



# **ALASKA MISSILE DEFENSE WEEKLY (Forty-First Edition)**

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## **ALASKA SPECIFIC NEWS BREAKS #41**

### **DECEMBER 9, 2002-DECEMBER 13, 2002**

**PLAN HAS GUARD MANNING MISSILES**, [Fairbanks Daily News-Miner](#), December 6, 2002. WASHINGTON--Alaska Army National Guard personnel would handle any emergency use of missile defense testing sites in the state under plans being considered by the Defense Department. Maj. Gen. Phil Oates, commander of the Guard in Alaska, said Thursday that officials have not formally decided to make the test system capable of defending against incoming enemy missiles. However, plans are being made with the assumption that the testing site at Fort Greely, just outside Delta Junction, will have emergency capability by 2004. The Defense Department plan would assign 85 full-time Guard members to the effort for the next several years, according to reports earlier this week in a Washington, D.C., publication that follows Army news. Maj. Mike Haller, spokesman for the Alaska Guard, said 67 of those positions are expected to be in Alaska. Fifty-two jobs would go to military police, Haller said. The remaining 15 would prepare to launch the test missiles in any "emergency defensive operations." Congress provided \$6.7 million for the positions in the current fiscal year. Haller said the Guard has begun recruiting to fill the jobs.

The Defense Department plans call for the Guard to handle the missile defense duties through at least 2009, if the emergency function is approved. "Right now it is nothing more than a test bed," Oates said Thursday. "There has been no decision to my knowledge to make it an operational deployment, but the plans are such to give the Department of Defense the ability to have some limited capability if the nation decides it needs that." Oates said Guard personnel are often well suited to such technical work

because they stay in one place long enough to build up skills. "The active duty generally has a lot more rotation than the National Guard," he said. "The other thing is, these missions are performed in the homeland," he said of the missile defense operations. Using Guard members "allows the active duty military to be more expeditionary and mobile." The military does not plan to add more full-time Guard positions, so the new jobs would come at the expense of existing part-time positions. Oates said some of the part-time positions eliminated could be in Alaska. However, he said he wants to make sure part-time members are trained in the missile operations so they can back up the full-timers and move into those positions when they open.

Some recent Guard unit transfers from the Northeast will give him the ability "to cover existing mission requirements" while also getting part-timers involved in missile defense work, he said. Guard members, when working at the missile test sites, would be under the U.S. Army Space Command and Space and Missile Defense Command, Oates said. The Alaska National Guard has about 3,700 members, roughly split between Air and Army forces. The Air Guard has about 500 full-time members, and the Army has about 250, Haller said.

**BOEING LOSES 25% OF MISSILE DEFENSE BONUS FOR TEST DELAY,** Bloomberg, December 10, 2002. Boeing Co. was docked about 25 percent of a potential \$45 million bonus for an October missile defense test because the intercept was 45 days late. The Oct. 14 test -- a success -- was delayed because of a suspected flaw in a nozzle on the Lockheed Martin Corp.-supplied booster rocket. Boeing's bonus will be \$34 million, said Monica Aloisio, a Boeing spokeswoman. "We are very hopeful the next test will go off without a hitch," she said. That test is slated for tomorrow, and Boeing can earn the withheld \$11 million if it demonstrates "superior performance," Lt. Colonel Richard Lehner, an MDA spokesman said. The bonus decrement reflects a system put in place two years ago by Pentagon Missile Defense Agency Director Ronald Kadish to tie Boeing's financial reward for successful intercept tests to performance and schedule goals as well. In three previous tests -- all successful -- Boeing won the full bonus twice and 88 percent once because the test was delayed. About \$44 million in bonuses are at stake tomorrow when Boeing and the Pentagon try for a fifth consecutive intercept of an incoming ballistic missile, Aloisio said. The Bush administration is developing a layered system of air, sea and space weapons to counter a variety of missiles. Boeing's \$6.4 billion, five-year contract to manage this development reimburses costs and offers 15 percent, or \$942 million, for bonuses -- a total of \$7.39 billion. Of this, almost \$565 million is tied to successful flight tests.

### **Site in Alaska**

The ground-based defense envisions Raytheon radar in the U.S. linked to early warning radar in England and Greenland that would be tied electronically to a command, control and communications system made by TRW Inc. The interceptor missiles would be

located in Alaska. The U.S. in June broke ground on an expanded test site at Fort Greeley, Alaska, that could have six missile silos operational by 2004 at the earliest. The six silo holes have been dug but not yet hardened with concrete, Lehner said. Low-orbiting satellites would spot missiles when fired and cue the system to launch rockets made by Orbital Sciences Corp. The rockets would carry Raytheon warheads. Lockheed Martin is providing a booster rocket to carry the Raytheon warhead until the Orbital Sciences booster is deemed ready for testing.

### **Threat From North Korea**

The system is designed to counter intercontinental ballistic missiles like those being developed by North Korea. North Korea agreed in 2000 to halt flight tests of its long-range Taepo Dong-2 missile capable of reaching the United States with a nuclear warhead.

Research and development continues. "The multiple-stage Taepo Dong-2 may be ready for flight testing," the Central Intelligence Agency wrote the Senate Intelligence Committee earlier this year. "We believe that the flight test moratorium is having minimal impact on North Korea's ability to continue its development of the Taepo Dong-2," the Defense Intelligence Agency told the panel.

Tomorrow's test will be a repeat of the October test when the system successfully intercepted a mock enemy warhead over the Pacific Ocean. This test included the first use of a Lockheed Martin Corp. Aegis-class ship-based radar, the Pentagon said. It's scheduled to take place at 3:00 a.m. Washington time from the Ronald Reagan Missile Site on Kwajalein Atoll, in the Marshall Islands. The USS Lake Erie, a Navy Aegis cruiser, will again be used to collect target information. The MDA also plans first use of a Raytheon Co. radar developed for the ground-based Theater High Altitude Area Defense System and heat-seeking sensor on board a prototype Boeing Co. 747-400 Airborne Laser freighter to gather test data but not participate in the actual intercept, Lehner said. The ABL will orbit off the coast of California to track the surrogate enemy missile launched from Vandenberg Air Force base. The Wednesday test is the eighth of the ground-based interceptor, with about 17 more planned through 2006, Lehner said. Four of six previous trials since October 1999 were successful, including the last four.

## **GLOBAL NEWS BREAKS #41**

**MONDAY, DECEMBER 9, 2002**

**IFT-10 ANNOUNCEMENT, DoD, December 9, 2002.** The Missile Defense Agency (MDA) will conduct a developmental flight test to include the planned intercept of a long-range ballistic missile target in support of the Ground-Based Midcourse Defense (GMD) system developmental test program on Dec. 11, 2002. The planned flight test

launch window is scheduled for 3:01 a.m. to 7:01 a.m. EST. This will be the first GMD intercept test that will involve the launch of the interceptor missile at night. The preceding four flight tests were successes, which has allowed MDA to assume greater risk by accelerating flight test objectives by as much as two years while flying against a more difficult target complex. The test will involve the launch of an Orbital Suborbital Program (OSP) long-range missile from Vandenberg Air Force Base, Calif. The OSP, a modified Minuteman II Intercontinental Ballistic Missile, will carry a mock warhead and decoys. About 20 minutes after the target missile is launched, and about 4,800 miles away, a Payload Launch Vehicle missile carrying an exoatmospheric kill vehicle (EKV) interceptor will launch from the Ronald Reagan Missile Test Facility at Kwajalein Atoll, in the Republic of the Marshall Islands. Within 10 minutes after the launch, the intercept is expected to take place at an altitude of approximately 140 miles above the central Pacific Ocean during the midcourse phase of the target warhead's flight.

This will be an integrated system test, with all representative system elements participating: Space-based missile warning sensor; ground-based early warning radar, the prototype X-Band radar at Kwajalein Atoll and the battle management, command, control and communications system located at Kwajalein Atoll and the Joint National Integration Facility in Colorado Springs, Colo. Since the system is in its research and development phase, these elements serve as either prototypes or surrogates for system elements which are in the developmental stage and have not yet been produced for actual operational use. A U.S. Navy Aegis cruiser, USS LAKE ERIE, will participate in the test, using its SPY-1 radar to track the target missile. While the cruiser's radar will not take part in directing the interceptor to its target, the data gathered will be used to ascertain the potential role the SPY-1 radar and the Aegis weapon system could play against long-range targets, as well as provide preparation for Aegis tracking support to GMD as part of the ballistic missile defense system Pacific Ocean test bed and a potential future operational system. This flight test will also involve for the first time a developmental radar that is representative of the radar currently used for the Theater High Altitude Area Defense (THAAD) system. The TPS-X Radar is a high-resolution, X-band phased array radar, originally developed during the program definition and risk reduction phase of the THAAD program. It has been configured as an instrumentation sensor, and will be located at Vandenberg Air Force Base, where it will observe the initial phases of the IFT-10 flight to collect data to investigate the radar's potential to support a ballistic missile defense system.

Also for the first time, the airborne laser prototype, a modified Boeing 747-400 freighter aircraft now being developed to use a series of chemical lasers to shoot down a ballistic missile soon after it is launched, will participate in the flight test. Although no lasers are yet installed on the aircraft, the ABL will use its on-board sensors to locate and track

the boosting target missile during the first minutes of its flight in order to test the capabilities of the sensors. As with the Aegis cruiser, neither the THAAD radar or the ABL will direct the interceptor to the target, but will collect data to assess their potential contribution to a layered and integrated missile defense system. This will be the eighth intercept test of the GMD research and development program. The first test on Oct. 3, 1999, resulted in the successful intercept of a ballistic missile target. The second test took place on Jan. 19, 2000, and did not achieve an intercept due to a clogged cooling pipe on the EKV, but did successfully test the integrated system of elements. The third test, on July 8, 2000, did not result in an intercept due an unsuccessful separation of the EKV from the booster rocket. The fourth test, on July 14, 2001, achieved a successful intercept of a ballistic missile target, as did tests on Dec. 3, 2001, and March 15, 2002. The successful test on Oct. 14, 2002 included the use of a ship-based SPY-1 radar for the first time to track a long-range target missile. The last four tests used all GMD system elements as part of an integrated flight test. News media point of contact is Lt. Col. Rick Lehner, MDA Communications, at (703) 697-8997 or Cheryl Irwin, Office of the Secretary of Defense (Public Affairs), at (703) 697-5331.

**MDA INITIATES SEARCH FOR CONTRACTORS TO BUILD NEW BOOST PHASE INTERCEPTOR**, Defense Daily, December 9, 2002. The Missile Defense Agency (MDA) last week said it is moving forward with a new effort to develop a new kinetic energy boost phase interceptor (KE BPI) that could intercept targets in all phases of flight...The envisioned multi-use missile, which could be used for defense in the mid-course and boost phases of an incoming missile's flight, could be developed within the next decade, Kadish said...MDA said last week it first plans to demonstrate a kinetic energy capability against ballistic missiles in the boost/ascent phase from a deployable ground-based launch platform. The goal is to have demonstrated this capability and have built prototypes for follow-on test and training by the end of FY '09, MDA said in a Dec. 5 Federal Business Opportunities notice. This first capability would then evolve over time to work with other launch platforms, such as sea-based, and to fill capability shortfalls in the overall ballistic missile defense architecture, MDA noted...The U.S. withdrawal from the Anti-Ballistic Missile treaty has opened the door for further exploring these BPI capabilities, according to Kadish. And, a multi-use, common interceptor is expected to provide more options for coverage under the MDA's planned layered defense architecture for the overall ballistic missile defense system, he said...MDA also intends to take lessons learned from the components of its Ground-based Midcourse Defense (GMD) program and build upon that for the KE BPI system, Kadish said. "Early experiments in boost are very promising in terms of results," Kadish said.

**NIGHT FLIGHT**, Defense Daily, December 9, 2002. MDA is on track for this week's night flight test in the Ground-based Midcourse Defense (GMD) program, officials report. The test, slated for Wednesday night, will be the last flight test until at

least the spring to allow for the transition of a new interceptor into the test program. With the exception of some additional sensor component, nothing in the flight test scenario will be different other than the previous test. An Aegis cruiser also will participate in the test in a tracking mode.

**PROPOSAL TO TRANSFER FUNDS TO PAC-3 MEETS HILL RESISTANCE,** Aerospace Daily, December 9, 2002. The Defense Department's proposal to transfer \$104 million from various programs to the Patriot Advanced Capability-3 (PAC-3) account is running into resistance from the Senate Appropriations defense subcommittee, a source said Dec. 6. DOD would use the money to speed production of the Lockheed Martin PAC-3 missile, which could be used in a war with Iraq. But subcommittee members are concerned because \$64 million of the amount that would be transferred to PAC-3 would come out of the \$3.2 billion fiscal 2003 budget for midcourse missile defense programs. PAC-3 enjoys strong support on Capitol Hill, but so do the midcourse programs that would lose money, including the Sea-based Midcourse Defense (SMD) system. DOD's proposal "has not been received well," the source told The DAILY. Despite its concerns, the subcommittee has not decided whether to block the funding transfer. The issue may not be resolved until lawmakers return to Washington in January.

**NOT WITHOUT MEADS,** Defense Daily, December 9, 2002. As the Army prepares its strategy for the transfer of responsibility of the Patriot Advanced Capability-3 (PAC-3) program from MDA, it also will be including plans for the Medium Extended Area Defense Systems (MEADS) program, DoD reports. In approving an acceleration of the PAC-3 missile production, DoD acquisition chief Pete Aldridge also directed that the MEADS program be included in the shift. MEADS is a joint international effort formed by the United States, Germany and Italy. MEADS is envisioned as a highly mobile missile defense system that can be rapidly deployed to a field of operations and move seamlessly with troops as they maneuver the battlefield. MEADS would consist of a PAC-3 missile, a lightweight launcher and a 360-degree fire control radar.

**STORM LOOMS OVER 'SON OF STAR WARS' MISSILE DEFENCE HOON SETS OUT OPTIONS FOR CONTROVERSIAL U.S. SYSTEM,** Financial Times (London), December 9, 2002. Geoff Hoon will today provoke a new row with leftwing Labor MPs when he publishes a dossier setting out options for Britain to join the U.S. "son of star wars" missile Defence system. Today's document - a precursor to a Commons debate early next year - will not commit the UK to investing in the Americans' multi-billion dollar system. But the fact that the government is consulting on the options will nonetheless be seen as accelerating a drive to support the U.S. on missile Defence. The Defence secretary, who first signaled support for the system in October, plans to make a final decision in the spring, according to government insiders. The UK could decide simply to allow the Americans access to British airbases to back a

U.S.-only system. But there are clear signs that Mr. Hoon may be willing to go much further than this and commit significant amounts to a British or European arm of the system... The dossier is expected to set out the options, rather than indicate the government's preferred route... The government is keen to distinguish current U.S. development work from the Reagan-era "star wars" proposals. The nature of the threat from ballistic missiles has changed since the collapse of the Soviet Union - a defense system would now be designed to deter and protect against rogue states, rather than another superpower. Government insiders believe this change means Europe may be more willing to support the U.S.

### **CZECH PREMIER: NO OFFICIAL DECISION YET ON JOINING U.S.**

**MISSILE DEFENCE SYSTEM**, Czech News Agency, CTK, December 4, 2002.

Prime Minister Vladimir Spidla (Social Democrats, CSSD) denied information today that the Czech Republic has decided to join the U.S. ballistic missile defense system. In a parliamentary question period, he said that the government has not formally discussed the issue and wants to do it only on the basis of expert reports. Defence Minister Jaroslav Tvrdik (CSSD) mentioned that the Czech Republic could join the program during his September visit to the United States. "I expressed the interest of the Czech Republic to join this program. I offered the Americans deployment of the ballistic missile defense system on Czech territory," Tvrdik then said after meeting Assistant Secretary of State Richard Armitage and Secretary of Defence Donald Rumsfeld... "Information on this matter in the media are based on distortions and misinterpretation of the partial information that could be given to the press in this sensitive matter," Spidla said.

### **NAVY ENVISIONS SURFACE COMBATANTS WITH POWERFUL LASER GUNS**, Inside The Navy, December 9, 2002.

The Navy is studying ways to equip its surface combatants in a decade with powerful laser guns unlike anything in the fleet's arsenal. The service is working on the project with the Energy Department's Thomas Jefferson Laboratory in Newport News, VA, and a variety of defense contractors. The idea is to develop a directed-energy weapon from free-electron laser (FEL) technology, creating a gun capable of lethal and non-lethal force. The laser may prove useful for force protection, destroying air and surface targets, and providing sea-based missile defense, according to the service... A ground-based FEL weapon technology was a key part of the Strategic Defense Initiative started under the Reagan administration. The science was sound but the program was canceled because the technology was immature... But the Navy's optimism about FEL technology has grown with recent successes at Thomas Jefferson Laboratory... The lab has developed the highest average power free-electron laser in the world... The Navy is drafting a requirement that, once approved, could formalize its need for this kind of laser weapon. The draft mission need statement "discusses the challenges the maritime forces are facing with the advanced cruise missile threats for our surface ships."

**TUESDAY, DECEMBER 10, 2002**

**MODIFIED MINUTEMAN 2 LAUNCH SLATED**, Santa Maria Times, December 10, 2002. The Missile Defense Agency will log its first nighttime interceptor test of the ground-based missile defense system early Wednesday. The modified Minuteman 2 missile launch at Vandenberg Air Force Base is planned for 12:01 a.m. [3:01 a.m. EST], but the window will remain open until 3:59 a.m. [6:59 a.m. EST]. Launch weather officers forecast a 40 percent likelihood conditions early Wednesday will prevent liftoff. If the launch is delayed 24 hours, conditions worsen to 60 percent, with clouds among the concerns...Decoys and the dummy warhead on the Vandenberg weapon will go up against a prototype interceptor launched on another modified missile from the Kwajalein Missile Range, 4,200 miles from the Central Coast. The second weapon will launch about 20 minutes after Vandenberg's missile blasts off. Ten minutes later, the small interceptor should smash into the mock warhead approximately 140 miles above the central Pacific Ocean. Lt. Col. Rick Lehner, a Missile Defense Agency spokesman, said the nighttime launch for the inceptor provides "another dose of operational realism" for the tests, which have become progressively more difficult.

**U.S. MILITARY SETS ANTI-MISSILE TEST FOR WEDNESDAY**, Reuters, December 9, 2002. The military will try to shoot down a dummy strategic missile warhead over the Pacific Ocean Wednesday in the eighth such test of a planned U.S. defense against ballistic missiles, the Pentagon said Monday. Five of the previous tests -- including the last four in a row -- have been successful against mock "enemy" missiles fired from Vandenberg Air Force in California toward Kwajalein atoll in the western Pacific...Also taking part in the test will be a modified Boeing 747 military aircraft the Air Force hopes to one day use as a flying laser platform to shoot down missiles as they take off. But the jet will not carry any such weapon and will simply track the Minuteman-2 intercontinental ballistic missile as it rises from Vandenburg with the warhead, the Pentagon said.

**INDUSTRY DAY TO KICK OFF MDA'S KINETIC ENERGY BOOST DEFENSE PROJECT**, Inside the Army, December 9, 2002. On Dec. 18, the Missile Defense Agency will present to industry its plan for developing by 2009 kinetic-energy interceptors that can destroy ballistic missiles as they travel through their boost and ascent phases of flight, which can last up to 600 seconds after launch. During the unclassified briefing in Arlington, VA, MDA officials will explain the plan is to first demonstrate a kinetic-energy interceptor capability against boost- and ascent-phase missiles with the interceptors carried on a "deployable ground-based launch platform," according to a recent Federal Business Opportunities announcement. MDA plans to have prototypes for follow-on testing and training built by the end of fiscal year 2009... Noting the short time in which interceptors can intercept boost- and ascent-phase

missiles, as well as the fact the boost/ascent phase of flight ends at altitudes between 20 kilometers and 450 kilometers, MDA said these two factors, “combined with an accelerating target, pose technical challenges for boost-phase intercepts.” The agency plans to release a draft request for proposals for the KE boost/ascent concept design phase around Jan. 7, 2003. A formal RFP will be issued near Feb. 4, according to the Fedbizopps notice.

**GREENLAND: PRO-INDEPENDENCE COALITION**, The New York Times, December 10, 2002. The main party formed a home-rule government with Eskimo nationalists that could threaten United States plans to include Greenland in its missile defense strategy. The Siumut Party and the Inuit Ataqatigiit (Eskimo Brotherhood) jointly won more than half the votes in elections on Dec. 3. Greenland won partial self-rule in 1979; Denmark controls foreign and security policy. “Greenland’s interests should be secured through a change of Denmark’s agreement with the United States from 1951” on the defense of Greenland, the parties said. That accord, reached without consulting Greenlanders, provided for an American military presence. The United States plans to upgrade a radar at Thule, in the northwest, as part of its missile defense plans.

**U.S. CHIEF OF JOINT STAFF ARRIVES IN MOSCOW FOR WORKING VISIT**, TASS, December 10, 2002. Russian Defense Minister Igor Ivanov will meet U.S. Chief of Joint Staff General Richard Mayers on Tuesday afternoon. General Mayers has arrived in Russia for a working visit. A spokesman for the Russian Defense Ministry said that the talks would dwell on the state and prospects for cooperation between the Russian and American military agencies, including struggle against terrorism and against proliferation of weapons of mass destruction (WMD)...The sides intend to assess the effectiveness of the existing mechanism of implementation of the Treaty on Strategic Offensive Reductions, which the Russian and American presidents signed during the Moscow summit, as well as questions of cooperation in the field of anti-missile defenses in conditions of the U.S. unilateral withdrawal from the 1972 ABM Treaty.

**BRITAIN OPENS DOOR TO SON OF STAR WARS: DISCUSSION PAPER POINTS TO JOB AND SAFETY BENEFITS OF U.S. MISSILE DEFENCE**, The Guardian (London), December 10, 2002. The government yesterday gave the clearest indication yet that it will embrace controversial U.S. plans for a “son of star wars” missile Defence project, and that the Fylingdales early warning radar station on the North Yorkshire moors will play a key part. Geoff Hoon, the Defence secretary, released what he called a “public discussion paper” designed to provoke “deeper debate” about whether missile Defence would be good for Britain and Europe, as well as for the U.S. He again insisted that the U.S. had yet to ask the government for use of British bases for its missile defense project. He said the government would agree to such a request “only if it were satisfied that the over all security of the UK and the alliance

would ultimately be enhanced”. But the tone of the document suggests ministers have already made up their minds. It says there is a growing threat of attacks on Britain and its European allies from ballistic missiles. Moreover, it adds, Britain’s defense companies could profit from the projects which would create “highly skilled employment” opportunities... But the government says it is not just in America’s interest to upgrade Fylingdales. The radar base could be a “key building block” for a future British or European missile defense system. “With interceptors placed somewhere in Europe, such a system could protect the UK and northwest Europe,” it argues. Fylingdales would enable the system to “protect most of Europe.”

**U.S. MAY PUT MISSILE DEFENSE SITE IN UK, The Daily Telegraph (London), December 10, 2002.** A new “interceptor site” designed to shoot down ballistic missiles could be established in Britain under proposals floated by the Ministry of Defence yesterday. The idea for new sites in northwest Europe was put forward in a discussion paper on American-led plans for a “Son of Star Wars” missile defense system. Launching the document, Geoff Hoon, the Defence Secretary, said that although the Government had not received any formal request from Washington, it was necessary to consider all options for countering the increasing threat from rogue states. It was a “serious cause for concern” that such states as Iraq, Iran, North Korea and Libya already had, or were seeking to acquire, ballistic missiles. “Keeping a low profile and hoping for the best is not an option,” the paper said...Extra sites to complement their existing facility at Fort Greely might be needed. “Additional interceptor sites, perhaps in the north-east United States and in north-west Europe would greatly enhance the defense of the U.S. and the latter could also provide protection for part of Europe”...Using Fylingdales could help defend Europe and America in the event of an attack launched from the Middle East, it said.

**SMALL ELECTION: BIG CONSEQUENCES, HOW GREENLAND MAY BLOCK THE U.S. FROM FULLY DEVELOPING ITS MISSILE DEFENSE PROGRAM, CDI, December 6, 2002.** The surprisingly strong showing of an opposition group in Greenland's parliamentary elections Tuesday may have unexpected consequences for U.S. missile defense plans. The left-wing Inuit Ataqatigiit (IA) party received 25.8 percent of the votes — out of an electorate of 39,000 — placing it second in Greenland's domestic parliament, the Landstinget. The IA now ranks just behind the pro-independence Siumut Party. If the two groups form a coalition government, which is likely, they would control 18 out of the Lanstinget's 31 seats. Greenland, formerly a colony of Denmark, received Home Rule in 1979 but still must yield to Copenhagen in foreign and security matters. Of late, Greenland has been pushing for more power in its external affairs and even for independence, which 80 percent of the population is said to support. Controversy over the U.S. missile defense radar located in Thule may prove to be the island's ticket to complete sovereignty. The missile defense system being

developed to protect the continental United States from ICBM attacks will require the eventual strategic distribution of upgraded early warning radars in order to detect oncoming missile volleys. Several existing radar sites being discussed as possible candidates are Thule, Greenland; Fylingsdale, U.K.; Clear, Alaska; and PAVE PAWS sites in Massachusetts and California. The expected upgrades would be of software and equipment; without this, the missile defense system could not effectively track enemy warheads. It probably would not change the radars' current operating bands, antennae patterns, or output levels. Also under consideration for deployment at the aforementioned sites is the vastly more powerful X-band radar being developed for missile defense programs.

Thule initially was created as a weather station by the United States in 1946, but its tumultuous relationship with the locals did not begin until later. In May 1953, when a population of 87 Inughuit — an ethnic group long revered by the rest of Greenland for surviving in an unforgiving climate and sticking to the old ways of hunting and fishing — was told by Danish authorities that the population had four days to clear out so that the Thule air base could expand its perimeters. For many years, Denmark claimed that the forced resettlement was done in response to Inughuit requests, an allegation that was always denied by community activists. In 1996, a group called the Hingitaq 53 filed suit on behalf of the survivors and their descendants — 610 individual co-sponsors in all — to request the right to return to Thule. If allowed, this suit would have closed the air base completely and given compensation for the loss of hunting and fishing rights. A settlement of 17,000 kroner (roughly \$2,288) was offered to each plaintiff in August 1999, with collective damages of 500,000 kroner (\$67,294). The Inughuit, who had been looking for damages more in ballpark of 238 million kroner (\$32 million), considered the offer insultingly low and rejected it. The case continues in front of the Danish Supreme Court. In September 2002, the United States agreed to give back by the end of the year Dundas, a town that had been engulfed by Thule. Locals believe this is a good first step but do not want to stop there.

The strife surrounding Thule air base is not simply an issue of land ownership. The local population has long been concerned about deleterious effects from making Thule's early warning radar (in use since 1960) a part of a revitalized missile defense system. In 1987, Thule's radar was replaced with a phased-array radar. This caused an uproar amongst the local population who saw that as a first move toward giving the radar offensive capabilities and lead to a fall of the coalition leading Greenland's Landstinget. More recently, at a hearing on missile defense held by the European Parliament in March 2001, Landstinget member Johan Lund Olsen enumerated the IA's objections to using Thule's radar for missile defense purposes. Worries of it making Greenland a target, sparking an arms race, fattening up weapons manufacturers' coffers, and inundating locals who had already suffered from the base's presence were all given.

Also a concern is environmental contamination of the area surrounding Thule. Says local politician Axel Lund Olsen, "If one day a war begins, people are afraid that if a bomb would hit Thule air base, all of the food we eat from the sea would be destroyed." This fear is not entirely unfounded. In 1968, a U.S. B-52 loaded with four nuclear weapons crashed 12 miles from Thule. Sediment from the ocean floor near where the plane went down showed in a 1991 study very high levels of radioactive plutonium contamination. Nearly three decades after the crash, in 1995, the Danish government admitted some culpability and paid \$15.5 million to the 1,700 Danish and Greenlandic locals who had worked at the Thule air base and were exposed to high levels of radiation from the incident.

The controversy surrounding Thule is not the only place the budding U.S. missile defense system is running into problems with the locals. The PAVE PAWS radar in Massachusetts is criticized by some for having a hand in the area's unusually high cancer rates. A coalition of environmental groups brought a lawsuit against the federal government in August 2001 to prompt the assessment of environmental damages missile defense work in Alaska might bear (six months later, the government agreed in principle to do an analysis). And the deployment of a second battery of Israel's Arrow missile defense program, a system developed in cooperation with the United States, was held up for almost two years while officials attempted to convince locals that the Green Pines radar would not have adverse effects on their health.

However, the rise of the IA in Greenland's Landstinget marks a new page in anti-missile defense movement. This ascension, combined with Denmark's awareness that the growing restlessness in Greenland may lead to its independence, means that Copenhagen is going to have to be more sensitive to the island's concerns. This new judiciousness may very well be expressed by hampering American attempts to upgrade Thule's early warning radar. In the end, international considerations may prove to be more of a stumbling block to the Bush administration's missile defense plans than technological limitations.

### **WEDNESDAY, DECEMBER 11, 2002**

**MISSILE DEFENSE TEST CONDUCTED, DoD**, December 11, 2002. The Missile Defense Agency (MDA) announced today it was not able to complete a test involving the planned intercept of a long-range ballistic missile target over the central Pacific Ocean when the exo-atmospheric kill vehicle (EKV) interceptor and the booster rocket failed to separate, preventing the EKV from engaging the target warhead in space. A modified Minuteman II intercontinental ballistic missile (ICBM) carrying the target warhead was successfully launched from Vandenberg Air Force Base, Calif., at 12:26 a.m. PST, and the booster rocket carrying the EKV was launched approximately 20 minutes later and about 4,800 miles away from Kwajalein Atoll in the Republic of the

Marshall Islands. This test was conducted in support of research and development efforts for the Ground-based Midcourse Defense (GMD) program.

This was the final planned test involving the use of the interceptor's booster rocket that has been serving as a surrogate booster system and used for all GMD intercept tests since 1999. In a test on July 8, 2000, an apparently similar anomaly resulted in not completing the test due to the booster and EKV not separating.

The surrogate booster is used for the developmental flight test program only, and is not intended for further use in the GMD test program or for a future operational GMD system. Two new booster designs are currently in development and will undergo flight-testing beginning next spring. One or both of the new boosters will be used by the GMD program in all future intercept tests beginning late next year. Initial post-test analysis indicate that all other GMD program elements successfully completed their test objectives, including radars and other sensors, as well as the battle management, command, control and communication elements that are vital in the GMD development effort. In a missile defense research and development program involving a number of different elements such as GMD, the successful integration of system elements is as important as the intercept. USS Lake Erie, an Aegis cruiser, successfully tracked the target missile after launch, and the Airborne Laser, a modified Boeing 747 aircraft, successfully used an installed infrared sensor to detect and track the boosting target missile after launch.

The developmental Theater High Altitude Area Defense (THAAD) radar located at Vandenberg Air Force Base also performed well, successfully tracking the target missile after launch. This was the eighth intercept test of the GMD research and development program. The first test on Oct. 3, 1999, resulted in the successful intercept of a ballistic missile target. The second test took place on Jan. 19, 2000, and did not achieve an intercept due to a clogged cooling pipe on the EKV, but did successfully test the integrated system of elements. The third test, on July 8, 2000, did not result in an intercept due an unsuccessful separation of the EKV and the booster rocket. The fourth test, on July 14, 2001, achieved a successful intercept of a ballistic missile target, as did tests on Dec. 3, 2001, and March 15, 2002. The successful test on Oct. 14, 2002 included the use of a ship-based SPY-1 radar for the first time to track a long-range target missile. The last four tests used all GMD system elements as part of an integrated flight test. Government and industry program officials will conduct an extensive review of the test results to determine the reason(s) why EKV/booster separation did not occur, as well as a thorough analysis of all test-related data. Due to the vast amount of telemetry and other data collected during the test, it is likely to be at least several days until even a preliminary evaluation is completed.

**MDA OVERESTIMATES MISSILE DEFENSE FLIGHT TEST RESULTS, CDI**, December 10, 2002. The Union of Concerned Scientists has come out with a study

showing that the MDA has greatly overestimated, and perhaps even exaggerated, the results of its flight test program in statements to Congress. This analysis comes out at a time when the MDA has classified part of the information on its flight test program and overall is reducing the amount of information available for independent oversight assessment. In his testimony to Congress, MDA head Lt. Gen. Ronald Kadish argues that most of the test failures could be attributed to quality control issues that prevented the interceptors from reaching their "endgame," or final stages where an interception would occur; with those problems ameliorated, Kadish has repeatedly testified, missile defense has demonstrated that it will work. UCS explains how this is not an accurate evaluation of the flight test program. The report, "An Assessment of the Missile Defense Agency's 'Endgame Success' Argument," by George Lewis and Lisbeth Gronlund, can be found at: (great info source)

[http://www.ucsusa.org/global\\_security/missile\\_defense/page.cfm?pageID=1066](http://www.ucsusa.org/global_security/missile_defense/page.cfm?pageID=1066)

### **SUBCOMMITTEE IFFY ON SHIFTING MONEY FOR PAC-3**

**PROCUREMENT**, Aerospace Daily, December 9, 2002. The Senate Appropriations defense subcommittee is said to be squeamish about a recent DoD request to transfer \$64 million from mid-course missile defense programs (out of its FY 03 \$3.2 billion budget) to the Patriot Advanced Capability (PAC)-3 program. This shift was proposed in order to speed production of the PAC-3 interceptor so it may be used in any action taken against Iraq. The \$64 million would double monthly production of the PAC-3 from four to eight missiles starting in January. It also would provide 12 missiles on top of that increase to meet a production gap between FY 03 and FY 04 buys. However, support for the proposed shift is shaky among some of the subcommittee members who firmly support the midcourse missile defense systems. A decision on the issue may not be made until Congress comes back into session next month.

**U.S. INTERCEPTOR MISSILE TEST OVER PACIFIC FAILS**, CNN, December 11, 2002. The U.S. military's project to develop a long-range missile capable of finding and knocking out another missile in midair suffered a setback Wednesday. The Pentagon said a failure of a booster rocket prevented an intercepting warhead from reaching its target during testing with a long-range ballistic missile over the Pacific Ocean. The Missile Defense Agency said in a statement that it was not able to complete the test because the kill vehicle interceptor and booster rocket failed to separate, preventing the interceptor -- called the exo-atmospheric kill vehicle -- from engaging the target warhead in space. The modified Minuteman II intercontinental ballistic missile was launched (at 3:26 a.m. EST) from Vandenberg Air Force Base in California. About 20 minutes later and 4,800 miles away, a missile carrying an interceptor was launched from the Ronald Reagan Missile Test Facility in the Marshall Islands in the Pacific Ocean. The statement said the interceptor's booster rocket, which also failed during a previous test, was an incidental part of the test and its failure prevented the military from testing the equipment in question. A Pentagon spokeswoman said the

systems under scrutiny did not indicate problems. The official also said an operational booster rocket is under development and will begin testing next spring. The flight test, the eighth in the series, would have been the first for a development radar and an airborne laser prototype. Five of the tests have successfully "killed" their targets, and three have failed. Testing of the Ground-based Midcourse Defense system began in October 1999. The intercept was to have been the first involving a nighttime launch of an interceptor missile. It was intended to destroy the "enemy" missile at a point some 140 miles above the central Pacific.

**BOEING LOSES 25 PERCENT OF MISSILE DEFENSE BONUS FOR TEST DELAY**, Bloomberg, December 10, 2002. Boeing Co. was docked about 25 percent of a potential \$45 million bonus for an October missile defense test because the intercept was 45 days late. The Oct. 14 test -- a success -- was delayed because of a suspected flaw in a nozzle on the Lockheed Martin Corp.-supplied booster rocket... "We are very hopeful the next test will go off without a hitch," she said. That test is slated for tomorrow [Dec. 11], and Boeing can earn the withheld \$11 million if it demonstrates "superior performance," Lt. Colonel Richard Lehner, an MDA spokesman said. The bonus decrement reflects a system put in place two years ago by Pentagon Missile Defense Agency Director Ronald Kadish to tie Boeing's financial reward for successful intercept tests to performance and schedule goals as well...About \$44 million in bonuses are at stake tomorrow when Boeing and the Pentagon try for a fifth consecutive intercept of an incoming ballistic missile, Aloisio said. The Bush administration is developing a layered system of air, sea and space weapons to counter a variety of missiles. Boeing's \$6.4 billion, five-year contract to manage this development reimburses costs and offers 15 percent, or \$942 million, for bonuses -- a total of \$7.39 billion. Of this, almost \$565 million is tied to successful flight tests.

**TRW DEAL CLEARED, NORTHROP SAYS**, Washington Post, December 11, 2002. Northrop Grumman Corp. said yesterday that it reached an agreement with the Justice Department that clears the final antitrust hurdle for its acquisition of TRW Inc., which could close today with shareholder approval...The negotiations with the Justice Department dragged on for six months, after competitors complained that the new entity would dominate the market for specialized radar systems and electronics used in military satellites. The consent decree was finalized yesterday with both sides agreeing on the "essential terms" just a day before shareholders from both companies were scheduled to vote on the deal, Northrop said. The Justice Department still must make an official announcement, but Northrop said that's expected today. A Justice spokesman declined to comment... Northrop went after TRW, despite its own high debt load and competing bids from rival defense contractors, for its penetration of the military satellite market, where Boeing Co. and Lockheed Martin reign. The deal puts Northrop at the center of the Pentagon's missile-defense plans and its plans for improving "sensor to shooter" technology -- shortening the time it takes for soldiers to get information about

a target spotted by a satellite. But Lockheed has complained that there is not enough business in the market for a third competitor and that the deal would give Northrop control of most of the important components used to build satellites for communications, missile-launch detection, and the collection of electronic images from space.

**RUSSIAN MISSILE TEST-FIRED**, Associated Press, December 11, 2002. The Space Forces successfully test-fired an RS-18 intercontinental ballistic missile Tuesday, the forces' press service said. The missile, known in the West as an SS-19, or Stiletto, blasted off from a silo at the Baikonur Cosmodrome in Kazakhstan at 8:15 a.m. Moscow time, said Space Forces spokesman Mikhail Deryagin. The pre-launch operations, the launch itself and the flight path went strictly according to plan, and the missile's six practice warheads hit their targets on the Kura testing ground on the Kamchatka Peninsula in the Far East, Deryagin said. The missile has been on combat duty for more than 25 years, he said.

**SCUD MISSILES FOUND ON SHIP OF NORTH KOREA**, New York Times, December 11, 2002. A North Korean cargo vessel flying no flag was halted on Monday in the Gulf of Aden by two Spanish warships, and a search revealed Scud missiles hidden beneath sacks of cement, senior administration and Pentagon officials said today. American military explosives experts were summoned, and the ordnance crews were still working tonight to identify and tally the contraband cargo and to stabilize any explosive warheads or volatile missile fuel, officials said. The ship, which a senior administration official said had been tracked by American intelligence "all the way out" from North Korea, appeared to be heading for Yemen when it was stopped by the two Spanish warships an estimated 600 miles off the Yemeni coast. But administration and Pentagon officials said it was not known whether the ultimate destination was Yemen, where the government has already deployed Scud missiles, some other nation in the region, or a private buyer like a militant group... "We believe this cargo vessel was headed for Yemen," one official said. "But we don't know if the intended customer was the Yemeni government, Iraq, Al Qaeda or somebody else." The Spanish warships, the Navarra and the Patino, were part of a sea borne operation initially established to halt Qaeda supporters who might be fleeing the war in Afghanistan.

**CANADA OPEN TO MISSILE-SHIELD DISCUSSIONS**, The Globe and Mail (Canada), December 10, 2002. Canada is "quite prepared" to talk with the Americans about the creation of a North American missile shield now that the two countries have signed a deal to co-operate on the land and sea Defence of North America. "When it comes to preparing for potential threats to our shared continent, we're in this together," Foreign Affairs Minister Bill Graham said yesterday, showing greater openness to military co-operation between Canada and the United States...Asked whether it is now time to turn to talks on ballistic missile Defence, which

the U.S. administration views as crucial to security, Mr. Graham said: "We're quite prepared to examine the issue of missile Defence. This is something that has been considered to some extent in Europe as well."...Former foreign affairs minister Lloyd Axworthy was opposed to the plan, and last March, Mr. Graham insisted that Canada's decision on missile Defence would be based solely on "our security and our interests." Yesterday, Mr. Graham likened the missile shield to the North American Aerospace Defence Command, which co-ordinates the Canadian and U.S. air Defence of the continent. Mr. Graham said that the renewed dialogue involving Russia and the United States has changed the international climate and opened the door to further talks.

**MDA FINDS ANOMALY IN MISSILE DEFENSE KILL VEHICLE DURING PREVIOUS FLIGHT TESTS**, Defense Daily, December 6, 2002. The Missile Defense Agency (MDA) confirmed yesterday that an anomaly in the Raytheon [RTN] exoatmospheric kill vehicle (EKV) occurred as it tracked incoming targets during previous flight tests in the Ground-based Midcourse Defense (GMD) program. "An anomaly with the prototype exoatmospheric kill vehicle target position estimation data was first noticed during the analysis of IFT-6 (Integrated Flight Test-6) performance data," MDA spokesman Air Force Lt. Col. Rick Lehner told Defense Daily. The target position estimation data provides the kill vehicle with data on its location to an incoming target. A GMD program official explained that periodically the EKV must reacquire the target track as it proceeds toward making an intercept. There has been concern, the official said, if the track is lost, even if for a second, at the wrong moment it may affect the final outcome of the intercept. MDA, however, maintains it has identified the source of the problem. MDA has continually evaluated the anomaly since it was first detected, Lehner said. And, while the glitch recurred in subsequent tests, it "never interfered with the effectiveness of the EKV, demonstrating a resilience and robustness in the system design," he added. Meanwhile, "flight data analysis, ground testing and modeling and simulation results have exonerated most potential sources of the error," Lehner said. The anomaly has been "isolated to degraded EKV inertial measurement unit output data," he said.

The most likely cause of the problem involves the introduction of electromagnetic interference into the EKV through some test-unique cabling that Lehner said will not be part of the operational GMD hardware. And, that cabling has been removed to resolve the issue in IFT-10, he added. IFT-10, a night flight test, is slated for Dec. 11. Raytheon declined to comment on the EKV anomaly.

While all of the GMD tests to date have used the Raytheon-built EKV, there is an effort underway to develop a second EKV option for the program. The MDA this fall modified a contract with GMD lead systems integrator Boeing [BA] to move forward with concept development of a complementary EKV (CEKV) for the missile defense program. The CEKV effort is envisioned as a multi-phased acquisition supporting both the GMD and Sea-Based Midcourse Defense (SMD) programs. Under the plan, CEKV

will use the latest technology to provide improved counter-countermeasure performance that exploits all available information; incorporates new active and passive sensors technologies; introduces new fusion and discrimination algorithms; and balances the load between on-board and off-board sensors and processors.

Boeing in the summer awarded small contracts to Lockheed Martin [LMT], Raytheon and Spectrum Astro to work on the CEKV, which could enter program definition and risk reduction around FY '04 or '05. MDA is contemplating first flight of the CEKV in the 2007-08 time frame. Air Force Lt. Gen. Ronald Kadish, director of MDA, told reporters this summer that MDA wanted to look more extensively at the possibility of using more common interceptors and kill vehicles that can be integrated into both ground-based and sea-based missile defense systems. For example, he said, it's possible the complementary kill vehicle that will be brought into the GMD program will also have applications for SMD. "I think it's now possible to think about and review common interceptors and kill vehicles...it makes a lot of sense...we're concentrating on that," Kadish said.

The secondary EKV plan is similar to MDA's decision to bring a second alternative booster into the GMD program. Earlier this year, MDA selected Orbital Sciences [ORB] to build an alternative booster vehicle for the program after problems surfaced with the Boeing commercial off-the-shelf (COTS) booster. Lockheed Martin also was tapped to take over Boeing's work on the COTS booster. The booster and the EKV technologies are key components of the GMD program, and by adding alternatives to the components now undergoing testing, MDA hopes to reduce overall program risk, an MDA official said. "It allows us to have an alternative approach to offset any risk that we might have," the MDA official said. Next week's GMD test will be the last flight test in which the Raytheon kill vehicle will be launched on a prototype payload launch vehicle, as the new booster is transitioned into the test program next year.

**IRAQI SCUDS: A THREAT WE HAVE TO RESPECT, CDI, December 3, 2002.**

The United States will face a number of risks as part of any invasion of Iraq that are quite serious, and could be even more serious in some cases than those that existed 12 years ago. The best, most capable, intelligence agencies in the world the CIA, the British MI5 and Israeli Mossad Special Operations Division are all very wary of the potential threat posed by Iraqi Scud missiles. Several of the latest CIA reports and recent defector statements indicate that Iraq has biological/chemical weapons on hand. Blister agents, mustard gas, VX gas, anthrax, and the nerve agents Sarin and Tabun are all possible payloads for Scud missiles. Saddam Hussein may be profiled as a calculating manipulator, but he is also an irrational risk taker. Intelligence analysts believe that Saddam is most dangerous when he is cornered: that he would sacrifice his life to secure his legacy and that he would try to wreak maximum destruction on his

foes if attacked. Of particular note, the CIA has recently released a threat assessment that asserts that Saddam is unlikely to use his lethal arsenal against the United States unless he comes under military attack. We cannot rule out the possibility of Saddam's first use of chemical/biological weapons in a war if he feels it is to his advantage. U.S. war planners have to acknowledge that threat. This would be one of our worst-case scenarios a U.S. offensive turns out to be the catalyst for Iraqi biological or chemical weapons to be launched into Israel or friendly coalition forces.

For these reasons, expect anti-Scud missions to be of the highest priority at the onset of any hostilities with Iraq. The threat of conventional, biological or chemical weapons hitting Israel, neighboring countries, or U.S. troops is one of the greatest concerns of Pentagon planners. The tactical capability and the actual damage a Scud can achieve is limited, but it can be quite effective as an area denial weapon or simply one of terror. To clean up the remnants of a biological or chemical Scud attack in Kuwait, for example, while dealing with the resulting horrendous humanitarian problem, would be a daunting challenge and require a tremendous amount of time and effort. U.S. planners will have to take seriously reports that Iraq may have a small inventory of the Scud C variant *al Hussein* missile with a range of over 310 miles. Iraq may also possess over a dozen well-hidden mobile Scud launchers that can be configured to be operational within 90 minutes. Iraqis are noted masters at deception, decoys and camouflage. Handling this threat will be one of the most challenging missions in a conflict with Iraq. It is probable that the Scud launch areas in western Iraq will be one of the first areas that coalition forces move to control.

During the Gulf War, the U.S. capability to counter the Scud threat was negligible. Iraq attacked with approximately 88 Scuds, with 46 striking in the Kuwait Theater of Operations (as far south as Qatar), and 42 in or near Israel. Coalition air forces flew 2,400 Scud strike sorties in an attempt to attack and destroy the elusive mobile launchers. On 42 occasions, patrolling aircraft spotted a launch plume, leading to eight attacks. Overall, tactical aircraft reportedly failed to destroy *any* Scud launchers. Gen. Wayne Downing, former assistant to the president on counterterrorism and a Gulf War veteran who commanded part of the Special Operations forces in the 1991 conflict, recently stated that he has seen Desert Storm helicopter-gunship video of successful Special Forces strikes on Iraq Scuds and debriefed their operators. He asserts that Special Operations Forces helicopters operating 250 miles behind enemy lines and guiding in air strikes took out six to eight Scuds, including a couple destroyed by anti-tank missiles launched by the teams.

Fortunately, the ability to find and destroy mobile missile launchers has improved to the extent that U.S. forces may now have an effective capability. Time critical targeting skills have been developed and honed during Operation Enduring Freedom in Afghanistan. For example, more than 80 percent of the combat sorties launched off aircraft carriers into Afghanistan did not have specific target coordinates until on scene,

with targeting information relayed in-flight. The Tactical Exploitation Systems and Battlefield Ordnance Awareness sensors will significantly shorten the "sensor-to-shooter" time frame — the amount of time between a target's detection and an actual attack on it — a critical factor when attacking "pop-up" or mobile targets. State-of-the-art sensors are now available to provide accurate and timely launch information to area commanders, defensive missile batteries, pilots and Special Forces on the ground throughout the Gulf region, including Israel. The current objective is to be able to put precision-guided ordnance on a target within 10 minutes of detection.

An integrated picture of the intelligence data from multiple sources is now available to the ground commanders who actually have their "fingers on the trigger." A substantial number of [tactical aircraft](#), ranging from AC-130 gunships receiving live-stream video, to Apache Longbow helicopters to F-15E Strike Eagles, are now linked to [surveillance aircraft](#) and Unmanned Aerial Vehicles (UAVs), and would be available to immediately respond to the threat of Scuds. Special Operations Forces will be equipped with a laptop software program called 'Rover' that allows troops on the ground to draw directly on photographic imagery of the target area, just as John Madden does in analyzing NFL plays on television. They will be able to annotate friendly and hostile forces, and then transmit the information directly to airborne tactical aircraft. Navy F-14 Tomcat fighters are able to transmit and receive imagery with Special Forces on the ground using the Navy's Fast Tactical Imagery (FTI) system. FTI is also compatible with the Army's AH-64 Apache helicopters.

Microwave energy weapons or "radio frequency weapons" that can disable electrical systems by sending bursts of high-powered microwave energy could disable computers controlling Scuds. These weapons produce a short spike of energy that can damage electronic devices, scramble computer memories or disable ignition systems. Air power alone is not enough to effectively suppress the Scud threat, however. Special Forces will be extremely active throughout Iraq. All of the elite Delta Force and Seal Team counter-terrorism units will be in high demand for specialized covert operations. U.S. Special Forces, possibly augmented by British SAS forces, will play a critical role in the effort to hunt down Scud missile launchers. Lessons learned in Afghanistan by Special Forces working with CIA field teams and targeting smart bombs dropped by tactical aircraft will be fully exploited.

Prior to the commencement of hostilities, Special Forces will likely be flown in to forward operating bases established in Saudi Arabia, Jordan and Iraq to assist in the Scud hunt. There have been reports that select Special Force units have been working with CIA and Israeli paramilitary units deep inside Iraq throughout the fall of 2002 in preparation for an invasion. The Special Forces involved consist primarily of specialized SEAL Teams and Army Delta Force soldiers. Such ongoing covert operations probably include scouting for arsenals of weapons of mass destruction and their artillery delivery systems, and detailing preparations for contingency sabotage

raids in the event of an invasion. The U.S. Army 5th Special Forces Group (SFG) is assigned responsibility for the Southwest Asia and the Middle East region. The SFG consists of about 1,400 personnel, and is organized into three battalions capable of deploying 18 12-person Operational Detachment Alphas (ODAs). The 82nd Airborne, Special Force Green Berets and the Rangers augment these units.

## **THURSDAY, DECEMBER 12, 2002**

**ATK SUCCESSFULLY TESTS NEW SOLID ROCKET**, Aerotech News, December 10, 2002. ATK has successfully tested a new Orion solid rocket motor that will serve as the first stage of the interceptor booster Orbital Sciences Corporation is developing for the U.S. Ground-based Missile Defense System. The 70-second static test firing conducted by ATK Thiokol Propulsion, Promontory, Utah, included a demonstration of full nozzle vector capability. The static firing is the only planned ground test of the motor. "This successful test is a major milestone in a program that will provide our nation with an efficient and cost-effective defense against missile threats," said Scott Lamph, chief engineer, Orion Motor Programs, ATK Thiokol Propulsion. ATK Thiokol Propulsion was selected earlier this year to be the solid propulsion supplier on the Orbital team that is developing the boost vehicle for Boeing, the prime contractor on the GMDS program. The three-stage boost vehicle uses slightly modified Orion motors flown on the Orbital Taurus(r) and Pegasus(r) launch vehicles, which are manufactured by ATK Thiokol Propulsion at its rocket motor production facility in Magna, Utah. The first-stage Orion 50SXLG motor is a stretched version of the Taurus motor, similar to the Pegasus XL first-stage motor, but with more solid propellant for increased performance. It includes a more robust nozzle with a shortened exit cone for ground launch capability, and a new Orbital thermal blanket/aft skirt and thrust vector actuation system. The second and third stages use flight-proven Pegasus XL motors that will not require additional static fire testing. ATK Composites, Clearfield, Utah, provides the composite cases for the Orion motors.

**UK CONSIDERS MISSILE DEFENCE SILOS**, NewScientist.com, December 10, 2002. The UK government has raised the possibility that missile interception systems could be built in the UK as part of an allied Defence initiative. A "public discussion paper" issued by the Ministry of Defence on Tuesday sets out the case for joining the controversial US missile Defence program, which is designed to counter the threat of ballistic weapons launched by enemy states or terrorists. The US program has faced criticism from experts who question the effectiveness of such a Defence system and the cost of implementing it. But political commentators believe the UK government may be preparing the ground for participation, which would meet with substantial domestic opposition. The MoD paper warns that the UK must consider the threat of states and terrorists launching ballistic missiles carrying biological and chemical weapon payloads.

It names North Korea and Iraq as possible aggressors. "The United States is now committed to a major technological effort to counter this threat," the paper says. "Britain too has a responsibility to take stock of the issues involved and to consider our options for addressing this potential threat, including whether we should play a role in the US program."

### **Threat of retaliation**

The paper notes that the threat of retaliation may not be enough to deter potential attackers. In order to extend protection from a US program, "interceptor sites" in northern Europe might be needed, it says, with additional sites in Eastern Europe if the system were to protect the whole European Union. The US military began missile Defence development in 1999 and has conducted seven tests so far. These used interceptor missiles to destroy the target. But some observers have accused the tests of failing to simulate real conditions. "The targets are not particularly realistic," John Pike, an analyst with Global Security, told *New Scientist*. "It's a small number of decoys and the decoys are obviously different from the warheads. The testing has basically been to validate that the missiles can distinguish between different objects." Pike thinks intercepting missiles that have dispatched realistic decoys may be "an intractable problem". However, he does not discount the possibility of destroying missiles soon after launch - boost phase interception - while the missiles rockets are still firing. He also believes experimental Defence technologies, such as directed energy laser weapons, could possibly be used both from the air and on the ground. The US has successfully tested a ground-based laser system developed with the Israeli Military.

### **Political balance**

Duncan Lennox, editor of the Defence industry publication *Jane's Strategic Weapons Systems* says the US tests are at an early stage and should not be pre-judged. He says of the discussion paper: "In my view, they've laid it out pretty fairly." Lennox believes a Europe-wide missile Defence system could be built. He supports the paper's conclusion that the Royal Air Force base in Fylingdales, North Yorkshire, would be well suited to monitoring ballistic missile launches from thousands of miles away. The base already provides support for US nuclear early warning systems. However, the political balancing of the great expense of a missile Defence system against the likely risk will be difficult, particularly as the paper itself acknowledges that "the precise extent of the threat ... is certainly difficult to quantify". A government discussion paper raises the possibility that the UK could join the US program to counter the potential threat from rogue states

### **BRITISH BASES WOULD STRENGTHEN US ANTI-MISSILE SHIELD: GOVT**

London (AFP), *Space Daily*, December 09, 2002. Britain on Monday made a strong claim for the use of British bases as part of a US ballistic missile Defence shield, saying they would help defend against any attack from the Middle East. Launching a ministry

discussion paper on the issue, Defence Secretary Geoff Hoon said the government had still not received a formal request from the United States for use of its bases, but said it would consider any such proposal "very seriously". "The potential threat from the proliferation of ballistic missiles is increasing, not least owing to the potential for their combination with weapons of mass destruction," Hoon said. "We have a responsibility to take stock of the issues involved and to consider our options for addressing this potential threat." Although Britain faced "no immediate significant threat" of a missile attack, the Defence ministry paper said there was a "serious cause for concern" that Iraq, Iran, North Korea and Libya already had, or were seeking, to acquire a ballistic missile capability. "Keeping a low profile and hoping for the best is not an option. Safety lies through recognizing threats as they arise and taking proactive steps to address them."

It added that the use of the early warning station at Royal Air Force Fylingdales in northern England would strengthen initial US plans for a Pacific-based Defence shield. "This initial system would only have a limited capability against a possible Middle East threat," the paper said. "The additional warning time provided by RAF Fylingdales for a Middle East threat is very substantial." It argued that there could be further interceptor missile sites in northeast America and northwest Europe, together with additional early warning radar in southeast Europe to "address a Middle Eastern threat". Another RAF base at Menwith Hill, close to Fylingdales in North Yorkshire county, has also been suggested as a support base for any US Defence shield. US President George W. Bush has made building the so-called "son of star wars" system a cornerstone of his national security policy, despite criticism at home and abroad leveled by those who believe the project will destabilize arms control efforts. The ministry's paper dismissed suggestions that Britain would be at great risk should it offer its bases for use. "Any regime contemplating the use of ballistic missiles against the UK would then face not only the near certainty of an overwhelming response, but also the probability that the attack would fail altogether."

**MISSILE SHIELD SETBACK**, CBS News, December 11, 2002. The Pentagon's missile defense program suffered a setback early Wednesday when an interceptor failed to separate from its booster rocket and missed its target high above the earth...A Pentagon statement blamed the failure on a booster rocket that was used for the final time in this test. To date, the Missile Defense Agency has been using what it calls a surrogate booster while development continues on the real booster that will propel the exoatmospheric kill vehicle, or EKV, on its path toward the target missile...Because the EKV could not separate from the booster, it apparently was not able to acquire the target. Cheryl Irwin, a Pentagon spokesperson, was quick to point out that the interceptor didn't miss. "The EKV did not have the opportunity to make an interception," she said. The Pentagon statement also applauded the performance of the rest of the missile defense system during the test, saying "radars and other sensors, as well as the battle management, command, control and communication elements that are

vital in the GMD development effort” performed according to plan. “USS Lake Erie, an Aegis cruiser, successfully tracked the target missile after launch, and the Airborne Laser, a modified Boeing 747 aircraft, successfully used an installed infrared sensor to detect and track the boosting target missile after launch,” the statement read...This is the second failure attributed to the use of the surrogate booster rocket. Two designs for the actual booster rocket are nearing completion, and will be tested this spring. Irwin said all future tests will use one of these prototypes. The next test has not yet been scheduled.

**VANDENBERG MISSILE LAUNCHES BUT INTERCEPT MISSES**, Santa Maria Times, December 12, 2002. A prototype interceptor failed to separate from its modified Minuteman missile, and never got a chance to slam into a mock warhead early Wednesday. It’s the second time the Pentagon’s missile defense program has been foiled by a basic aspect of rocket science rather than the new technology being tested. “We could not complete the test, obviously,” Lt. Col. Rick Lehner, a Missile Defense Agency spokesman, said more than two hours after the test. “I think most people understand this is not anything to do with missile defense technology,” said Lehner. “The kill vehicle never got a chance to play.”...”Everything was nominal with the target and GBI (ground-based interceptor) until it came time for the kill vehicle to separate,” said Lehner...Lehner said that both military and industry investigations would look into the cause of Wednesday’s flop. Technicians were already reviewing data from the test to pinpoint what went wrong...Lehner said the successful target launch from Vandenberg allowed other aspects of the tests to occur. “All the objectives were met, except for the intercept,” he said.

**ISRAEL GETS TWO PATRIOT MISSILE BATTERIES BEFORE JOINT U.S.-ISRAELI EXERCISE**, Agence France Presse, December 12, 2002. Two Patriot missile batteries arrived in Israel’s Ashdod port Wednesday ahead of a joint exercise with the U.S. military next month, Israel public radio reported. U.S. warships and state-of-the-art Arrow interceptor missiles will also participate in the exercise, after which the Patriot missiles will remain in Israel, the radio said. The new generation Patriots are to form part of Israel’s double-layer anti-ballistic missile Defence system, which uses both Patriot and Arrow missiles, ahead of the possible U.S. strike on Iraq, which is feared could cause Iraq to target Israel. During the 1991 Gulf War, when 39 Iraqi Scud missiles struck Israel killing one person and causing widespread damage, the US Patriot missile was used with limited success. But since then, the Patriot has been significantly upgraded and improved. According to a report on the website of Israeli daily Haaretz, the joint exercise will include the use of both Arrow and Hawk missiles, as well as an American ship-based radar system designed to pinpoint incoming ground-to-ground missiles. Three weeks ago, Germany said it planned to supply Israel with requested U.S.-made Patriot anti-missile missiles, saying it was the country’s “historic and moral duty.”

**U.S. JOINT CHIEFS HEAD MYERS VISITS RUSSIAN MISSILE DEFENSE SITE**, Associated Press, December 11, 2002. Chairman of the U.S. Joint Chiefs of Staff Gen. Richard Myers visited a Russian missile-attack warning site on Wednesday...Myers visited a missile and space defense command post in Solnechnogorsk outside the capital, the U.S. Embassy said. The U.S. military leader was accompanied by the commander of Russia's Space Forces, Col.-Gen. Anatoly Perminov, the Interfax-Military news agency reported. It said Myers familiarized himself with routines at the post and was told about Russian defense systems. The ITAR-Tass news agency said Myers and Russian Defense Minister Sergei Ivanov discussed cooperation on early warnings of missile attacks, responses to unauthorized ballistic missile launches and measures to complete the construction of a joint center to exchange information on these issues.

**TRW, NORTHROP SHAREHOLDERS APPROVE SALE**, Associated Press, December 12, 2002. Northrop Grumman has closed its \$7.8 billion acquisition of TRW Inc., completing Northrop's transformation from a defense industry also-ran in the mid-1990s to the world's second-largest defense contractor. Shareholders for both companies approved the deal Wednesday. Their votes came a day after Northrop announced an agreement with the Justice Department to ensure that the merger will not impede fair and open competition related to electronics in spacecraft. The TRW acquisition makes Northrop a defense powerhouse, able to compete for work on homeland security, missile defense and electronic warfare programs. Northrop now ranks as a primary provider of airplanes, ships, sophisticated radar systems, satellites and unmanned reconnaissance drones, such as the Global Hawk...With the addition of TRW, Northrop will have \$25 billion in annual sales and 120,000 employees, behind Lockheed Martin. Boeing Corp. now becomes the third-largest defense contractor, followed by Raytheon. To win Justice Department approval for the deal, Northrop signed a consent agreement requiring the company to sell satellite sensors to competitors at a fair price. Justice officials had said they were concerned that the combination of Northrop, which makes sensors and other electronics for satellites, and TRW, one of two primary contractors for military satellites, would have substantially reduced competition.

## **OPINION/LETTERS**

**END BRITAIN'S RELATIONSHIP WITH AMERICA (LETTER)**, The Daily Telegraph (London), December 12, 2002. From Geoff Hoon's recent statement to the House of Commons and his comments on Newsnight on Monday, it is clear that the Government has already decided to allow America whatever facilities it needs on British soil for its projected anti-missile Defence; and that the public "debate" on the topic initiated by Mr. Hoon will be merely another exercise in spin. Will the Conservatives again follow their line of "me-tooism" in matters of foreign policy/grand

strategy, and simply question the small print of government proposals, instead of questioning British involvement in “Star-Wars Mk II” au fond? In the light of this new potential entanglement with the Bush Administration's world policy, coming on top of our existing entanglement in its preparations for a needless war against Iraq...we should surely re-examine the utility to this country of the "special relationship" with America at the present degree of intimacy. It is 57 years since Nazi Germany went down to defeat, and 12 years since the Soviet Union followed suit. Where today is there a comparable threat to Britain-in-Europe that might render American protection necessary? Certainly not the "axis of evil", with its primitive weapons systems and absence of any motivation to attack us. Certainly not "global terrorism", that overrated menace, where in any case Britain is more likely to be attacked because of her loyalty to America than on her own account.

**FRIDAY, DECEMBER 13, 2002**

**RUSSIA PROCEEDS WITH “ASYMMETRICAL” RESPONSE TO U.S.**

**WITHDRAWAL FROM ABM TREATY**, RIA News Agency (Moscow), December 13, 2002. Today is the first anniversary of U.S. President George Bush’s official announcement that his country would be withdrawing from the Treaty on the Limitation of Anti-Ballistic Missile Systems, better known as the 1972 ABM treaty. Exactly six months later, on 13 June 2002, the document, which was described as “the cornerstone of strategic stability” and the basis of the entire Russian-U.S. system of arms control and arms reduction, passed into history...Moscow now has a real chance to compensate for the disappearance of the ABM treaty, without any extraordinary financial outlay. Russia’s asymmetrical measures consist of a revision of plans to reduce strategic offensive armaments...In addition to these measures, as Defence Minister Sergey Ivanov has stated in the presence of journalists, a special-purpose command, which will become “the spearhead of the country’s aerospace defenses”, is being created out of the Moscow air force and air defense district. It will amalgamate the Air Force and Space Troops, including Missile Space Defence Troops, which also comprises Moscow’s missile defense system, and air defense troops. Early next year these formations are due to start joint command-post exercises, which will make it possible to gain experience in developing the new operational-strategic organization, which will not be an exact equivalent of America’s NMD command, but will still be capable of reliably tackling the task of providing aerospace defense for at least one region of the Russian Federation. This will evidently be a part - and not very burdensome for the Russian economy - of our undeclared, but genuinely asymmetrical response to President George Bush’s decision to withdraw from the 1972 ABM treaty.

**SCUD MISSILE IS CRUDE BUT EFFECTIVE**, Reuters, December 11, 2002.

While many countries own Scuds and similar missiles, the unsophisticated weapons become controversial threats if their operators fit them with nuclear, chemical or

biological warheads. North Korea's version of the missile has a range of about 340 miles and can deliver a 1,700 lb. warhead, according to Jane's Strategic Weapon Systems, a standard reference work...Scuds are highly inaccurate: North Korea's are believed to have only a 50 percent chance of landing within about 1,000 yards of their targets. But analysts say such inaccuracy may not matter if the warhead is a weapon of mass destruction...Since the Scud is not a long-range weapon, it travels more slowly than the intercontinental ballistic missiles that the major nuclear powers can fire across the oceans at each other. But even its re-entry velocity is determined to be a great challenge for all but the most powerful U.S., Russian and Israeli defensive systems...Israel has developed its Arrow 2 missile system to deal with ballistic missiles, has deployed two batteries and is constructing a third. "Israeli sources have claimed that the Arrow 2 can intercept an incoming Scud-class target at 50 km. altitude and 100 km. from its launch point," another Jane's publication, *Missiles & Rockets*, reported this month.

**COMMITTEE SAYS NO TO MISSILE DEFENCE,** The Globe and Mail (Canada), December 11, 2002. The Commons foreign-affairs committee is refusing to endorse Canadian participation in a U.S. missile-defense program. The Liberal-dominated committee is to release a report tomorrow that casts doubts on the feasibility of the controversial Pentagon program, committee sources said. The report will appear days after Foreign Affairs Minister Bill Graham said the government is ready to talk with Washington about creating a North American shield against missile attacks.

**MTHHEL TESTBED SCORES MORE FLIGHT TEST HITS, HARDWARE DEVELOPMENT PHASE NEXT,** Defense Daily, December 12, 2002. The Mobile Tactical High Energy Laser (MTHHEL) testbed in flight tests Monday shot down a 152mm artillery projectile and then a Russian-built 122mm Katyusha rocket, Army Space and Missile Defense (SMDC) program officials here said. To date, the MTHHEL testbed has scored 30 hits in flight tests at the Army's High Energy Laser Systems Test Facility (HELSTF) located at White Sands. The MTHHEL testbed consists of the remnants of the joint U.S.-Israeli THEL advanced concept technology demonstration (ACTD) program started in 1996. Now, the Army is gearing up in FY '04 to award a contract for the development of the new hardware to build the latest variant of the system, envisioned to eventually be much smaller and mobile, said Gerald Wilson, program manager for MTHHEL. The Army also has decided to transfer management of the MTHHEL program from the Army's SMDC to the Army's Program Executive Office for Air and Missile Defense. This move, SMDC officials contend, will put the system into the hands of warfighters sooner...Under the current plan, an MTHHEL demonstrator will be completed in the 2006-07 time frame. Meanwhile, the Army officials reported they are making significant progress with the new Zeus laser system.

**RAYTHEON REPORTEDLY HELD MERGER TALKS**, Boston Globe, December 11, 2002. Raytheon Co. held separate merger talks this year with General Dynamics Corp. and with Britain's BAE Systems, said a person knowledgeable about the discussions. But senior Raytheon executives, confident in their recovery strategy, backed away from any possible deals. Raytheon's stock has been stagnant at around \$30 a share, despite the run-up in U.S. defense spending. The Lexington-based defense contractor, which makes the Tomahawk cruise missile and radar systems, has often been mentioned as a possible candidate for a merger - which could help it counter the other large companies being assembled in the defense industry.

**NORTH KOREA SAYS IT WILL RENEW WORK AT REACTORS**, Washington Post, December 13, 2002. North Korea said today it will restart work at three abandoned nuclear power plants that could produce material for nuclear weapons, reviving the threat that brought it to the brink of war with the United States in 1994. The announcement caused alarm in capitals in the region. Japan's prime minister called for calm, and the South Korean government convened its security chiefs over what it said was a looming "crisis on the Korean Peninsula." ...If operational, the plants at Yongbyon and Taechon, north of Pyongyang, would produce spent fuel rods as part of the power generation process. The rods could be reprocessed at Yongbyon into plutonium, the heart of a nuclear weapon...Many experts had predicted an escalation in the standoff by North Korea in answer to the fuel oil cutoff, but today's move was more drastic than most had anticipated. It came on the heels of Monday's U.S.-led seizure of a North Korean ship bound for Yemen with 15 Scud missiles, Pyongyang's chief legal export.

**U.S. NAVY OUTLINES VISION FOR SEA POWER 21 CONCEPT**, Jane's Defence Weekly, December 11, 2002. The US Navy (USN), in a series of speeches, interviews, and articles by senior officers, has begun to provide greater detail of the framework on which it will base future plans. The concept, called 'Sea Power 21', is "a roadmap for the future ... [of] what the navy ought to look like over the next 20-30 years", according to Chief of Naval Operations Adm Vernon Clark. Adm Clark said he wants to take the navy from being able to prosecute "war at sea" to fighting "war from sea". To do so, he added, "we must have the capability, operating from the maritime domain where we do not need a permission slip...to climb in the ring with the enemy and be able to stay there long enough to get the job done". 'Sea Power 21' is intended to provide those capabilities and is based on three primary areas; Sea Strike, Sea Shield and Sea Basing (*Jane's Defence Weekly* 19 June). Sea Strike will offer "offensive power at great range" through the use of submarine-, ship- and aircraft-launched munitions, special operations forces, and US Marine Corps (USMC) troops. Key technologies for Sea Strike, Adm Clark said, include autonomous loitering unmanned air vehicles (UAVs), unmanned combat air vehicles, hypersonic missiles, electro- magnetic railguns, and hyperspectral imaging.

Those technologies will provide persistent intelligence, surveillance and reconnaissance (ISR) data as well as the weapons to engage identified targets. The ISR and target data will be collected from numerous USN and USMC forces, including future submarines that launch and control UAVs and unmanned underwater vehicles (UUVs), but also by joint and national assets. This information, delivered quickly to naval forces capable of firing smaller precision munitions, navy officials said, will vastly improve power in combat against both fixed and moving targets. However, future naval forces will not rely solely on munitions to take down enemy units. According to senior navy officials, the service is for the first time putting significant resources into maritime-based Information Operations in an effort to make it a major warfare area. While details of these systems are scant, they are said to include ship-based psychological operations dissemination systems, computer network attack and defense, as well as improved electronic-warfare capabilities.

The second tenet of the strategy, Sea Shield, is intended to project defense power over land to protect US troops and allies. It would defend against anti-access strategies such as ballistic and cruise missiles, naval mines, swarming small boats, and diesel-electric submarines. To counter these anti-access threats, the navy plans to develop capabilities, called Navy Fire Control - Counter-air, for ballistic and cruise missile defense from future CG(X) cruisers. Those ships will be tied in a network by Co-operative Engagement Capability and Link 16 data links transmitting information from E-2C Hawkeye airborne surveillance and command-and-control (C2) aircraft that have undergone the Radar Modernization Program, as well as to Advanced Electronically Scanned Array radar-equipped F/A-18E/F Super Hornet aircraft and F-35 Joint Strike

Fighters. The CG(X), which will be part of future missile defense Surface Actions Groups, is expected to be equipped with a family of missile interceptors, including the next variant of the Standard Missile, dubbed SM-5. Over the longer term, the navy could look to directed-energy weapons to conduct self-defense and eventually missile defense missions.

A second key new mission under Sea Shield is what Adm Clark called "littoral sea control", which includes defense against expected threats such as swarming small craft, naval mines and diesel-electric submarines. To meet these challenges, the future Littoral Combat Ship (LCS) is expected to play a key role and will be networked with other capabilities such as underwater detection systems like UUVs and advanced deployable systems linked by a common undersea picture. To protect aircraft carriers, navy officials noted that carrier-borne helicopters will be given greater roles for conducting anti-mine, anti-submarine, and anti-surface missions.

Noting that "we are entering a period where sovereignty issues are going to be more important than ever", Adm Clark outlined his vision for increasing use of Sea Basing to limit US dependence on shore bases. Keeping larger portions of the non-combat force at sea, the concept goes, will allow forces ashore to be more mobile and deployable, and will also make the task of force protection easier.

One key to the Sea Basing concept will be the Maritime Preposition Force-Future (MPF(F)) ship, he added. The ship is expected to do at-sea arrival and assembly, selective offload and reconstitution at-sea and be used for other tasks such as housing C2 facilities that could host a forward-based Joint Task Force headquarters. While no decision has been made on what the MPF(F) will look like, industry sources said they are looking at putting a "flat top" on the ship with enough deck space so it can host assault helicopters or other aviation such as the MV-22 Osprey tilt-rotor aircraft, and possibly even short take-off and vertical landing F-35 Joint Strike Fighters. The ship is further expected to have "hotel functions" to allow at-sea reconstitution of a Marine Expeditionary Brigade-sized force or SOF, the industry sources said. The Defense Science Board (DSB) is set to study how best to conduct sea basing, with a report due by June 2003, according to Department of Defense documents. The DSB will study the Enhanced Networked Seabasing concept, including having logistics, C2 and fire support at-sea rather than on shore. One concept the DSB may look into is the viability of a Mobile Offshore Base, which could use oilrig technology.

To ferry these troops and supplies ashore, the navy and USMC have several programs under consideration. The best publicized is the use of high-speed vessels such as the Bollinger/Incat Joint venture HSV-1X. Other options include a future Heavy Lift Landing Craft Air Cushion that would increase the craft's length and cargo area by 33% and would double the payload to 144 tons, making it capable of carrying 10 light armored vehicles or two M1A1 tanks. Another is the Landing Craft Utility-

Replacement, which will complement the high-speed vessels and be able to operate from the well decks of US amphibious ships. A network called FORCEnet will tie together each of these concepts, and the systems and platforms that implement them. FORCEnet aims to "operationalize the concept of network-centric warfare", Adm Clark said. Noting that "we are just on the border of understanding the power of information dominance", he admitted the service has "only scratched the surface" of achieving the network-centric warfare goal. "We have been talking about network-centric warfare for a decade. Is anybody satisfied? I'm not." Despite Adm Clark's frank assessment, industry sources - and even some senior naval officials - said the service still has not sufficiently defined what FORCEnet is and how it will work. One source described it as yet another paper concept with little applicability when it comes to the reality of implementation with existing information technology systems.

**NAVY ENVISIONS SURFACE COMBATANTS WITH POWERFUL LASER GUNS**, *Inside The Navy*, December 9, 2002. The Navy is studying ways to equip its surface combatants in a decade with powerful laser guns unlike anything in the fleet's arsenal. The service is working on the project with the Energy Department's Thomas Jefferson Laboratory in Newport News, VA, and a variety of defense contractors. The idea is to develop a directed-energy weapon from free-electron laser (FEL) technology, creating a gun capable of lethal and non-lethal force. The laser may prove useful for force protection, destroying air and surface targets, and providing sea-based missile defense, according to the service. Rear Adm. Jay Cohen, the chief of naval research, Rear Adm. Mike Mathis, head of the Naval Sea System Command's Naval Surface Warfare Center, and Lt. Gen. Emil Bedard, head of the Marine Corps' plans, policies and operations branch, are proponents of the effort. A ground-based FEL weapon technology was a key part of the Strategic Defense Initiative started under the Reagan administration.

The science was sound but the program was canceled because the technology was immature, according to a Navy briefing slide on the FEL weapon concept. But the Navy's optimism about FEL technology has grown with recent successes at Thomas Jefferson Laboratory, according to that slide and Cmdr. Roger McGinnis, who works on directed energy at Naval Sea Systems Command. The lab has developed the highest average power free-electron laser in the world, he explained to *Inside the Navy* in an interview by e-mail last week. "They achieved 2.2 [kilowatts] last year, and are currently under Navy funding to scale to 10 kW later this year," he said. "The previous high power record was 11 watts, making Jefferson Laboratory's laser 200 times more powerful." Additionally, the lab has overcome some major technological hurdles in the design of its laser that will enable scaling the laser's power up to weapon-power levels, McGinnis explained. "These advances include recovery of the electron beam's energy, which will increase the efficiency of the laser, and the use of superconducting cavities which preclude any of the energy being lost by resistive losses in the accelerator

cavities," he said. "This greatly reduces the thermal management problem common among high energy devices." These advances were considered unachievable in the mid-1980's, but Jefferson Laboratory's FEL team has accomplished both, McGinnis said.

The Navy is already designing its future DD(X) warships to be capable of powering futuristic directed-energy weapons with an Integrated Power System. That flexibility alone, however, does not solve all of the challenges associated with putting directed-energy weapons on ships. In March 2001, Vice Adm. Pete Nanos, then head of Naval Sea Systems Command, told *ITN* the service had "a lot of work to do" before fielding shipboard directed-energy weapons capable of meeting valid warfighting requirements. Suitability, effectiveness and affordability all must be addressed before the Navy even thinks of putting such a weapon on a ship, he said. The Navy is drafting a requirement that, once approved, could formalize its need for this kind of laser weapon. The draft mission need statement "discusses the challenges the maritime forces are facing with the advanced cruise missile threats for our surface ships," as well as the need for precision and speed to engage asymmetric threats, McGinnis said. A high-energy laser is "one of the primary candidate solutions" for this mission need, he said. The document has been in a flag-level review process for "a few months," he said.

On the technology side, Cohen's Office of Naval Research, NAVSEA, and the office of the chief of naval operations are in discussions to begin development of a 100 kW free-electron laser, said McGinnis. The idea is to expand and scale the technology at Jefferson Laboratory to obtain the needed increase in power, he said, noting other options are also being discussed. "This size laser would offer capabilities against some targets," McGinnis said. But the power would need to be increased somewhat in order to become effective against all the targets the Navy is interested in engaging, he said. Actual power levels of weapon-class devices will, of course, be classified, said McGinnis. The real promise of a free-electron laser is that it appears to have scalability to very high power levels, he said. Other lasers such as solid state lasers are believed to have limits on how much power they will eventually produce because of overheating, he explained. How soon the Navy can incorporate FEL technology into a ship will be driven by technology and the availability of adequate funding, he said. Assuming money is available, the Navy would like to develop the 100 kW laser in three years, with a follow-on weapon-class laser built and installed at a maritime test site about four to five years later, he said.

A parallel effort to work out the engineering requirements for designing a FEL weapon into a ship could also be conducted, resulting in a weapon ready for ship installation in about 10 years, said McGinnis. Some experts tracking the FEL project share the Navy's optimism. "Due to increased emphasis in [the Defense Department] for high-energy lasers, there are several areas showing significant promise for weapons capabilities," said Dolores Etter, who in the summer of 2001 finished a three-year run as the

Pentagon's deputy under secretary for science and technology. With increased Navy support, it is possible the Jefferson Lab will be able to expand its progress on FEL by demonstrating 100 kW power output in just a few years, said Etter, now a professor at the U.S. Naval Academy. This would allow the Navy to reasonably think about using the FEL for weapons systems on ships, she said.

"There are still some significant challenges, such as ruggedizing, but the FEL has some advantages over chemical lasers and solid state lasers, particularly in the support areas," said Etter. "The bottom line here is that laser weapons in general offer transformational new capabilities, and the DOD S&T program should continue to seriously support the various paths to get to these new capabilities." Noting laser weapons can provide capabilities for all the services, Etter said the Pentagon's joint technology office for high-energy lasers is doing an excellent job of providing leadership and leverage for the dollars in these programs. Wet, misty environments are hardly ideal for laser beams. McGinnis acknowledged the maritime environment would be more difficult to operate in than the atmosphere the Air Force is negotiating with its Airborne Laser. But the Navy sees something special in FEL technology that could help overcome environmental challenges. