamette Falls, 17 miles south of Portland, Ore. Willamette Falls Locks was the first water resource development project in Oregon, and it is the oldest project of its type operating in the U.S. It was placed in the National Register of Historic Places on Feb. 5, 1974.

Before tractor-trailers and interstate highways, the Willamette River (with the help of the locks) served as the main transportation route for goods transported into and out of Oregon's fertile Willamette Valley. The locks continued this tradition until 1996 when the last major commercial user, a paper mill beside the project, closed. Today, the locks mostly serve recreational boaters, fishermen, and tour boats.

Lock needed

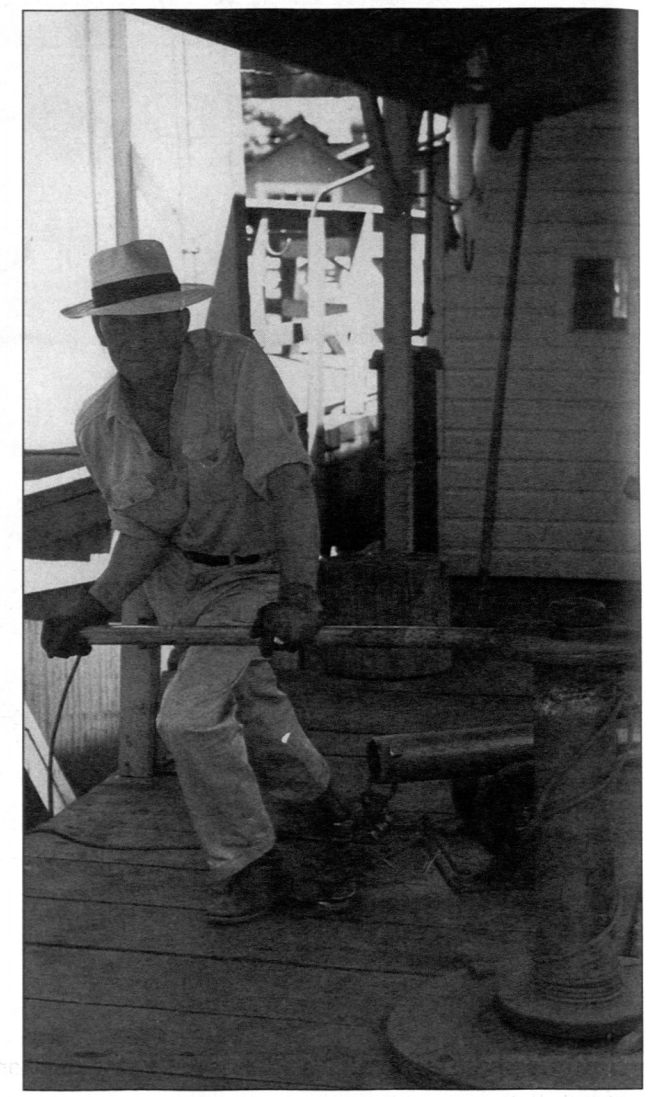
The Willamette River was important in Oregon's early history, first to fur traders, then to settlers looking for the promise of free land. The lack of adequate wagon roads and railroads forced people to look to the river for cheaper, more efficient transportation. However, sandbars, snags, and the 40-foot falls limited the number of companies willing to invest in the river's commercial potential. That left one, the People's Transportation Company (PTC), with all the business.

The Willamette Falls Canal and Locks Company organized in 1868 and set out to build a navigation lock around Willamette Falls. One of its goals was to break up PTC's 10-year river monopoly and reduce the cost to ship goods up and down the river. PTC had long been the only boating company to move commercial goods between Portland and the Willamette Valley, charging $16 per ton to ship upstream from Portland to Eugene, and $11 per ton if you were shipping downstream.

In 1870, the company started to build the locks, made almost entirely of local stone and timber, at a cost of $600,000. The project was later taken over by PTC. Partial funding came from the state through the sale of gold bonds. The state legislature saw the $200,000 investment as a good move, saying "the obstacles to the free navigation of the Willamette River at that place should be removed, and freight carried on said river should be cheapened."

Before opening the locks, cargo-laden craft had to either be portaged around or hoisted over the falls by muscle-power and stout ropes tied to trees. This method was called "cordelling."

Three years after opening, the locks were sold to the Willamette Transportation and Locks Company, a corporation that eventually came under the control of the Oregon Railway and Navigation Company. The locks were sold again in 1892 to the Portland General Electric Company before changing hands one more time to the Portland Railway Light and Power Company. In 1915, the federal government purchased the project for $375,000. The Corps has operated the project since that time.

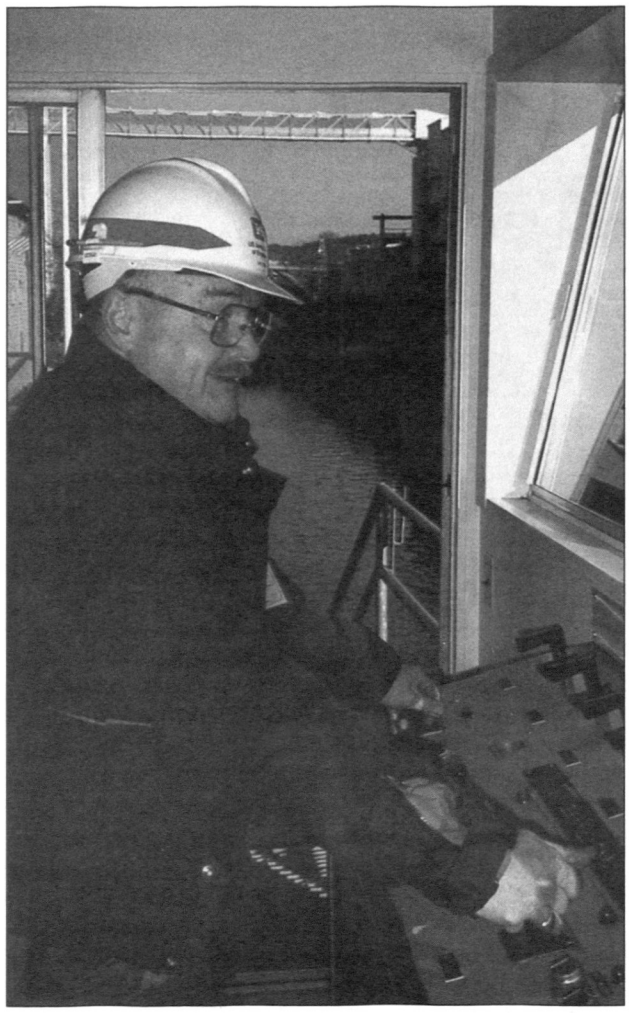


Opening and closing the lock gates before the 1940s required a strong back. (Photo courtesy of Portland District.)

Key to the valley

It wasn't long before commercial users discovered the new navigation system. During 1878, 65,000 tons of goods and 17,000 people were transported through the locks. Three companies offered steamboat freight and passenger service at that time between Portland and the Willamette Valley towns of Salem, Albany, Corvallis, and Eugene. A toll, 50 cents per ton and 10 cents per passenger, was levied on each boat using the locks.

As populations in the Willamette Valley swelled, and with Portland becoming a major seaport, reliance on the locks increased. Between the 1950s and the early 1970s more than two million tons of commodities, mostly rafted logs and paper products, were transported through the locks each year. By the end of the 1970s, annual tonnage dipped below 800,000 tons. For fiscal year 1997, total tonnage locked through was 4,154 tons.



Today, lock operators like Dave Denman need only turn a few switches to open the gates, letting hydraulic equipment do the heavy lifting. (Photo by Matt Rabe.)

Changing with the times

As needs changed, so did lock operation. When the Corps purchased the locks in 1915, we committed to renovate the project. The first move was to deepen the chambers from three feet to six feet to accommodate the newer, deeper draft vessels.

Technology also played an important role for the project. When first built, the chamber gates were made almost entirely of wood and had to be opened manually, which required strong backs. The 1940s brought hydraulics to the project and the gates are now opened at the flick of a switch. At the same time, the wooden gates were replaced with gates made mostly of metal. The wooden lagging remains, however, as a reminder of the project's past.

Portland District recently completed a three-month rehabilitation of the lock system. Two sets of gates were removed and repaired, along with some other construction work.

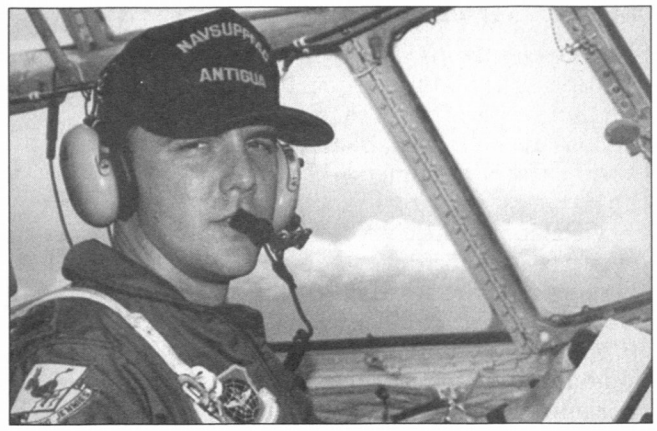
Another change at the project is the hours of operation. Previously, boaters could lock through as early as 7 a.m. and as late as 11 p.m. Reduced use by commercial traffic forced the project to trim its operations to a single 10-hour shift. But the project staff continues to listen to its customers and changes hours seasonally, based on demands made by both commercial and recreational boaters.

