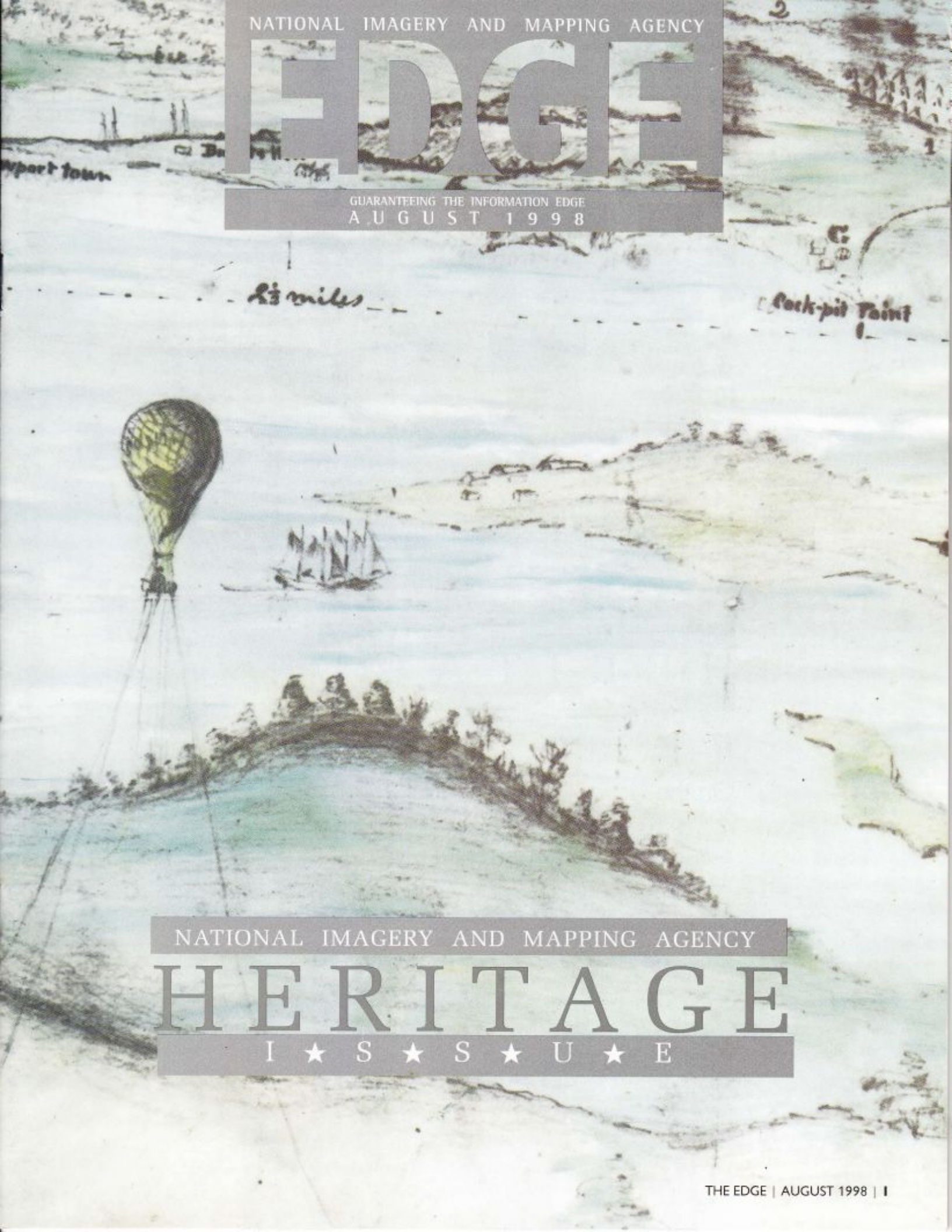
NATIONAL IMAGERY AND MAPPING AGENCY

EDGE

GUARANTEEING THE INFORMATION EDGE
AUGUST 1998



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HERITAGE

I ★ S ★ S ★ U ★ E

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HERITAGE

I ★ S ★ S ★ U ★ E

On the Cover

An aerial sketch of Virginia, made from Professor Lowe's balloon, for the Commander in Chief, Dec. 8, 1861 by Col. William F. Small, 26th Regular Pennsylvania Volunteers.

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COMMAND POST

The imagery and mapping traditions of NIMA have a proud and illustrious heritage. The cover of this issue is especially relevant to this heritage because it reflects pioneering aerial reconnaissance by the U.S. during the Civil War, uniquely blended with topography and hydrography. Although crude by today's standards, this melding of technology survives today with applications of great value to diplomats, warfighters and in rescue and firefighting efforts worldwide.

NIMA's proud heritage spans more than two centuries. While the colonies were still battling for independence, George Washington, an accomplished surveyor and mapmaker, appointed Robert Erskine to meet the mapping needs of the Continental Army. That appointment is the first root of our old family tree.

U.S. map- and chart-making proceeded at an ever-accelerating pace ever since. Lewis and Clark are among our forebears, as is Matthew Maury, who pioneered charting for the Navy. The Civil War introduced airborne imagery when the Union Army ascended in balloons to observe Confederate forces and photograph ground installations.

In World War II, we produced more than 500 million maps. And by 1945, imagery collection and analysis had become an integral part of all military planning. The first U-2 mission was flown more than 42 years ago (on July 4, 1956). The National Photographic Interpretation Center (NPIC) was created over 37 years ago, at the dawn of the photo reconnaissance satellite era, and reaffirmed the United States' lead in extracting information from a variety of imaging systems.

Through the Korean War, Vietnam and all of the Cold War—and today, in an uncertain environment—we continue to deliver the world's best geospatial and imagery intelligence products. Our efforts during Desert Shield/Desert Storm are some of the most legendary in our history.

NIMA is the inheritor of a great tradition and keenly conscious of its obligations to defend the nation. Our amazing past influences the present. We should all be proud to be a part of this unbroken tradition of professional service, devotion to duty and excellence in guaranteeing the information edge.

James C. King
Major General, USA

Focus Days Spotlight Critical Issues

by Laura Snow
Director, Congressional and Public Liaison

There's something missing, but something gained, at NIMA on the fourth Thursday of every month. What's missing is the senior leadership, who convene at the Reston Auditorium to focus attention on a specially selected issue that is critical to NIMA's success.

What's gained is renewed corporate commitment to solving a hard issue.The need for a monthly gathering of NIMA's corporate leadership was first identified at their April 1998 offsite. At that session, it became apparent that some issues are so intertwined with NIMA's ultimate success or failure that they required the dedicated stewardship of senior leaders.

WORKFORCE21 *was the topic of the first Focus Day in May* (see article below). *The June session directed scrutiny to NIMA's mission, vision and values to ensure their continued relevance and to galvanize management support for them.*

Why a focus on NIMA's mission, vision and values? To Major General James C. King, the answer is straightforward. If the Agency's leaders do not accept, understand and personify the NIMA mission, vision and values, the Agency will fail to achieve them.

"We can't will things to happen," said King. "Neither can we simply communicate with 50 people at the top and expect change to occur. We must doggedly repeat our mission, vision and values over and over again, reinforcing them at every opportunity."

After lively group analysis and discussion, General King announced his decision to retain the Agency's mission statement as "Provide timely, relevant and accurate imagery, imagery intelligence and geospatial information in support of national security objectives." The Agency's vision of "guaranteeing the information edge" was judged to remain pertinent

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NIMA Vision

"Guaranteeing the Information Edge"

- Our information provides the common reference framework for planning, decisions and actions.
- Our customers will have ready access to the databases of imagery, imagery intelligence and geospatial information that we acquire or produce.
- Our information is used to create tailored, customer-specific solutions.
- Our information enables our customers to visualize key aspects of national security problems.
- Our people's expertise is critical to acquiring or creating the information that gives the advantage to our customers.

NIMA Core Values

We are committed to:

- Our **Customers**!
- **People** who demonstrate pride, initiative, commitment to our vision and mission, personal integrity and professionalism.
- A **Culture** that promotes trust, diversity, personal and professional growth, mutual respect and open communications.
- An **Environment** that rewards teamwork, partnership, risk-taking, creativity, leadership, expertise and adaptability.
- A **Tradition** of excellence and personal accountability in all we do.

WORKFORCE21 Gleans Leadership Support at Focus Day '98

by John Iler

The nuts and bolts of the Agency's new personnel system was the topic of one of NIMA's Focus Days, held recently at NIMA Reston. There, the Agency's top management met for half a day to gauge the progress of implementation and offer input into the WORKFORCE21 team.

"WORKFORCE21 is the future of our agency," said Army Maj. Gen. James C. King, NIMA's Director, in his opening remarks. "I am convinced that how our mid-level managers deal with WORKFORCE21 will be the benchmark for our success or failure for what we're doing."

King said NIMA employees want consistent treatment and fairness in recruiting and promotion. It is up to management at all levels, he added, to ensure that responsiveness, openness, and accessibility are all embodied in WORKFORCE21.

"Our credibility and their perception of us pulling this off successfully lies in the balance," he said. "We're not going to get by on words alone—we have an extremely complex program that we must implement in a fair, unwavering sense. People see their careers in our hands. They're saying, 'Leaders, you have to show us you can do it.'"

Ed Obloy, vice chairman of the WORKFORCE21 Project Steering Team, called the new personnel system "a revolution."

"No longer will longevity for longevity's sake be rewarded," he told NIMA's leadership. He added, smiling, "Performance will be rewarded—an entirely new concept to many under the old system."

All concepts of the new system were discussed, including pay banding, promotions, appointments, ratings, training, resources, skills analysis, occupation councils and strategic workforce planning.

King called Focus Day "a very productive session."

"It's made it clearer what WORKFORCE21 is and what it will be," he said. "And it's shown us how much we've done and how much more we need to go. It will take total commitment on our parts and that will be the key to its success. Seeing the detail of work done by the WORKFORCE21 team makes you realize that this is not an impossible task—that it can be done."

Implementation of WORKFORCE21 is subject to the completion of the Agency's labor relations obligations. Bargaining unit employees may refer questions or comments on WORKFORCE21 directly to union officials.

Maudlin, Ghormley New Regional Commanders

by Don Kusturin and Joan Mears

Change-of-command ceremonies were held this month at NIMA's east and west regions.

Army Col. Delmar C. Maudlin Jr. became regional commander, Mission Support East, and Army Col. Larry Ghormley became regional commander, Mission Support West.

Maudlin replaced Col. Jim Bryan (see July *Edge*), who retired in July. Ghormley replaced Col. James Stordahl, who retired in August.

Maudlin, a Kentucky native, graduated from Purdue University in 1974 and was commissioned in the Corps of Engineers. He also attended the Command and Staff College and the Air War College.

He served with U.S. Army Forces Command, Fort McPherson, Ga., and the 1st Armed Division in Germany. He is married to the former Angela K. Leach. They have two children.

Stordahl retires from the Army after more than a quarter of a century. He entered military service at the end of the Vietnam War and began his career at Fort Ord, Calif. He's been to Panama; the University of Wyoming as an assistant professor of Military Science; Hawaii; Virginia; and Mannheim, Germany. He has held various command positions before becoming regional commander.

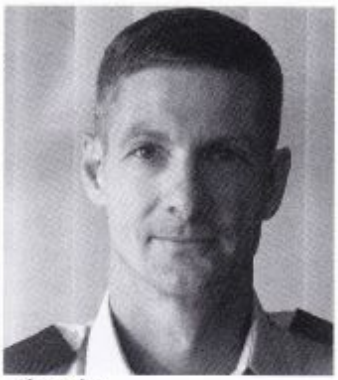
Maudlin

Under Stordahl, NIMA became more a part of the St. Louis community by his chairing the Federal Executive board and joining the Regional Commerce and Growth Association.

What will he miss most about NIMA? "The people—no doubt about it. The people here are great!"

Ghormley comes to NIMA from the Army's Personnel Command. A 1975 graduate of West Point, he proceeded to Germany as a platoon leader for the 8th Infantry Division for his first assignment.

Serving as a battalion commander at Fort Bragg, N. C., he returned to the academy as an instructor of military history. He also served in Alaska and Texas.



Ghormley

Ghormley holds a master's degree in history and a master's degree in civil engineering, both from the University of Michigan. He also is a graduate of the U.S. Army Command and General Staff College. He and his wife, Lea, have three children.

To Ghormley, Stordahl leaves these words: "Congratulations. He is going to have a great time. He's a super guy and I think he's going to have a lot of fun. It's very unique; it's not your run-of-the-mill, Army colonel command kind of job."

Stordahl and his wife Marian will begin retirement with a "trek" to visit their children.

NIMA Gets New Chief of Staff

by Tammi Kiser-Sparks

Army Col. Michael R. Thompson assumed the chief of staff position July 22, following a two-year tour as Commander of the 2nd "Dagger" Brigade, 1st Infantry Division, Schweinfurt, Germany.

Lt. Col. John Biggs, formerly acting chief of staff, returned to his position as chief, Human Resource Military Division, Human Resources Office.

"We look forward to returning to the D.C. area after two more years overseas and living the difficulty of missions between the Balkans and Germany," said Thompson. "I especially look forward to working with all the professionals at NIMA as we work to bring the true power of information into the hands of warfighters into the 21st century."

Thompson, a native of Wyoming, is a 1973 graduate of West Point with a bachelor of science degree. He was first commissioned an infantry second lieutenant. He earned a master of science in photogrammetry and geodesy from Purdue University and a master of military art and science from the School of Advanced Military Studies. His military education includes Infantry Officer Basic and Advanced courses, the U.S. Army Command and General College and the U.S. Army War College.

Thompson has held a variety of command and staff positions, including assignments in Bamberg, Goeppingen, Baumholder and Schweinfurt,Germany; Bosnia and Fort Benning, Ga.

Thompson

He is married to the former Cheryl Ann Maurer of Long Island, N.Y. They have one son, Michael, 16.

It's Back to School

for NIMA's School Partnership Program

photos by Ted Koth

Students listen intently while visiting the NIMA Map Library.

MG James C. King presents a certificate to a West Elementary School Geography Bee winner. Winners were treated to a visit and lunch at NIMA Bethesda.

by Joan Mears and Sharon Smith

With the school year rapidly approaching, NIMA is renewing its commitment to the schools it supports in the St. Louis, Washington and Northern Virginia areas.

Each year, NIMA coordinators meet with school officials to evaluate academic needs and determine how NIMA can assist them in the educational process. Coordinators then enlist the aid of volunteers to support partnership activities—activities such as reading, tutoring, science fairs, spelling bees, geography bees or simply helping with homework.

Volunteers also serve as positive role models. It's an opportunity for the Agency to contribute to the community and to the future of its youth.

"It doesn't matter whether you can spare an hour a week or an hour a month," said Mary Seavey, a NIMA Bethesda volunteer. "Any time that's contributed can be a beneficial learning experience to someone who needs the help."

Last year, more than 100 NIMA employees participated in the School Partnership Program. Consistent with mission requirements and supervisory approval, volunteers support partnership activities at the school during work hours. While the program is sponsored by the Congressional and Public Liaison Office under its community relations activities, volunteers throughout the Agency are the backbone of the program. At a recent awards ceremony in Bethesda, NIMA Director MG James C. King enthusiastically praised those who volunteered in the 1997-1998 school partnership program.

President Reagan introduced the education initiative in 1984 by proclaiming that year as the "National Year of Partnerships in Education." This was followed by President Bush's educational program "America 2000." In support of his predecessors's efforts, President Clinton signed "Goals 2000: Educate America Act" (P. L. 103-227) into law March 31, 1994. Agency guidance regarding school partnerships is provided in NIMA Instruction 5740.1, May 27, 1998.

For more information, contact Joan Mears in Bethesda at (301) 227-2057 or Sharon Smith in St. Louis at (314) 263-4142.

In Washington:

West Elementary School, Washington, D.C.

•The grocery receipts program was a success with more than $35,000 in receipts collected by NIMA volunteers for donation to West. Local grocery stores give schools computer supplies and equipment in exchange for grocery receipts. Coordinator for West Elementary was Air Force Maj. Bryan Fortson.

•The geography bee was a big hit. Using a game-show format, teams of NIMA personnel asked children various geography questions. The prize was a visit to NIMA Bethesda where Major General King presented certificates of recognition and NIMA mementos. The Director praised the children for their accomplishments and encouraged them to always seek the answers to their questions. The children then toured the map library and credit union followed by pizza and cake in the Erskine Hall cafeteria (lunch courtesy of the Constellation Federal Credit Union).

Cheney Elementary, Fort Belvoir, Va.

•Working closely with the garrison commander at Fort Belvoir, coordinator Air Force Capt. Kathleen Decker and 17 other NIMA volunteers met weekly with students to provide individual tutoring. Other volunteers participated in special school events.

•Students and teachers loved the partnership mementos — pencils, erasers, rulers and pencil cases. Volunteer tutors gave children a pencil and eraser as a reward for their efforts. School counselors distributed the items to recognize good behavior. The globe erasers were a real favorite of the first graders who happened to be studying the continents at the time.

Hutchison Elementary, Reston, Va.

•Volunteers initiated a "pen pal" program at Hutchison to enhance the writing skills of first graders.

•NIMA was nominated for Fairfax County's Volunteer of the Year award for its support to Hutchison. Coordinator Linda Tsagos represented NIMA at Fairfax County's annual volunteer recognition breakfast held in May.

In St. Louis:

Sigel Elementary

•The Reading Connection, a read-aloud program for children in kindergarten through second grade, has proven successful in improving children's vocabulary, demonstrating the practical applications of reading and exposing students to adult role models whose expertise is not traditionally available. Each team, consisting of two to four people, is assigned a classroom. Team members alternate selecting materials and reading to the children once a week for 20 to 30 minutes. Throughout the school year, the teams often sponsor unusual or unique activities, such as a picnic on the playground or a visit from Santa. To the delight of the students, one team even arranged a tour of the public library.

Dewey School of International Studies

•Students at Dewey, a magnet school with emphasis on foreign languages and cultures, continue to enjoy the unique experience of having stories read to them in Spanish, thanks to the Hispanic Employment Program committee that solicited volunteers for this special project. In addition to reading, volunteers made presentations with a Hispanic theme. Art and culture of Puerto Rico and Hispanic holidays were just two of the topics covered. For more information on the Spanish Reading Connection, contact Mary Phillips, (314) 263-4383.

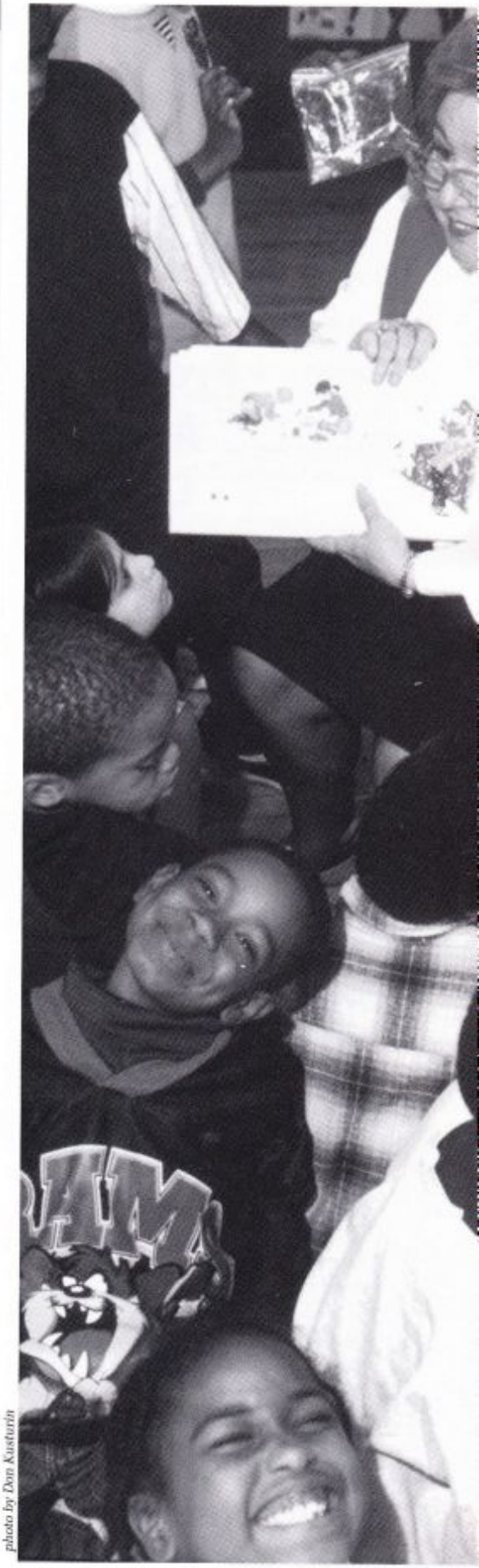


photo by Don Kusturin

NIMA Team Wins Accolades Building Custom Products Aboard Carrier

Vic Kuchar

USS John C. Stennis

by Paul Hurlburt

The large poster recently received by NIMA and signed by the crew of the aircraft carrier *USS John C. Stennis* proclaimed, "JWID 98 — Thanks to NIMA!"

The poster salutes the Agency's support of this year's Joint Warrior Interoperability Demonstration (JWID). And it praises the initiative taken by NIMA in conducting the demonstration.

"Aggressive and innovative," said *Stennis* skipper Capt. Doug Roulston, describing NIMA's support. "Unwavering," said fighter pilot Lt.j.g. Kevin Nelson. These were just some of the inscriptions on the poster.

"Thanks for the monumental work," wrote Lt.j.g. Claudio Belto, the intelligence officer for a squadron of fighter pilots. And Gus Crissman, fleet targeteer, said, "Keep the good ideas coming!"

Against the backdrop of the Iraqi crisis, NIMA used its JWID 98 demonstration to provide operational support, thanks to the foresight and ingenuity of NIMA people.

In 1997, NIMA's demonstration—"Imagery and Geospatial Support to the Warfighter"—placed fifth out of 28 in utility and operational readiness. It wasn't enough to earn a "golden nugget," said Vic Kuchar, project lead for JWID '98, but evaluators did consider the demonstration a "diamond in the rough."

This year, NIMA's demonstration met or exceeded operational military requirements, said Kuchar—mainly because of strides taken to make the best use of NIMA products in the Iraqi crisis.

NIMA Keeps on Keeping On

At the close of JWID '97, NIMA, like other participants, had left equipment aboard *Stennis*. To ensure that this equipment found operational use, Rear Adm. Jack Dantone Jr., NIMA's Director at the time, pumped new resources into the demonstration, Kuchar said.

Technical support was provided by NIMA's customer liaisons in Norfolk. But that support would not be available with the imminent deployment of the carrier on its maiden voyage to the Arabian Gulf.

After several inquiries, Kuchar approached Data Generation Division (GID) Chief Mikel Jackson about placing personnel aboard the ship to provide direct support.

Jackson, said Kuchar, saw the deployments as "an opportunity for

photo courtesy U.S. Navy

his people to gain experience and provide support to the warfighter." Likewise, the Imagery Analysis side of the house assembled a team for deployment aboard the *Stennis*.

In January, Richard Simpson, a St. Louis-based physical scientist in the Science and Technology Directorate, spent two weeks aboard ship fabricating special products for the deployment. One was an imagery and geospatial template for the Arabian Gulf. Built from a database called the "Rosetta Stone," it is frequently updated by the U.S. Navy Central Command (NAVCENT) to stay current on Gulf activities.

As the Iraqi crisis heated up in February, Kuchar and the first team deployed aboard *Stennis*. Members were cartographer Dave Montgomery, imagery analyst Carolyn Barry and systems contractor Harold Bussey, of Draper Laboratory, Inc., Cambridge, Mass.

Crossing the Atlantic in 10 days, *Stennis* continued through the Mediterranean and, four days later was on station in the Arabian Gulf.

"To see that much naval force up and running in such a short time has to scare our enemies," Kuchar said.

NIMA Builds Custom Products

The NIMA team gathered information to build new products by talking with pilots, intelligence staff, strike planners—even Roulston and Vice Adm. Thomas Fargo, commander of the Fifth Fleet.

"We looked at what they were trying to accomplish with all their various maps and images, usually in hardcopy," Kuchar said. After assessing their inputs, the team merged various NIMA and other digital sources to make new, hybrid products.

"This was exciting because we were able to build custom, special-purpose products never seen or used before."

Although fabrication aboard ship was key to the process, crucial support was provided by many people stateside. These included Simpson in St. Louis and Bill MacDonald and Andy Cohen in Bethesda.

Many of the custom products were integrated versions of standard limited-distribution products, such as Controlled Image Base (CIB) merged into an ARC Digitized Raster Graphic (ADRG). The graphics contained an inset of the target area with the latest high-resolution image. Such products were provided in hard or soft copy depending on the request.

"This kind of product is invaluable," wrote pilot Kevin Nelson. "It's one of the first things asked for and one of the last consulted before launching a strike mission."

It "will make all the difference in getting F-14 bombs on target," wrote Lt. Cmdr. Hank Hamblet.

Digitally creating a new imagery or geospatial product over an area of interest, with the target in the middle, saved time normally spent researching and assembling the information. At the same time it allowed the pilots or anyone else on the military's Secret Internet Protocol Routing Network (SIPRNet) to view the target.

Responding to a request from Cmdr. Pete O'Brien, the admiral's intelligence officer, for a better digital targeting reference, systems contractor Bussey built a targeting home page on the SIPRNet. By clicking on a numbered target, intelligence planners and operational users could obtain maps, images and target information, including the latest imagery gathered by pilots. Said O'Brien: "You have turned a ton of my frustrations into a hell of a capability."

"We simply assembled everything that was available into a quick-retrieval format, kind of a one-stop shop," Kuchar said. "The pilots never seem to have enough time to get all the information they want."

"[You have] taken customer support/operational support to new heights," wrote *Stennis* intelligence officer Cmdr. Paula Moore.

Hearing about NIMA's support from his intelligence officer, Vice Adm. Fargo received a personal demonstration aboard *Stennis*.

"The admiral was very pleased that NIMA was providing this digital capability to *Stennis*," Kuchar said. "He suggested that NIMA work with his staff to get something similar at Fifth Fleet Headquarters so this capability would reside in Bahrain, where all the ships in [the] area could benefit."

The idea of the poster came when Rear Adm. Benny Suggs, the Stennis battle group commander, told Kuchar he wished there was some way he could thank all the NIMA people for their support.

Handing the admiral a pen and the image-map, Kuchar said, "Just write them a note in the margin. I'll see that it gets to them."

After Suggs had thanked NIMA people for their "great support," O'Brien said, "I'd like to write something, too." And so it went.

The fourth NIMA team is presently aboard *Stennis*. Meanwhile, NIMA is working on the request from Fargo to provide similar support to NAVCENT. More recently, the JWID program office asked the NIMA team to brief at its quarterly meeting, so that others could hear their success story. ‖

State Department Goes Geospatial

photo courtesy State Department

(l to r) State Department Geographer Bill Wood; State Department Assistant Secretary for Intelligence and Research Phyllis Oakley; NIMA's Air Force Brig. Gen. Arthur D. Sikes Jr.; Undersecretary Bonnie Cohen; NIMA's John Gates; and Navy Capt. Ben Jaramillo.

Phyllis Oakley, State Department assistant secretary for Intelligence and Research, and MG James C. King during his July visit to the International Affairs Geographic Information Center (IAGIC).

by Jennifer Lafley

Thanks to NIMA, the State Department is seeing the world a little differently these days.

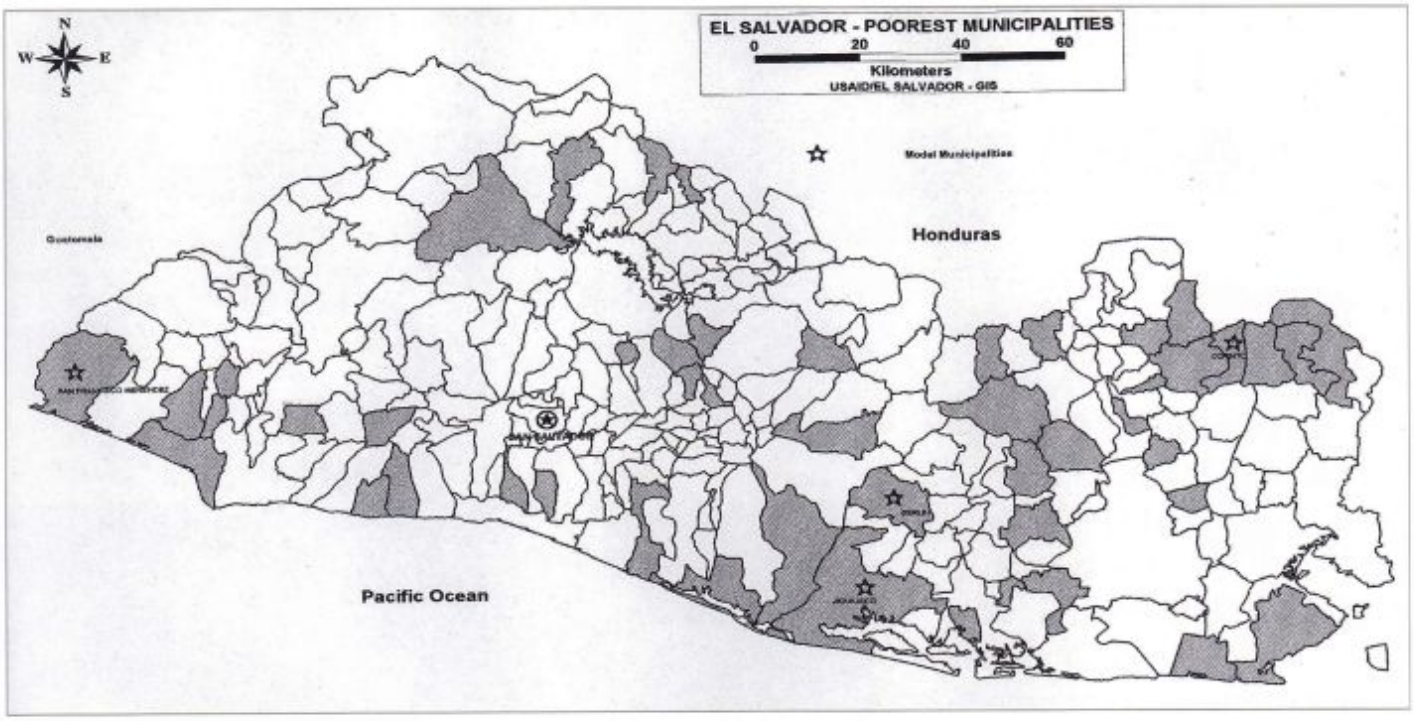
In July, the State Department previewed the International Affairs Geographic Information Center (IAGIC), scheduled to open this fall. MG James C. King, NIMA Director; Irv Buck, Customer Support Office (CO); Greg Smith, Technical Assistance Office (CC); and Charlie Russ (CO) visited the new center.

"The GIS [Geographic Information System] center will help the State Department to perform its mission. We are excited about the opportunity to help State," said Alan Huguley, part of the Customer Support Team that supports the State Department. "The GIS center will be providing them with data and capabilities to better demonstrate and affect foreign policy."

In March, State Department employees had the opportunity to explore the world of digital mapping when the department hosted its first Digital Map Expo that included satellite-based remote sensing imagery, digital mapping, imagery technology and GIS software. NIMA provided demonstrations and expertise.

At the expo, the featured speaker, State Undersecretary Bonnie Cohen said, "I am looking forward to working with the National Imagery and Mapping Agency to improve the Department's capabilities to manage geographic information.... We need your help, because no federal agency can afford to go it alone in the fast-paced GIS field."

The expo included a demonstration of how NIMA used remote sensing data to support border negotiations between Ecuador and Peru, a project that required a close look at the remote borders between the two countries. By using the three-dimensional "terrain visualization" fly-through of the Cordilla del Condor Mountain Range, the most accurate map ever created of the area was developed.



Poverty Focus Map: This is an example of an application of GIS using 1992 census data and NIMA digitized maps. The map shows 49 out of 262 municipalities meet the criteria to concentrate U.S. government aid.

Cohen gave this as an example of how GIS technology can help with diplomacy. "In the 1940's the U.S. Air Force performed the first detailed mapping of remote segments of the Ecuador-Peru border," she said. "This effort took three years, during which time two aircraft were lost and 14 Americans tragically lost their lives. Today, NIMA…in eight months developed and presented to the Ecuadorian and Peruvian negotiations scores of maps and imagery products covering more than 10,000 square kilometers."

She challenged the audience by asking them to visit the demos, talk to NIMA specialists and ask themselves, "How can we use this to improve the way we do our work?"

Because GIS technology is a new concept to many diplomats and foreign affairs specialists, opening the center may have a substantial impact on their work. Through the expertise and geospatial information provided by NIMA and other agencies, the State Department will be able to pull together diverse types of data over a region and better analyze and graphically demonstrate areas that require State's assistance.

NIMA is planning to have a technical representative assigned to the State Department. This liaison will help the center provide specific, tailored support to Department of State's bureaus and embassies.

"The State Department usually has *un*-typical requests," said Huguley. "For example, the geospatial data will help them with humanitarian relief by giving them new ways to identify roads, elevation of mountain passes and water sources." They are also frequent customers of NIMA's Geonames database.

The IAGIC will help NIMA provide superior, tailored support to the foreign policy and planning process, international negotiations, refugee and humanitarian assistance, as well as disaster mitigation, said Huguley.

The IAGIC will be managed by the State Department's Office of the Geographer and Global Issues, and will have both classified and unclassified components. By using NIMA's imagery-based products, State hopes to apply digital mapping technology to international relations. ▌

Focus Days

continued from page 4

and inspiring, but was enhanced with additional details to help promote widespread understanding (see box, page 4).

The Agency's core values were universally endorsed and retained (see box, page 4). Discussing the "values thing," Deputy Director Leo Hazlewood reminded leaders that core values represent not only how we do our work, but how we wish to be treated. Concluded Hazlewood, "If we do not 'live' our values, we should not have them."

What's next? General King made his expectations clear: Leaders must go forth and share, translate, explain, repeat, reinforce and embody the NIMA mission, vision and values to their employees. This means "walking the talk" to demonstrate their personal commitment at least two levels down into the organization. It also means adopting a corporate leadership style that recognizes the interdependencies within the Agency. Working as a team toward a common vision, we will "guarantee the information edge" for all NIMA's customers. ▌

THE EVOLVING saga

by Jim Mohan

In recent testimony, Director of Central Intelligence George J. Tenet told Congress that if there were no NIMA, one would have to be created to face the challenges of the future.

Formally established on Oct. 1, 1996, the Agency was a composite of several predecessor organizations and programs, including the Defense Mapping Agency, Central Imagery Office, CIA's National Photographic Interpretation Center, the Defense Dissemination Program Office and imagery elements of the Defense Intelligence Agency, National Reconnaissance Office and Defense Airborne Reconnaissance Office. It also was comprised of thousands of people and more than 2,300 policies.

1776

However, the history of NIMA did not begin with the consolidation of its robust predecessors. It was a natural evolution in the development of the arts of reconnaissance and map making.

American military mapmaking dates from June 1775 with the appointment to command of the Continental Army of George Washington. A surveyor himself, he had mapped the Shenandoah Valley a quarter century earlier.

As a military leader, he realized the vital importance of accurate maps to successful combat strategy. It was Washington who commissioned Scotsman Robert Erskine to survey roads, sketch the countryside and manage the fledgling mapping units that provided the nation's first full-time cartographic support.

Washington also realized the value of intelligence. In 1776, he directed Lt. Col. Thomas Knowlton to lead a company of military and civilian volunteers on reconnaissance missions. The creation of Knowlton's

1838

Rangers is celebrated as the birth of U.S. Intelligence.

During the next few decades, the boundaries of the states and lands of the new West, including the area of the Louisiana Purchase of 1803, were surveyed.

The most significant military mapping and intelligence development of the War of 1812 had been the authorization of topographical engineer officers by Congress in 1813. Post-war exploration of the West focused on the same missions as before the conflict—to gather data about the terrain, wildlife, plants, and inhabitants, and to prepare accurate maps.

Col. John J. Abert

In 1818, a centralized Topographic Unit was added. By 1838, Congress established the Topographical Engineers as a separate corps, naming Col. John J. Abert as commander. (Abert Hall, in Bethesda, is named in his honor.)

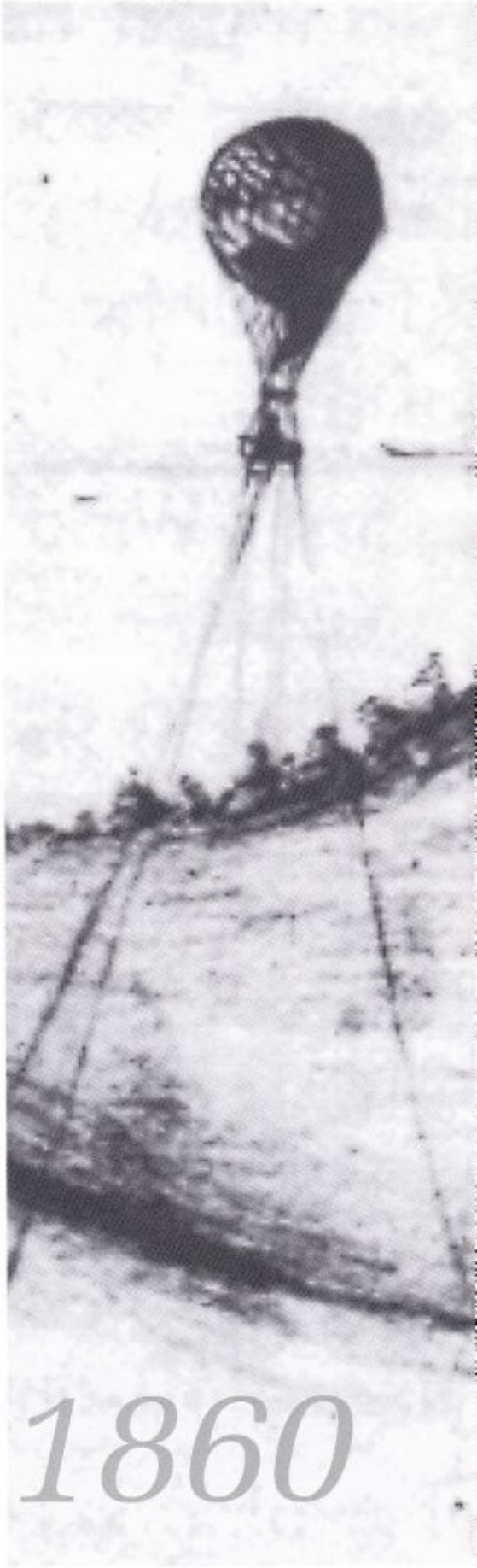
Eight years prior, the U.S. Navy established the Depot of Charts and Instruments in a rented house in Washington, D.C. Five years later a lithographic press was added and in 1837 the first engraved nautical charts were issued.

In 1842, Congress authorized and appropriated funds for the U.S. Navy Observatory and Hydrographic Office, and, in 1847, Lt. Matthew Maury called the founder of oceanographic science, issued a wind and current chart of the North Atlantic. (Maury Hall, also in Bethesda, is named in his honor.)

Army topographic officer John C. Fremont led significant expeditions into the West. Known as "the Pathfinder," Fremont, accompanied by famed frontiersman Kit Carson, reached the South Pass of the Continental Divide in 1842, charting the most favorable route to the Pacific Northwest. NIMA's Fremont Building, in Bethesda, was named after this explorer.

Continued on next page

1847



1860

Merging Technologies

The invention of the photographic camera in the late 1820s opened new possibilities for aerial reconnaissance, promising to provide tacticians with detailed photographs instead of drawings.

It was not until 1860, however, that the two infant technologies were married in the United States. On Oct. 13 of that year, Samuel A. King and James W. Black took the first American aerial photograph when they shot south Boston from the basket of the balloon *Queen of the Air* at an altitude of 1,200 feet.

1918

Mapping and charting on land and sea expanded during the Civil War, with topographic and hydrographic officers serving in both armies and navies. Manned balloons were used for the first time in the U.S. to observe and record the disposition of enemy forces.

In the spring of 1861, New Hampshire meteorologist Thaddeus S. C. Lowe took off from Cincinnati in a balloon to make weather observations. Caught up and carried by high winds to South Carolina, he was promptly arrested as a Union spy.

Convincing his captors that he had been conducting legitimate scientific experiments, he was released. But he became convinced that tethered balloons would make excellent platforms for observing Confederate positions. He arranged a demonstration for President Abraham Lincoln on June 18, during which he sent the first air-to-ground telegraph message. The president was sufficiently impressed and authorized the creation of an Army Balloon Corps with Lowe in command.

In 1863, responsibility for military mapping was transferred to the Army Corps of Engineers. Two years later, the first topographic company was formed at Jefferson Barracks, Mo. Later it was moved to Washington Barracks, now Ft. McNair, Washington, D.C.

After the war, westward expansion continued. Army surveyors resumed exploring and mapping, leading to the subsequent preservation of areas that became Yellowstone, Yosemite, and Sequoia National Parks. National civil projects included mapping out improvements to America's water resources, rivers and harbors.

The first *Notice to Mariners* was issued in 1869, and the Hydrographic Office proposed a standardized system of names for geographic and maritime features. This resulted in the creation of the U.S. Board of Geographic Names in 1889.

So the Navy Department might be supplied with the most accurate information on the progress of naval science and the condition and resources of foreign navies, the Office of Naval Intelligence (ONI) was established in 1882. Three years later, the Army formed the Military Information Division. Its data collecting, much like the ONI's, focused on

1863

Washington Barracks, now Ft. McNair, Washington, D.C.

foreign military capabilities and technological advances in arms and equipment.

As the 19th century neared an end, the U.S., for the first time, had viable peacetime intelligence organizations gathering information to assist in readiness for the next conflict.

Photographic Reconnaissance

Photographic reconnaissance also was evolving. Both the U.S. and British armies used kites, carrying remote-controlled or timed-release cameras. The kites were less expensive than balloons, easier to transport, and less apt to be put out of action when hit by enemy fire. Aerial reconnaissance of this sort is said to have been used in Puerto Rico during the Spanish-American war.

In 1909, the Army's Central Map Reproduction Plant was established at Ft. McNair and only eight years later was anticipating the mapping needs of World War I. Reorganized and expanded by Capt. Charles Ruth, it produced nine million maps during the conflict.

A passenger took the first American photography from an airplane of the San Diego waterfront on a Curtiss hydroplane in January 1911— barely seven years after the Wright Brothers' inaugural flight. That same year the U.S. Army Signal Corps opened a flight training school at College Park, Md., and put aerial photography on the curriculum.

Also during the early part of the 20th century, there was increasing use of maps by military aviators. The Hydrographic Office produced the first aviation charts used by American World War I fliers.

It was during World War I that photo reconnaissance came into its own. By the end of 1917, British, French, and German reconnaissance planes were bringing back thousands of photographs a day and, in the process, completely covered the entire western front every two weeks.

It was not until April 15, 1918, that the first American aerial reconnaissance flew over enemy lines. During their first weeks, the reconnaissance flights relied on the visual observations of the aircrew.

The Americans, however, soon adopted the British method of aerial photography. Pilots and observers experimented with many different cameras, mounts and photography methods before they eventually devised techniques that would remain standard for the U.S. air corps through World War II.

Photo Interpretation

It was also during World War I that photo interpretation became a science. Comparative coverage, which remains a cornerstone of imagery analysis, was developed relatively early. It involved comparing pictures of the same target that were taken on successive days or weeks in order to spot such changes as troop buildups or withdrawals, bridge or road construction, armament stockpiling, the laying of railroad tracks and other indicators of enemy intentions.

Interpreters were taught not only to spot points of interest in the photographs, but also to "exploit" what they saw. Trained to take the information they gleaned and draw valid conclusions about enemy plans, they used stereo viewers for three-dimensional observations that helped them notice objects of interest and determine their size. They also learned how to assemble multiple photographs into large photomosaics depicting entire combat areas.

Aerial reconnaissance had assumed mammoth proportions by the fall of 1918. During the Meuse-Argonne offensive in September, for example, 56,000 aerial reconnaissance prints were delivered to various U.S. Army units in a four-day period. The missions were flown by pilots from the Aviation Section, U.S. Army Signal Corps.

Some 1.3 million prints were produced between July 1, 1918, and Armistice Day the following November. Toward the closing months of the war, aerial photographs were handled very efficiently. In many cases, only 20 minutes elapsed from the time an important photograph of enemy territory was taken until it had been brought to ground, developed, printed, interpreted and used as a basis for giving American batteries the proper range for artillery fire, according to the book *Deep Black*, written by William E. Burrows.

It also was in 1918 that a school of surveying, reproduction and ranging, a forerunner of the NIMA College, was established at Camp A. A. Humphreys, now Fort Belvoir, Va.

In December 1928, the Army Air Corps established a map unit under its Information Division in the Munitions Building in Washington, D.C. In 1941,

1942

1943

the Information Division's name was changed to the Intelligence Division.

Aerial Surveys

Aerial reconnaissance established its value in World War I. Throughout the 1920s and 1930s, despite shrunken military budgets, research and improvements in the field of aerial reconnaissance continued.

During the 1930s and the 1940s, the first aerial surveys of large areas of the United States were undertaken to support government programs in soil conservation and forest management.

In the years immediately following World War I, George W. Goddard of the Army Air Corps experimented with infrared and long distance photography. He also did extensive ground mapping for the civilian federal board of surveys and maps, organized the first army aerial photographic mapping unit, and worked extensively on developing the very long focal-length camera lenses that were to prove so valuable.

Goddard anticipated the development of real-time photography when he transmitted television-like pictures of the federal prison at Fort Leavenworth, Kan., from the air, developing the pictures in the plane. The photos, transmitted over telegraph wires, arrived in New York 23 minutes after they were taken.

World War II

When World War II erupted, the relatively small Army and Navy mapping units suddenly were overwhelmed by demands. The Army's Geographic Section and Engineer Reproduction Plant moved from the Army War College to Brookmont, Md., and became the Army Map Service (AMS) in 1942. During the war, AMS produced more than 500 million copies of over 40,000 different maps. More than 70 million maps were required for the Normandy Invasion alone.

Following Pearl Harbor, requests for Navy charts jumped more than 40 times the normal demand. The Hydrographic Office moved to a new office building and plant in Suitland, Md. At the peak of the conflict, it produced more than 43 million copies per year, with significant production coming from the three survey ships containing presses and other equipment necessary to produce navigational products at sea.

The Army Air Corps transferred its map unit from downtown Washington to Bolling Field, where it

1951

became the Map-Chart Division. The following year the name changed again, to the Aeronautical Chart Division. On June 15, 1943, the Army Air Force Aeronautical Chart Plant became operational in St. Louis.

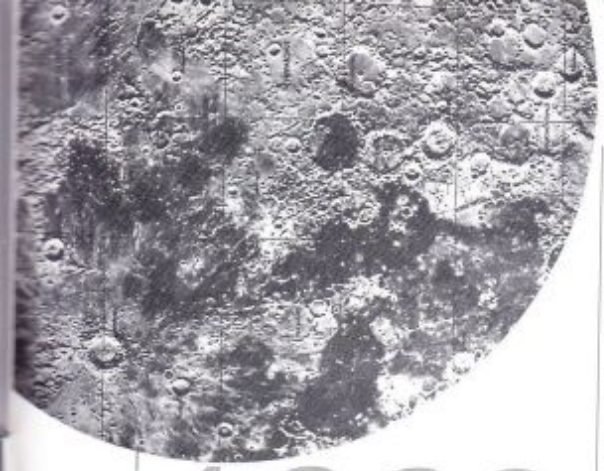
The war's relentless demands pushed military mapping facilities to the limit.

Military applications of aerial photography expanded dramatically, as did technological improvements in aircraft, cameras and films. Ultimately, however, it was the human element that produced full success of aerial photography.

Photo interpretation evolved into an exacting skill. Analysts could extract crucial information from pictures that to the untrained eye appeared meaningless. Some specialized in certain types of geography, others in various weapons systems or engineering. The best of them eventually got to know their areas so well

1956

they became intuitive. They could look at a photograph taken from 40,000 feet and know instinctively that something had changed: a power line had been added or a small ship moved, or a V-1 "buzz-bomb" was poised for firing.



1960

Each military service also had its own intelligence apparatus, but great gains were made when the services pooled their information. Joint intelligence efforts contributed to Allied operations in every theater.

These combined efforts enhanced collection, improved production and helped expedite dissemination of critical information.

One such effort was the Office of Strategic Services (OSS), created June 13, 1942, and placed under the military's newly formed Joint Chiefs of Staff. The first and only commander of OSS was William "Wild Bill" Donovan.

Charged with providing a centralized command for intelligence, propaganda, sabotage, subversion, and other clandestine activities, the OSS operated in both the European and Pacific theaters in World War II.

Following the war, Donovan proposed that the OSS continue as a permanent, centralized national intelligence organization. However, as part of a number of budget cutting moves following the war, President Harry Truman signed an executive order terminating the OSS in October 1945.

The Cold War

After the war came inevitable cutbacks in production and in new hiring. With the beginning of the Cold War and the urgent need to support strategic air and missile defense systems, hiring resumed.

In the mid-1940s, the Pan American Institute of Geography and History (PAIGH) asked the U.S. to establish an agency to coordinate, promote and encourage cartographic studies in Latin America to improve the defense posture of the region.

President Harry S. Truman directed the War Department to establish long-range mapping projects in the Caribbean and Central and South America. Thus, the Inter-American Geodetic Survey (IAGS) was founded in 1946.

The threat of Communism following World War II hastened the reorganization and unification of the armed services. On Sept. 18, 1948, the National Security Act of 1947 unified the departments of the Army and Navy under a single Department of Defense. It also created the National Security Council, a coordination and planning group consisting of the President, Vice President, and Secretaries of State and Defense.

Under the act, the Central Intelligence Agency was formed. Controlled by the executive branch of the government, it would have the authority to coordinate all intelligence matters.

That year, the Air Force was established as a separate service arm, its Aeronautical Chart Service assigned to the new Strategic Air Command. Air Force Col. Paul Schauer, head of the Aeronautical Chart Service in Washington, formed a committee to find a new site for the St. Louis Aeronautical Chart Plant.

A return to wartime status came quickly in 1951 with the outbreak of hostilities in Korea. Again, millions of topographic maps, nautical and aeronautical maps and charts were produced. In 1952, the historic St. Louis Arsenal was selected as the new site for the Aeronautical Chart Plant. In August, the Aeronautical Chart Service became the Aeronautical Chart and Information Service and moved from Washington to St. Louis. The Aeronautical Chart Plant was redesignated the Air Force Aeronautical Chart and Information Center (ACIC).

Right, In the enlargement of this Corona image, individual vehicles can be identified as trucks or cars, and the line of people waiting to enter Lenin's Tomb in Red Square is apparent.

1962

Aerial reconnaissance achieved new importance when the first U-2 mission over the Soviet Union was flown on July 4, 1956. Less than a month later, President Dwight D. Eisenhower ordered U-2 flights over the Middle East during the Suez Crisis.

During the 1960s, a major and unprecedented effort at Aeronautical Chart and Information Center and Army Map Service was the development of special mapping and charting materials for the early U.S. space program. Established in 1959, this program provided operational charts for manned space missions and detailed maps of the moon in anticipation of a manned landing.

The National Reconnaissance Office (NRO) was created in August 1960, but its existence was not officially declassified until September 1992. The NRO was created to design, build, and operate our nation's intelligence satellites. Over the years, NRO collected imagery intelligence to support such functions as indications and warning, monitoring arms control agreements, military operations and exercises, and monitoring natural disasters and other environmental issues.

The Space Age

The first images from space came with the NRO's launch of Corona in 1960. During the series of 145 launches, Corona satellites photographed vast portions of the Earth, allowing the U.S. and its allies to keep track of military targets and denied areas and to understand Sino-Soviet strategic capabilities.

The advent of photo reconnaissance from space meant that instead of days-old imagery, photo interpreters had information just a few hours old. Now, millions of miles of imagery with valuable strategic information of the Soviet Union, China and other crisis areas were available for exploitation. However, the wealth and volume of information meant expanded training and around-the-clock analysis.

With Corona data, the Free World could track arms sales and activities of Soviet client states. Above all, the imagery allowed the U.S. to make more informed national security decisions based on accurate information—not guesswork.

During their years of operation, Corona satellites achieved an enviable record of significant firsts—it was the first spacecraft to gather photo intelligence, the first to map the Earth from space and the first to gather stereo-optical data from space.

The National Photographic Interpretation Center (NPIC) was created in 1961 to provide national imagery analysis and reporting to warfighters and policy-makers. Among its customers were the President, Congress, the departments of State and Defense, U.S. military commands and civil agencies. Foreign policy decision-makers from the President and National Security Council down depended on information reported by NPIC analysts—imagery-derived information on military forces, arms control and natural disasters. NPIC analysts monitored the Cuban Missile Crisis and reported on China's first atomic bomb blast.

The Defense Intelligence Agency (DIA) was established in October 1961 as the nation's primary producer of foreign military intelligence. It filled a critical need for a central intelligence manager for the Department of Defense to support the requirements of the Secretary of Defense, the Joint Chiefs of Staff and the military forces, as well as other policy makers.

Probably at no time in this nation's history has the importance of aerial reconnaissance been demonstrated more dramatically than during the Cuban Missile Crisis in October 1962.

The U.S. showdown with Cuba came during the DIA's first year of existence.

DIA imagery analyst John Hughes appeared with Secretary of Defense Robert McNamara on live television and provided the American public sobering evidence, in the form of U-2 reconnaissance photos, of Russian missiles on Cuban soil.

The missile crisis also marked a rite of passage for U.S. space reconnaissance. Emerging as a strategic system that had a profound effect on international relations, it was destined to play a continually greater role in the years ahead, and to provide American decision-makers a capability that has never been matched in the world.

It was also in 1962 that the Navy's Hydrographic office became the U.S. Naval Oceanographic Office.

Army mapping reached a new plateau in 1968 with the establishment of the Army Topographic Command. It incorporated all the mapping, charting and geodesy assets of the Army Map Service, the Army Engineer Topographic Laboratories, two historic Engineer Topographic Base Battalions, and selected staff elements of the Engineer Corps. At the same time, the new Topographer of the Army was appointed to the staff of the Chief Engineers.

Defense Mapping Agency

In 1970, a Presidential Blue Ribbon Committee recommended that all military mapping, charting and geodesy activities be consolidated into a single agency. The following year, President Richard M. Nixon authorized it and in 1972, after almost two centuries of U.S. military mapmaking, the Defense Mapping Agency (DMA) was born.

Formally established on Jan. 1 as a separate Department of Defense entity centralizing mapping, charting and geodesy resources, DMA officially opened its doors in July.

About 80 percent of DoD mapping, charting and geodetic resources were dedicated to the new organization. Included were: the Mapping Charting and Geodesy (MC&G) staff of the Defense Intelligence Agency; the Army Topographic Command, less its research and development unit and troop command; the Department of Topography of the U.S. Army Engineer School; the Inter American Geodetic Survey; the chart information and distribution of the Naval Oceanographic Office; the Air Force's Aeronautical Chart and Information Center; as well as the Air Force's 1st Geodetic Survey Squadron; and the MC&G elements of the 15th Reconnaissance Technical Squadron.

The new agency received a tasking in 1973 from NASA to support a new project called Skylab. Although DMA's predecessor organizations had a wealth of experience supporting space missions individually, Skylab was DMA's first joint venture into space.

The 1970s also saw a dramatic advance in computer capabilities and the technologies of overhead systems. Helping to fuel these advances was the Defense Dissemination Program office (DDPO).

Created in 1974, DDPO was formed to meet the requirements for electronic dissemination of high-resolution imagery delivered in near real-time. In just three years, the office designed, fielded and began operating four new systems. Its customer base included mobile warfighters, the scientific community, the civilian sector and the national intelligence agencies.

Arms control issues became prominent during the 1970s. NPIC imagery analysts were responsible for reporting on activities relating to the Strategic Arms Limitation Talks Treaty.

To recognize the expanded role of NPIC photo interpreters, the agency changed the name of the field to imagery analysis to reflect the added analytical aspects of the job. The term became an Intelligence Community standard.

At the same time, the rapid development of new weapons systems demanded an increase in the need for digital data. DMA was an active player in developing priorities and planning for the cruise missile. The new weapons system presented a variety of challenges.

Launched from the land, sea, or air, the cruise missile was designed to use inertial guidance. After making landfall, the missile required low-altitude terrain contour matching guidance. Its "brain" was the onboard radar altimeter, which took readings at predetermined checkpoints along the route and compared them with onboard DMA-generated computer maps, correcting the missile's course as required, flying an extremely accurate profile to the target.

The cruise missile was the watershed event that moved DMA increasingly into the digital arena, poising the agency to meet the challenges to come with the arrival of the digital production system in the mid-1980s.

1970

In 1976, U.S. high-resolution photography was shared with a foreign nation for the first time. U-2 photography was used to do damage assessment in support of disaster relief in Guatemala following an earthquake.

NPIC launched its first Basic Imagery Course in May 1978. Rather than sending image analysts to Offutt Air Force Base, Neb., it began training them in-house.

On Sept. 18, 1978, the separate distribution elements within the DMA hydrographic, topographic, and aerospace production centers were consolidated into the Office of Distribution Services and located in Brookmont, Md. The name changed to Combat Support Center in April 1987 to more accurately reflect its mission.

The DMA Systems Center was established in January 1987 and emerged from earlier efforts to convert DMA's mapping, charting and geodesy production capability to a congressionally mandated digital system. Expanding on the charter of the Special Program Office for Exploitation Modernization, the Systems Center assumed responsibility for performing all research, development, and engineering to support production and to provide new data sets for emerging military service systems and weapons.

DMA's Reston Center was established in October the same year. The new component enabled the agency to not only increase the volume of its products, but also to keep abreast of the many sophisticated systems being developed by the armed forces. Reston Center served as a test bed for the agency's new Digital Production System.

NPIC'S imagery analysis in the 1980s focused on terrorism and conflict around the globe, and contributed to community assessments of the Chernobyl nuclear power plant disaster in the former Soviet Union as well as the events in China's Tiananmen Square.

1991

Desert Storm/Desert Shield and Future Threats

The dawn of the 1990s saw the collapse of the Soviet Union. Threats became increasingly diverse and less predictable, and conflicts more multinational. One of the first challenges was Iraq's invasion of Kuwait.

During the first months of Operations Desert Storm/Desert Shield, DMA produced more than 100 million maps and charts. The operational area was just over one million square miles, twice the size of the allied Western European air and land theater in World War II. It was 15 times larger than Korea and four times the area of Southeast Asia. More than 4,500 different MC&G products were required to cover the area.

NPIC also responded to the challenge by providing valuable imagery analysis support to its DoD counterparts.

DIA set up an extensive 24-hour crisis management cell designed to tailor national-level intelligence support to coalition forces. By the time Desert Storm began, some 2,000 agency personnel were involved in the intelligence support effort. Most of them were associated with the national-level Joint Intelligence Center (JIC), which DIA established in the Pentagon to integrate the intelligence being produced throughout the community. DIA sent more than 100 employees into the Kuwaiti theater of operations to provide intelligence support, and deployed 11 national military support teams overseas.

Following Desert Storm, the Defense Airborne Reconnaissance Office was established in November 1993 to oversee the development and acquisition of all joint military and Defense-wide airborne reconnaissance capabilities, including manned and unmanned aircraft, their sensors, data links, data relays and ground stations.

The Central Imagery Office (CIO), a joint Intelligence Community-Department of Defense activity, was created in 1993 to remedy shortfalls in collecting, analyzing, exploiting and disseminating imagery and products derived from imagery, which existed during the Persian Gulf War.

Immediately following the war, a specially formed Imagery Blue Ribbon Task Force recommended comprehensive improvements in the nation's imagery system and the creation of a central management authority for all imagery activities.

CIO became the principal policy overseer and general manager for the U.S. Imagery System (USIS), a coalition of U.S. organizations, networks and relationships that acquired, produced and disseminated imagery, imagery data, imagery-derived materials and services to users both in and outside the government.

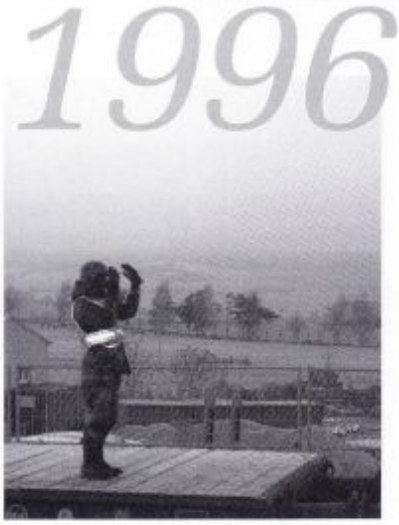
In 1995, in addition to supporting American military operations in Bosnia-Herzegovina, DMA played a pivotal role in the Bosnian Peace Talks at Wright-Patterson Air Force Base, Ohio. Some 55 mapping personnel, led by DMA and armed with more than $5 million in high-tech equipment, provided around-the-clock mapping support.

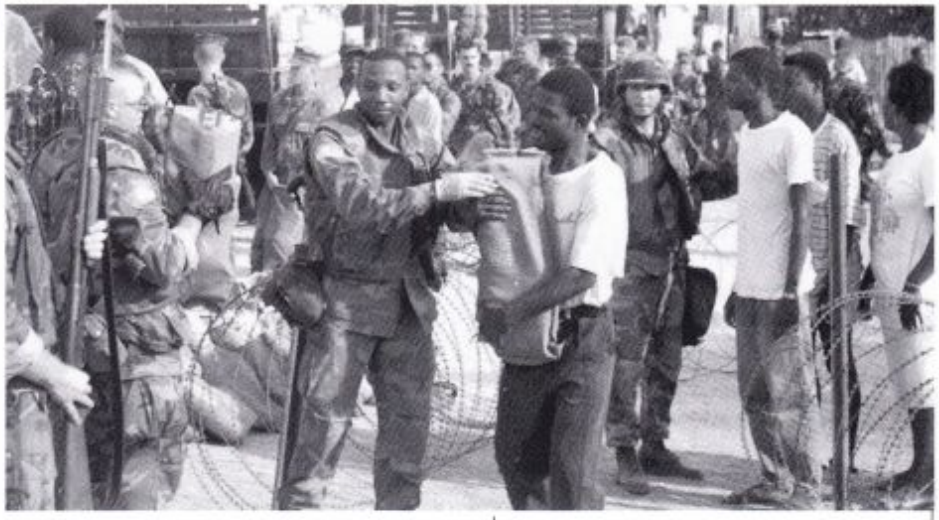
NATIONAL IMAGERY AND MAPPING AGENCY

HERITAGE

I ★ S ★ S ★ U ★ E

1996





Crisis Response: Enter NIMA

Crisis response by mappers and imagery analysts alike was key in Bosnia, as well as in Haiti, Somalia and Rwanda. National leaders and military decision-makers began to demand more precise information at faster rates, in addition to requiring that it be provided in easily-understood formats that could be adapted to satisfy unique requirements.

It was against this backdrop that the National Imagery and Mapping Agency (NIMA) was formed in 1996 to address the expanding requirements in the areas of imagery, imagery intelligence and geospatial information.

The End of An Era: *Three printing presses at Bethesda, Md., are readied for shipment—traded in for new high-speed presses to be installed at the NIMA facility in Arnold, Mo. At its peak, the Bethesda printing presses produced an annual average of 35 million chart and map sheets. When it becomes operational, the Arnold facility will be one the most modern and efficient print shops of its type in the world.*

THE EVOLVING *saga*

Y2K Looms Ever Larger in National Focus

by John Iler

Tick tock, tick tock, nothing ever stops the clock. But what will happen when the clock strikes midnight on Jan. 1, 2000?

No one really knows, but government agencies, the military, small companies and large corporations are all working feverishly against an immovable deadline.

The problem began, experts say, when programmers wrote code for computers in the 1960s. Memory was expensive and processing time relatively slow, so corporate executives decided to cut corners and use two-digit date fields. Thus, 1968 became simply "68." After all, they reasoned, new computers and software would be in place by the turn of the century and these would use four-digit fields.

However, as time marched on, these executives and their successors discovered that updating the old code was cheaper than writing new code. So even though some computer systems were updated, the updated code kept ticking away with the years—ticking inexorably towards the year 2000. Now, less than two years before the new century, programmers are scrambling to correct a problem they say can, and should, have been fixed long ago.

As early as 1993, Jim Seymour, of *PC Magazine*, wrote, "Mainframers are in serious denial these days about what will happen a couple of seconds after midnight on Dec. 31, 1999, when many thousands of mainframe programs handling critical business applications discover they don't know how to deal with dates that include the year 2000."

The problem, he noted, wasn't that COBOL programmers don't know how to fix the code, or that current mainframe programming languages are incapable of handling dates in the next century. Rather, it's the "mountain of old, fragile mainframe code still in use in businesses around the world—often running processes that lie right at the heart of a company's business. These applications have been around so long, were developed in such tangles of spaghetti code, and have been modified in undocumented ways so many times that no one now employed by the company knows how to fix them. In some cases, no one now alive knows how to fix them."

Meanwhile, David Starr, vice president and chief information officer at *The Reader's Digest*, dismisses Y2K as "the biggest fraud perpetrated by consultants on the business community since re-engineering." In an interview last year with *Computerworld*, Starr said "most IS (information service) organizations can fix [the problem] in the normal course of business."

But Tom Earley, chairman of NIMA's Y2K Task Force, said many organizations have either underestimated the magnitude of the Y2K problem or have accepted the risks of addressing the problem after the changeover.

"Since the U.S. is the most advanced information technology-based nation in the world, we have become the most dependent nation in the world on our network and linking computer systems," he noted. "This combination has led a number of pundits to conclude that some sectors of the country's industry will be adversely affected at the century changeover and could cause a domino effect across the stock market and the economy."

According to Duncan C. Connall, of Global Software, Inc., a consulting firm with headquarters in Raleigh, N.C., "Without the century digits, the last day of this millennium will be 99-12-31. And after the stroke of midnight, many computers will see Jan. 1, 2000 as 00-01-01—a smaller number than the day before. Time will appear to have reversed. Old will seem young, a few moments will seem like an entire century. Future events will have already occurred."

Computer consultant and author Ed Yourdon said he daily ponders the complexities of the situation and freely admits he doesn't have all of the answers.

"I spend a portion of each day wanting to believe that none of these crises will occur," he wrote in his report. "But I can't find a way to deny the possibility that they could occur...as a series of domino-effect problems that ripple through society." Speaking of the National Summit 97 conference, where attendees were asked if they believed serious problems will not occur, Yourdon said "a significant number of people raised their hands to indicate they did not believe that serious year-2000 related failures would occur.

Surely, people will argue, he said, that companies would find a way to solve this problem. "Given our track record for normal software projects over the past 30 years," he said, "this argument borders on hysterical optimism. More likely, it's cognitive dissonance: if the facts disagree with the conclusions you were hoping for, then ignore the facts."

Will NIMA be ready when the clock strikes 12:01 a.m., Jan. 1, 2000? Find out next issue! Also, drop by the Director's Townhall Home Page on NIMA's Intranet for Q&As on Y2K.

NIMA Goes Tactical to Support Future Military Service Combat Doctrine

by Ronny Bragger
Plans, Policy and Analysis

Since last October, NIMA has been working closely with the U.S. Army to better define imagery needs in supporting future Army tactical doctrine.

The vehicle for capturing these tactical needs is a major theater war scenario in NIMA's Community Imagery Needs Forecast (CINF) (see "NIMA Database Projects Community Imagery Needs," March issue).

"The Army will be substantially more dependent on imagery in the future," said Lt. Col. Dale Conner, of the office of the Army's deputy chief for intelligence. "Major imagery decisions, acquisitions and development guiding [the] next generation of imagery systems are ongoing... CINF is the 'authority' on requirements—even those for tactical users of tactical systems. And, he added, "It is the modeling and simulation vehicle of choice."

The initial effort culminated in a joint NIMA/Army delegation that in March briefed the U.S. Forces Korea (USFK), 8th U.S. Army (EUSA), and Pacific Command on the Army's methodology, as well as future Army tactical imagery needs. Those needs were validated, and the Future Needs Working Group approved their inclusion in the CINF.

The entire process is being driven by *Joint Vision 2010*, which calls for the future U.S. warfighter to have "dominant battlespace awareness (DBA)." That interactive "picture" is expected to yield much more accurate assessments of friendly and enemy operations within given areas of interest.

In addition to DBA, commanders at all echelons will increasingly rely on timely and accurate intelligence that enables the commander to achieve dominant battlespace knowledge (DBK). DBK is achieved when the intelligence reported to a commander regarding an enemy event, location, situation, activity or other important enemy attribute is confirmed at a 95 percent or better confidence level for the selected time period.

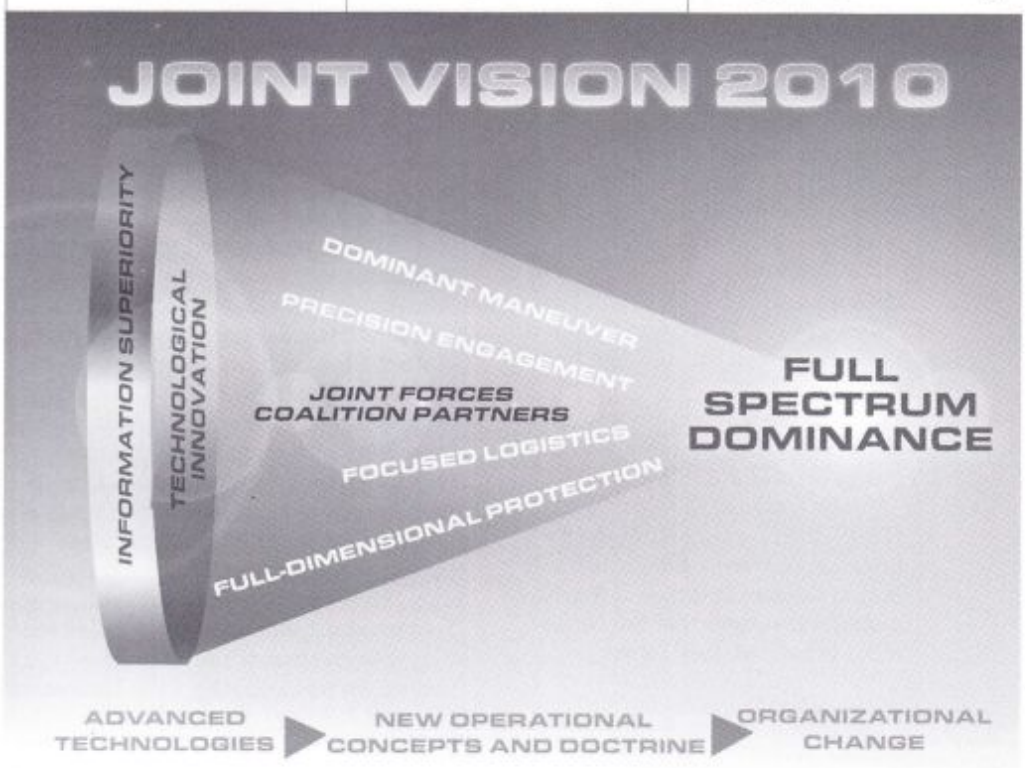
As future military service doctrines call for increased wartime operations tempos, DBK intelligence needs increase and become increasingly time sensitive.

According to a study drafted under the auspices of Maj. Gen. James C. King, prior to his becoming NIMA Director, "Combat operations pose the greatest challenge and requirement for intelligence support in terms of level of effort needed, strain on the system and stringent timelines for providing products to the warfighter." Information superiority, the study added, "provides a clearer picture of enemy and friendly forces and is key to permitting joint commanders to coordinate widely dispersed units, receive accurate feedback and execute more demanding, higher precision requirements."

In addition to articulating future imagery needs of the joint warfighter, NIMA/PAS is diligently working to better determine the needs of the military service components down to the tactical (battalion, ship or squadron) level.

NIMA/PAS is continuing to work with the Army and has initiated a new scenario to better determine Navy and Marine future tactical imagery needs. Discussions with the Air Force are ongoing, and it is anticipated that in fiscal 1999, NIMA and the Air Force will work through an update to a major theater war scenario to better portray Air Force tactical needs in the CINF.

Questions or comments about CINF scenarios should be directed to Dr. David Hartmann at 703-808-0762, or Navy Cmdr. Jack Greenspan, 703-808-0783. ▌



NIMA's Worldwide Navigational Warning Service to the Rescue

A U.S. Navy ship receives a broadcast message and renders assistance. A human being is saved.

by Howard Cohen

...SICK CREW MEMBER REPORTED ON M/V SEAGULL HARMONY IN 12°-46'N, 048°-18'E AT 171745Z JUN 98. VESSELS IN VICINITY WITH DOCTOR ON BOARD REQUESTED TO ASSIST IF POSSIBLE...

A 42-year-old Ukrainian seaman onboard a merchant ship in the Gulf of Aden suddenly becomes ill, developing a fever and complaining of chest pain. The ship, *Seagull Harmony*, issues an immediate request for assistance.

The request is received by the Rescue Coordination Center in Cyprus and routed to NIMA's Worldwide Navigational Warning Service. Within 15 minutes the center issues a navigation safety message to "vessels in vicinity with doctor on board" that could respond. Within seven hours, the seaman is receiving medical treatment onboard the amphibious warfare ship USS *Denver* (LPD 9).

The Marine Navigation Department (GIMM) provides such around-the-clock service for its customers—the U.S. Navy and merchant fleets of the world. The radio broadcast desk team, directed by Michael Whitby, senior watch officer, and Peter Doherty (team lead), is responsible for screening numerous safety messages sent to NIMA from commands and vessels worldwide and determining which messages will be issued.

Roger Ford, a six-year veteran of the watch with NIMA and its predecessor agency, DMA, and trainee Tom Budreika, recall the message from Cyprus.

"We knew it was important," Ford said. "And we knew we had to go out on it as an 'IMMEDIATE.'"

The message was transmitted as a HYDROPAC, a long-range safety broadcast covering the Pacific and Indian Oceans. It is one of five types of major messages that the NIMA radio broadcast desk issues.

A short time later, the phone rang at the radio broadcast desk. It was USS *Denver*, calling from somewhere in the Gulf of Aden. Ford answered.

"They wanted to know more about the sick crewman, how to get in touch with the merchant ship and how to reach the Rescue Coordination Center in Cyprus, under whose jurisdiction this fell," he said.

"It was amazing to get a call from a ship that was eager and ready to give assistance," Budreika said. "The broadcast messages are instantaneous. As quickly as you hit the return key, the message is gone."

Ford asked *Denver* to call back with a status report. "If the Navy was going to be assisting, then we would 'cancel' the message so as not to have other ships heading towards the *Seagull Harmony*. I even called the Rescue Coordination Center for a status report. We wanted to stay on top of the situation from all angles."

By daybreak, *Denver*'s doctor, Lt. Mike Favata, Corpsman Second Class Rickey Conrad, and Lt. Col. Marc Lieber, who speaks fluent Russian and was the translator, boarded the Cypriot-flagged, Greek-owned, Ukrainian-manned merchant vessel.

"When we boarded the ship, we weren't exactly sure what condition the seaman was in, so we had packed most of our emergency response gear into the rescue boat," Favata said. "When we boarded the ship, we were welcomed by a dozen merchant mariners who escorted us into the man's cabin. When he saw us, I could see a smile of relief and hope in a man that, at first sight, I knew was weak and had been ailing for some time."

They then returned with the seaman by motor whaleboat to *Denver*.

Favata determined that the crewman was suffering from "inflam-

"NIMA's support to safety of navigation is greatly beneficial to Navy ships. Regular messages informing of live fire events, cable laying operations or vessel assist requests help in track plotting, course selection and hazard avoidance, and assistance at sea cases such as this. NIMA's Worldwide Navigational Warning Service is an invaluable tool to any vessel at sea and is highly appreciated."

USS *Denver*

photo by John Iler

Trainee Tom Budreika, left, observes Roger Ford preparing a broadcast message. Senior watch officer Mike Whitby, right, looks on.

matory pulmonary condition." Although not in critical condition, the man's symptoms were serious enough to have warranted hospitalization within the next 24 hours.

"Without further treatment, the patient's health was likely to have deteriorated to the point that his lungs would have filled with fluid and his breathing would have become extremely complicated," Conrad said.

The patient was stabilized and returned to his waiting ship.

With their crewmember safely back aboard, *Seagull Harmony* set course for Djibouti, Africa, to let their shipmate off for further medical treatment before continuing to Leixues, Portugal.

The next day back in the watch room, Ford found out the man was going to be all right.

"It was gratifying," he said, "not only that the crewman survived, but Budreika, a first-week trainee, got to see real-time action and witness that what we do in this room *is* important."

Despite differing nationalities, flags, languages and experiences between vessels and crews, the time-honored mariner's tradition of providing assistance at sea to those in distress was upheld.

Doherty summed it up: "The quick reaction of the watchstander in the transmission of this message was critical to the success of saving this crewman's life. But the duties of the watch team do not end there. Because of the maritime background that the watchstanding team shares with the mariner, we feel a deep sense of commitment to the safety of life at sea."

White House Announces Public Release of Digital Nautical Chart

photos by Paul Hurlburt

Vice President Al Gore discusses panel reports with delegates to National Ocean Conference.

by Paul Hurlburt

The White House recently announced the public release of NIMA's Digital Nautical Chart (DNC®) by 2002.

Addressing the National Ocean Conference in Monterey, Calif., June 11, Vice President Al Gore said, "Used in conjunction with the Defense Department's Global Positioning System, this new technology is considered by many the greatest advance in safety at sea since the introduction of radar. It will allow mariners to move cargo more efficiently through ports worldwide while minimizing the risk of collision and environmental harm."

President Clinton, who attended the June 12 conference, also discussed the release of "military data" to enhance the safety of marine navigation.

As stated in a White House release following the president's remarks, "Over the next five years, the Department of Defense's National Imagery and Mapping Agency will prepare for military use purposes a series of computer-based charts for most of the world's oceans and coastal waters. Digital Nautical Charts covering virtually all areas of commercial shipping activity worldwide will be available by 2002."

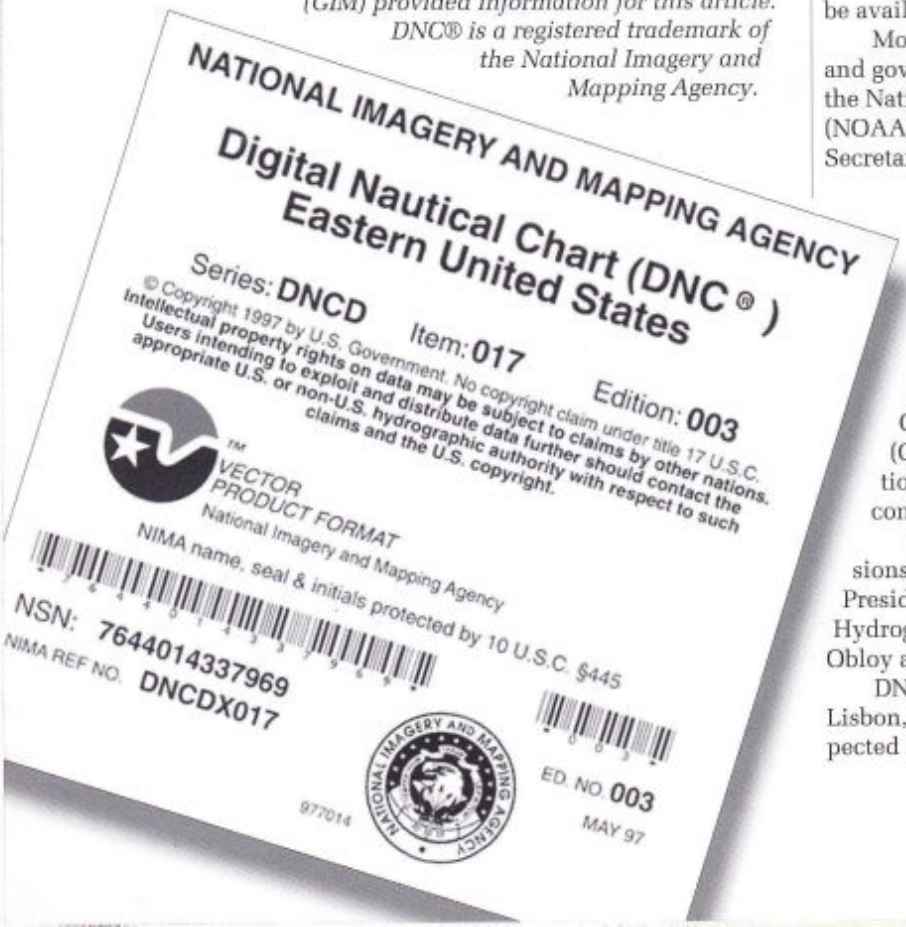
More than 700 members of private industry, academia and government attended the conference, sponsored by the National Oceanic and Atmospheric Administration (NOAA) and hosted by the Secretary of the Navy and the Secretary of Commerce at the Naval Postgraduate School.

Navy liaison Ed Danford, cartographer Steve Higgins (GIDBE) and Contracting Officer Technical Representative Jeff Whitaker demonstrated DNC on laptop computers. Nearly 200 copies of a DNC sampler on CD-ROM were distributed to high-level government officials, as well as the press and general public. The video, created for the conference by the Geospatial Information Management Division (GIM), illustrated the automated, interactive navigational capability provided by DNC data when used in conjunction with specialized software.

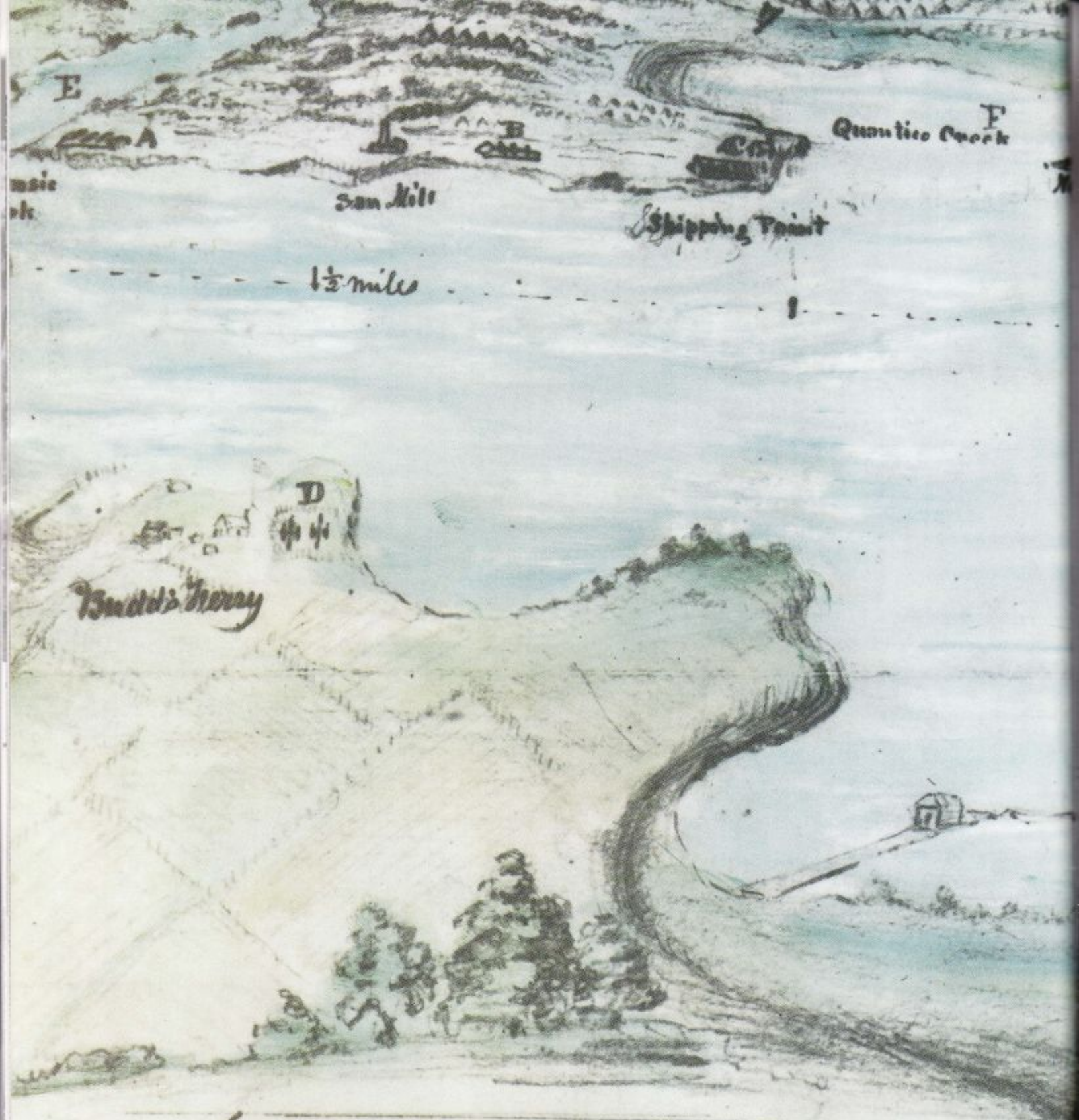
Three NIMA officials took part in panel discussions and the presentation of their reports to the Vice President during a plenary session. They were NIMA Hydrographer Chris Andreasen, General Counsel Ed Obloy and Associate Director, GIM, Mark Schultz.

DNC also is being featured at World Expo 98 in Lisbon, Portugal, through September. Millions are expected to see the DNC exhibit. ▌

Sam Adamczyk (GIDBE) and Lynda Snyder (GIM) provided information for this article. DNC® is a registered trademark of the National Imagery and Mapping Agency.



Ed Danford, NIMA Liaison to the Navy, shows a delegate to the National Ocean Conference how Digital Nautical Chart can be used for navigation on a laptop computer.



Sketch of Virginia, and the Rebel Camps and Batteries, in front of Gen. Jas. Hooker's Division in Charles County, Maryland.
Made from Prof. Lowe's Balloon, for the Commander in Chief, Dec. 8, 1861
By Col. Wm. F. Small, 26th Reg. Pa. Vols.