Not your typical lock

Willamette Falls Locks is not your typical lock system. Rather than being a single-lift lock, it is actually a series of four consecutive locks, a canal basin, and a guard lock. Each lock has a lift capacity of 10 feet. Boaters who look closely at the lock chamber walls see wood and cut rock instead of the normal concrete lining because the locks were built in the late 19th century, before concrete technology. Despite the rock construction (hand-cut stones, placed in such a way that large stones interlock with smaller ones), the chambers remain watertight today. Also, the chamber gates are equipped with slide gates which are opened and closed to regulate the water level between the chambers. There are no underground conduits to drain the chambers such as those used in modern locks; the water is merely transferred between the locks.

Willamette Falls Locks is as much a part of the city of West Linn as is the town's city hall, according to Dave Denman, project worker. He says most of the town's residents have, at one time or another, worked at either the locks or the adjoining papermill (which opened in 1889), the privately-owned hydroelectric power station (also opened in 1889), or the state-run fish ladder (one of the oldest in the state).

"A lot of people have a sense of ownership to the locks," said Denman. "You can't talk to anyone in West Linn who doesn't have a connection with the project. These people know the locks."



Left, a WC-130 Hercules aircraft, workhorse of the 53rd Weather Reconnaissance Squadron, the Hurricane Hunters, prepares for a mission. Above, Hurricane Hunter Douglas Otto. (Photos courtesy of the U.S. Air Force.)

Mobile man flys straight into hurricanes

By Tim Dugan
Mobile District

When a hurricane approaches the U.S., most people wonder where to go to escape it. Doug Otto thinks the opposite. He dons a flight suit, climbs onto the flight deck of a weather reconnaissance aircraft, and heads straight *toward* the storm.

That's because Otto is a hurricane hunter with the U.S. Air Force's 53rd Weather Reconnaissance Squadron (WRS) of the 403rd Wing at Keesler Air Force Base in Biloxi, Miss. Called the Hurricane Hunters, the 53rd is the only Department of Defense unit that routinely flies into hurricanes.

Otto is a hydraulic engineer in Mobile District's Hydrology and Hydraulics Branch. On weekends and for hurricane season, he's on call in the Air Force Reserve, and tangles with hurricanes like Andrew, Fran, and Opal.

The Hurricane Hunters fly the WC-130, the weather recon version of the four-engined Hercules tactical transport. They fly into the heart of a hurricane to take meteorological measurements and transmit them to the National Hurricane Center (NHC) in Miami, Fla.

During hurricane season they provide aerial weather reconnaissance of tropical disturbances and hurricanes in the Atlantic, Caribbean, Gulf of Mexico, and Eastern and Central Pacific Ocean. When not tracking hurricanes, they fly into winter storms on both U.S. coasts.

Otto started with the Corps as a co-op student in 1977 and became a full-time hydraulic engineer in 1981. He learned of the Hurricane Hunters from a co-worker. "There was another hydraulic engineer here, an ex-Vietnam War pilot, who was in the unit. He told me the Air Force Reserve recruits people for pilot training. I had thought they only recruited from active duty."

Otto was interviewed, tested, accepted, and joined the Reserves in 1984. "For the first 18 months I was in training. My Corps supervisor graciously allowed me a leave of absence. I completed the flight screening program, officer training school, undergraduate pilot training, water survival, and combat survival schools, and C-130 basic school. After completing the required training, I returned to work full-time for the Corps and began flying for the Air Force Reserve part-time. I flew my first hurricane in June 1986."

Otto has been with the 145-member squadron for 11 years. Reserve duty requires one weekend a month, but he averages one more night a week to fly and train. He schedules his annual Reserve training in late August and early September, a common time for Atlantic hurricanes.

"My Corps supervisors have taken the position that as long as I continue to do a good job and complete all my assigned projects, then the time I spend in the Air Force Reserve is a service to the country," he said. "I still have all my assigned duties here, just like any other employee. Sometimes it's hard to balance the two commitments. I often tell the squadron 'no' when projects here at the Corps won't allow me to be away."

> ***"Some storms are so powerful you can't discern a weak point on the radar."***

When conditions are favorable for a hurricane, the NHC tasks weather crews to find the storm's location, motion, strength, and size.

They request fixes, or coordinates, for certain times of day. "Each mission profile depends on how far out to sea the storm is and how many fixes we need," Otto said. "We normally fly an Alpha Pattern when penetrating a hurricane. The Alpha Pattern, which resembles an 'X,' begins 105 miles out from the storm center, proceeds to the eye, then out another 105 miles to the opposite side of the storm. We fly this pattern repeatedly, gathering data in all storm quadrants as well as fixing the storm center at our tasked times."

With a Corps job that requires travel, Otto won't fly every storm, but he's tracked countless hurricanes in the last decade. He's been up-close-and-personal with hurricanes Andrew, Fran, Erin, and Opal.

As the crews fly the Alpha Pattern into each quadrant of the storm, they measure the wind in each sector, the sea-level pressure in the eye, and the temperature difference inside and outside the eye. A mission could easily last 12 hours.

But flying into the middle of a hurricane with 140 mph winds isn't as dangerous as it sounds, Otto said. "While it's obviously extremely bad weather, flying into a hurricane is more long and grueling than terrifying. Every now and then, though, storms like Andrew will get your attention. That was quite a ride.

"With some storms, penetrating into the eye is like trying to fly through a wall. I've encountered severe downdrafts where we've lost 3,000 feet of altitude just like *that,*" he said, snapping his fingers. "That's why we fly at 10,000 feet in a big hurricane."

The crew reports weather data every 30 seconds, and the WC-130 carries special equipment to do that. Sensors mounted on the plane are tied into computers and automatically measure temperature, humidity, barometric pressure, altitude and winds. The crews also parachute sensors called dropsondes into the storm to measure weather data down to the ocean surface. The information is transmitted to a satellite, which relays the data to the NHC.

If the storm is far from land, fixes might be needed for six hours. As it approaches land, the fixes might be increased to every three hours. In that case, "every three hours somebody has to be in the eye," Otto said. "On a landfalling hurricane, you can count on a 53rd aircraft being in the storm virtually 24 hours a day."

Some storms, such as Andrew, are so strong that both the pilot and copilot are needed to control the aircraft — one on the flight controls and the other on the throttles. "The eyewall is made up of embedded thunderstorms," Otto said. "These storms have tremendous downdrafts, updrafts, and turbulence. Flight conditions are changing so rapidly you have to have two pilots flying.

"Some storms are so powerful you can't discern a weak point on the radar," Otto said. "You just set your best thunderstorm penetration air speed and bust through. We'll try to avoid the worst weather, but often we're in the weather and can't see. We are flying on instruments, relying on the radar and the navigator for guidance."

With coastal area populations growing and potential property damage greater, more attention is now focused on hurricanes. A typical hurricane warning costs about $192 million due to preparation, evacuation, and lost commerce, said Air Force officials. Narrowing the warning area could save $640,000 per mile or more. They report that accurate data from Air Force and National Oceanographic and Atmospheric Administration aircraft has improved forecast accuracy by 25 percent.

Hunting hurricanes is not all Otto has done as an Air Force Reserve pilot. He made 25 flights into Panama during Operation Just Cause in 1989, and 30 flights during Operation Desert Shield in 1990. So Otto faces the difficulties of balancing two challenging careers.

But he calls that the easy stuff. "The most difficult part is being away from my wife and two children," said Otto.

New Orleans preserves cultural icon

By Lira Frye
New Orleans District

Virgin Island in Pierre Part, La., which New Orleans District restored, has long been the scene of the annual celebration of mass in honor of the blessed Virgin Mary on Mother's Day. Worshipers gather for the mass around the island in boats; a blessing of the vessels has become customary. (Photo courtesy of New Orleans District.)

Virgin Island in Pierre Part, La., is not an exotic tropical island, but it *is* an important historic property to the Acadian people of the area. Faced with the loss of the island to stream bank erosion, the parishioners of St. Joseph the Worker Catholic Church turned to New Orleans District (NOD) to help preserve their heritage.

Located at the intersection of Bayou Grosbec and Bayou Pierre Part in Assumption Parish, La., Virgin Island is home to a statue of the community's patroness, the Blessed Virgin Mary. The statue has quite a history.

During a hurricane in 1882, floods destroyed the interior of the chapel in Pierre Part. A small statue of the Virgin Mary fell off its stand in the chapel, but landed on its feet in the water. So, unlike other statues in the chapel, it was not ruined by exposure to wind, rain, or flood. In 1892, the parishioners placed the statue on Virgin Island where it could be seen.

In another flood sometime between 1892 and 1909, the rising waters stopped at the feet of the Virgin Mary's statue, then receded. According to local history, this incident reinforced the notion that the Virgin Mary protected Pierre Part. Finally, a powerful hurricane in 1909 blew the statue over, breaking it. A large concrete statue was acquired to replace it and is still present on the island.

In 1976, the island was renovated and a wooden bulkhead built around it. This bulkhead is beginning to fail, and that's where the district becomes part of the story.

When church officials requested federal assistance to prevent the historical landmark from being lost to streambank erosion, they were directed to the district's Continuing Authorities Program. The project fell under Section 14 of the Flood Control Act of 1946. Work under Section 14 is intended to prevent erosion damage to highways, bridge approaches, public works, and other non-profit public facilities by the emergency construction or repair of streambank and shoreline protection.

Ada Benavides, Planning Division study manager, got the assignment.

From study initiation to construction award for Section 14 work normally takes 12 months, but Benavides' team completed their project in less than seven months.

"We received money for the study in March, and the first thing we did was take a field trip to the site," said Benavides. In April the team planned the design analysis. "I asked the team members what they thought would be the best way to protect the island. We determined that building a steel sheetpile wall around the island would be the most cost-effective method of construction."

The plan consisted of building a tieback sheetpile wall around the little island, which is about 250 feet long and 45 feet wide, and placing dredged fill material in the existing eroded areas. The construction cost would be about $341,000.

There was one stumbling block, though. To be eligible for Section 14 assistance, Virgin Island had to be included in the National Register of Historic Places, the nation's official list of properties worthy of preservation.

"That was our biggest hurdle," Benavides said. "It was the first time that a historic property in Louisiana would be found eligible for the National Register as a traditional cultural property. The fact that the island is a religious property made it even more difficult."

To prove the island's eligibility, Planning Division's contractor, Earth Search, Inc., researched and presented the historic and cultural value of the island. If the island didn't get approval for the National Register, the project would be discontinued.

In September, the keeper of the National Register determined that Virgin Island was eligible. The deciding authority said the Corps convinced them of the historical and cultural significance of Virgin Island in the lives of the Acadian people of Pierre Part.

"With this determination, we convinced Mississippi Valley Division that preserving the island would produce intangible benefits equal to or greater than the cost of building the project," Benavides said.

"Completing the Planning Design Analysis and approval of this project in a six month time-frame is historic in NOD," she added. "This project was also significant because of its controversial nature as a religious site. We weren't sure of obtaining eligibility by using the historic and cultural value route since it was the first time we tried it. However, the approval has opened the door for us. We can now use this resource to participate in other historic and cultural value projects."

Construction around the island, performed by the district's hired labor unit, is scheduled to be completed this month.

Sci-fi weapons under development

By Joan Mier
Albuquerque District

Beam weapons that can destroy the enemy with a lance of energy may seem like the stuff of *Stars Wars* and *Star Trek*, but Albuquerque District is playing a role in their development.

The district recently awarded the design/build contract for the Advanced Laser Facility at Phillips Laboratory to Black and Veatch of Kansas City, Mo. The $8.5 million facility will be used by the lab to develop laser technology for the Air Force's airborne laser program.

"The lasers are mounted on 747s and used to explode missiles in the air," said Kent Heyne, project manager. "They are much more accurate than what's available for use today. This facility is where they will develop electronic and chemical lasers." The 20,000-square-foot facility also includes an 8,000-square-foot laser testing area.

The high degree of technology necessary to design and build the facility is roughly equal to that required to build a hospital, according to Heyne. "The volatile chemical piping and tubing that must be included in the construction make this a very high-tech facility," he said.

The project was a fiscal year 1997 congressional insert, which meant it had to be advertised and awarded during that fiscal year. "That was very difficult because we didn't get the authorization to prepare the Request for Proposal until the end of September of 1996," Heyne said. "The team did a great job."

The project is also notable for being the first in the district to be advertised using the electronic bid sets, where all bid documents are contained on a single CD-ROM disk. "We're still learning and trying to streamline this method because we see it as the way of the future," Heyne said.

The design phase of the project will be completed in about six months with an anticipated occupancy date of February 2000.

Around the Corps

Military award

Col. Greg Bean, commander of Memphis District, has been named the outstanding Military Person of the Year, 1997, by the Military Affairs Council of the Memphis Area Chamber of Commerce. Bean competed with several hundred other military personnel in the Memphis area, and was the first Army recipient in 17 years.

Computer sale

Norfolk District came up with a novel way to get 70 computers. Instead of a large computer buy, it sent a Corps-wide search on e-mail for used computers. The district was setting up training stations to help its members convert to CEFMS, and new systems were not required.

Cheryl Bailey, Kansas City District's (KCD) chief of Logistics Management, responded. Today, Norfolk has its computers and KCD has reduced its inventory. Bailey said this was an opportunity to assist another district, saving taxpayer money and cleaning warehouse space at the same time. "It removed some 210 accountable items from our property book."

In the past, KCD has donated computers to local school systems, but never in the amount of this transfer, and never to another government agency. No money exchanged hands. That many new systems would have cost Norfolk $144,000, but all it paid was about $1,500 for a freight line to pick up the units in Missouri and deliver them to Virginia.

KCD's costs were a few manhours in checking the systems and preparing them for shipment, not much different than if the systems were being sent to a school or the computer graveyard. KCD people cleaned the systems, recorded the serial numbers, ensured they worked, and the hard disks were reformatted leaving only the "Command.Com" file to allow the system to boot up. Then they were packed in crates for shipment.

Special safety award

Col. Jonathan A. Jacobsen, commander of Japan Engineer District, recently presented the U.S. Army Corps of Engineers Major Command Contractor Safe Performance Award to Hazama Corporation for the firm's outstanding safety record while building the Vehicle Maintenance/Operations Facility, Misawa Air Base, Japan.

Hazama Corp. is the first foreign contractor to get special MACOM recognition for its safety record. The firm had no recordable accidents during the 1.25 million man-hours it took to build the 72,353-square-foot facility. Also, in the past four years, Hazama Corp. accumulated almost 10 million man-hours of accident-free construction on other Corps projects in Japan.

Jacobsen also gave K. Yamamizu, project manager for the Hazama Corp. Misawa project office, the District Commander's Safety Award for managing the project and recognized him for maintaining an active Facilities Improvement Program project safety committee.

Partnership

The Corps and American Waterways Operators (AWO) have established a partnership to improve the efficiency of the inland waterway system. Thomas A. Allegretti, AWO President, and Charles M. Hess, the Corps' Chief of Operations, Construction and Readiness Division, structured the partnership on total quality management principles.

There will be a national Quality Steering Committee (QSC) of senior navigation industry and Corps representatives which will identify opportunities for improvement from the barge and towing industry, AWO, and Corps staff. Quality action teams (QATs), working under the QSC, will address and recommend solutions to specific problems or issues having Corps-wide policy implications. QAT members will come from USACE and the navigation industry.

Their efforts will be in concert with regional or local coordination among the navigation industry, USACE field elements, and the Coast Guard to address waterway-specific issues and the USACE-wide effort to improve the operational and financial efficiency of the inland waterways infrastructure and other operations and maintenance functions.

PRISM developer dies

Jack Jordan, formerly of Huntington District Programs Office, died on Nov. 6 in Huntington, W.Va. He was 74 and retired from Huntington District in 1989.

Jordan began his career in Huntington District as a Civil Engineer in Construction Division. He moved to Programs Division where he worked on a network analysis system leading to a district system to allocate resources. He formed a team which developed computer programs for the IBM 360 and, by 1970, Huntington District had a fully operational resource allocation/project management system that they called the Management Information System.

In 1971, the system was expanded throughout North Central Division (now Great Lakes and Ohio River Division) and renamed the Resource Allocation System. In 1972, headquarters adopted the Huntington System as the prototype for the Corps. Modifications were made, the system renamed Resource Allocation/ Project Management and seminars were presented around the country to deliver the system. That system was later modified and renamed Project Resource and Information System for Management (PRISM).

Jordan is survived by his wife, Marian, and son, Mark.

New Cape Cod Canal traffic system

A new, improved vessel control system at the Cape Cod Canal was unveiled on Nov. 21 at New England District's Buzzards Bay field office. Hughes Aircraft Company's Naval and Maritime Systems Division installed the system under a $4.8 million contract with the Corps, which operates and maintains the waterway.

The improvements integrate a variety of data into an automated system which allow marine traffic controllers in the Buzzards Bay control center to monitor and manage more than 8,000 commercial and 15,000 recreational trips through the 17.5 mile waterway each year.

The system integrates VHF/FM radio, five radar scopes, 11 closed-circuit television cameras, and several wind, air and water temperature, and tidal current sensors. Automatic processing of the data presents a complete picture of vessels and conditions in the canal, the approach channels, and the anchorage areas.

In addition to monitoring waterway activities, the system provides security and alarm monitoring for several buildings at the Buzzards Bay headquarters, as well as readings of wind and rain conditions which could require the restriction of traffic on the two highway spans over the canal.

The new system also incorporates devices in New Bedford Harbor to monitor tidal and wind conditions to assist in operating the New Bedford Hurricane Barrier. The barrier, which spans the harbor entrance, can be closed against tidal surges to protect harbor property from hurricanes and other wind-driven tides.

Louisiana forests

A series of lowland bayous surrounded by second-growth hardwood and Cypress forests make up the first state natural area in New Orleans District's history. The almost 4,000 acre Bayou Fordoche State Natural Area in the Atchafalaya Basin, will be cooperatively managed by the Corps, the Nature Conservancy and the Department of Wildlife and Fisheries.

The idea for a state natural area came when a private group, the Nature Conservancy, approached the district looking for a unique area to set aside for preservation.

"Bayou Fordoche is typical of the forest in the basin," said Robert LaFleur, district natural resource specialist. "The bayou has never been dredged and it's still in a pretty natural state. It's also assessable only by water, so it was a good candidate for the program."

Robert Russell, Planning Division wildlife biologist, said naming the bayou a natural area means every effort will be made to maintain the natural characteristics of the forest. "We will allow traditional uses such as fishing, hunting and crawfishing, and people can use motorized boats, but not motorized vehicles," he said. "No roads or paths will be cut through the area."

The district will manage the area following the Nature Conservancy's guidelines.

LaFleur said the district's motivation to manage a natural area was also sparked by a sense of responsibility. "We wanted to put something back into the basin after disturbing the area when we built the levee," he said. "Also, we can use the area as a research tool. It's a great opportunity to watch the progression of species over time without man's influence."

Plane crash

On Sept. 13, a small homebuilt plane crashed into Fort Gibson Lake in Tulsa District. Park ranger Darvin McClellan went immediately to the boat ramp nearest the accident.

Some fishermen took him by boat to the scene where they found the plane partially submerged and filling with water. Another fisherman had already arrived, and was holding one victim's head out of the water. McClellan and the fisherman pulled the plane into more shallow water, and began to cut both victims out of the plane while more help was summoned.

Park ranger Jim Montgomery and Jeff Seward arrived by patrol boat to help while ranger Jonathan Polk got the work barge and other equipment ready. Once the victims were removed and transported, the rangers used the work barge to tow the plane back to the Wagoner City Park boat ramp where it was picked up by the Federal Aviation Administration.

One person was killed but the other's life may have been saved by the rangers and the fishermen.

SandyDuck

The Waterways Experiment Station sponsored SandyDuck, the world's largest coastal field experiment, at Duck, N.C., Sept. 22 through Oct. 31. The research will advance knowledge of how natural forces (water, wind, and sand) cause beaches to change.

More than 100 scientists, technicians, and students monitored 400 sensors in support of 30 research experiments. SandyDuck's participants were from the U.S., Canada, and Great Britain and represented 18 universities, six governments, and two private companies.

SandyDuck was sponsored by the Corps, the Office of Naval Research, and the U.S. Geological Survey and held at the Corps' Field Research Facility at Duck.

Previous near-shore experiments focused on understanding waves and currents. SandyDuck emphasized measuring and understanding sediment movement through a variety of sophisticated sensors. These included acoustic probes, current meters, fiber optic sensors, side-scan sonars, secscan sonars, acoustic altimeters, radar systems, and others.

Corps completes flood cleanup

By Peter Verstegen
St. Paul District

For much of the past year, St. Paul District has been helping eastern North Dakota and western Minnesota recover from record floods in early 1997. Although the floods occurred in the spring, the last of the district's work ended just weeks ago.

"We put in a herculean effort," said Tim Bertschi, manager of the Flood Control Project office in Fargo, N.D. "We worked through many unforeseen weather conditions. We had the 'mother of all floods,' with a blizzard in the middle."

Autumn rains in the region had been two-to-four inches above normal, saturating the ground. Seven blizzards struck during the winter of 1996-97, piling up record snowpack. April opened with temperatures 10 degrees above normal. The snow melted rapidly and, on March 30, the Red River began to flood. Then on April 5 it began to rain and about two inches fell in one day.

On April 6 an eighth blizzard struck. Temperatures dropped to 20 degrees colder than usual, with wind gusts up to 50 miles per hour and windchill of 40 below zero. Six deaths in Minnesota and two in North Dakota were attributed to the weather.

The flood was recorded as a 200-year event on the Red River of the North. St. Paul District, augmented by volunteers from other U.S. Army Corps of Engineers districts, fought the floods for most of April, and have been involved ever since with recovery efforts.

Grand Forks, N.D., and East Grand Forks, Minn., were among the communities hit hardest by the flooding and required the largest recovery effort.

"St. Paul District achieved a number of major objectives in its recovery efforts for the Grand Forks area," said Bruce Boldon, recovery manager. "One objective was providing temporary housing for the hundreds of people who were displaced by the flood. A second was quite visible — the pickup of debris off the streets of Grand Forks. The third was cleaning the sanitary and storm sewers in Grand Forks."

A Corps contractor cleaned about 75 percent of the sanitary and storm sewers in Grand Forks. The contractor ran high-pressure water hoses with cleaning heads through each sewer line. Debris collected in manholes and catch basins where it was pumped out. "This took about 75 days, and cost about $2.7 million," said Boldon.

"Demolition was a fairly major mission, too," said Rick Tillman, New Orleans District. "We took down 150 residential buildings that were determined to pose an immediate threat to health and safety." These were located along the Red River in Grand Forks.

"The total for recovery missions will be between $20-22 million," said Boldon. One of the last recovery contracts was for Pembina, N.D. "The Pembina demolition effort involved removal of 10 structures that were outside the city's main levee system," said Boldon. Pembina is wedged between Interstate 29 on the west, the Red River on the east, the Canadian border on the north, and the Pembina River on the south. "Work in Pembina is complete now," said Boldon.

Five major missions grew out of a total of 21 missions the district conducted for the Federal Emergency Management Agency (FEMA) in communities hit by the flood. North Dakota had 12 missions and Minnesota had nine. The missions were authorized by FEMA under the Disaster Relief and Emergency Assistance Act (PL 93-288).

Major missions included debris removal, demolition, temporary housing, storm sewer cleaning, and inspecting structures. "Dollar-wise, the single biggest mission was debris removal," said Tillman. "There were three big debris removal contracts." Debris included fuel oil tanks, sandbags, home furnishings, appliances, and building material such as sheetrock. Altogether, the district's contractors hauled away about 625,000 cubic yards (75,000 tons) of debris from flood-stricken areas.

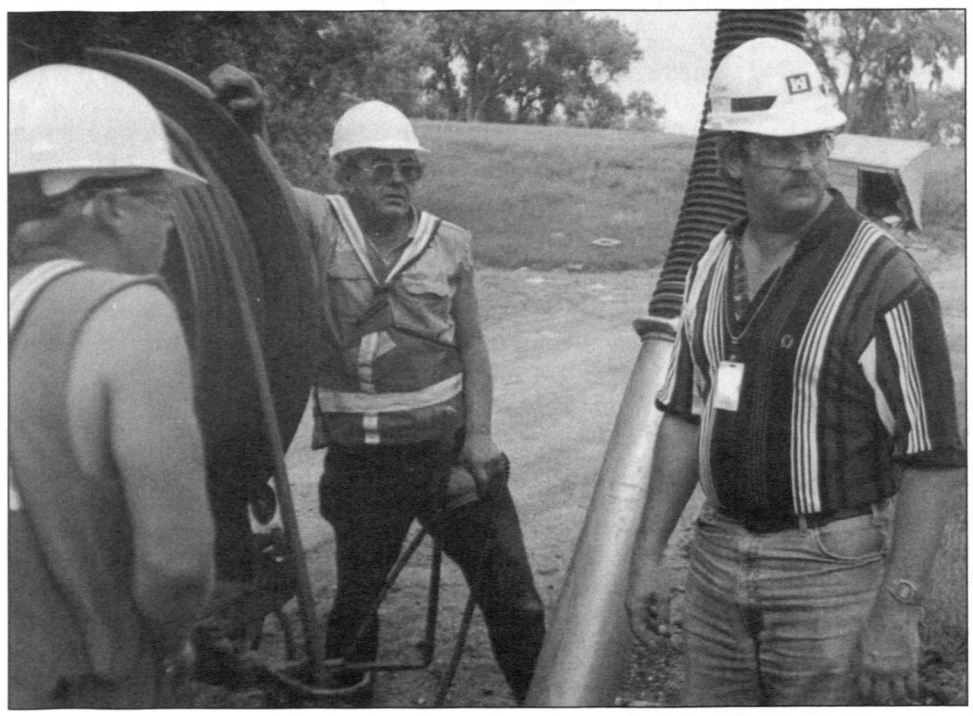
The district obligated about $8 million for debris removal, and more than $6 million to develop 549 sites for mobile homes for residents displaced by the flood. In East Grand Forks, the district contracted for two sites with 220 mobile homes each. In Grand Forks, the district developed two sites for 329 mobile homes.

FEMA provided the mobile homes and the district prepared the sites. "Site preparation consisted of installing all needed utilities, entrance roads, grading the site for drainage, and building gravel sidewalks and driveways," said Boldon. "Utilities included electrical, water, natural gas or propane, cable television, sanitary and storm sewers, telephone service, and mailboxes."

At the peak of efforts, 84 people worked recovery missions, "plus four or five providing support from the district office," said Boldon. Between 130 and 140 people from 14 Corps districts and the Construction Engineering Research Laboratory rotated in and out. Districts which provided primary support included Detroit, Fort Worth, Jacksonville, Louisville, Memphis, Mobile, Nashville, New England, New Orleans, Rock Island, Saint Louis, St. Paul, Savannah, and Vicksburg.

Melvin Cundiff of St. Louis District, (left), meets with a Corps landfill management contractor at the Grand Forks, N.D., landfill. (Photo courtesy of St. Paul District.)

A contract employee works to remove debris from a residential neighborhood in Grand Forks, N.D. About $8 million was obligated for debris removal. (Photo courtesy of St. Paul District.)



Rick Tillman (right), New Orleans District, visits contract personnel as they operate equipment designed to clean out sewers in Grand Forks, N.D. Sewer cleaning was one of the Corps' major recovery missions after record-breaking floods ravaged the area last spring. (Photo courtesy of St. Paul District.)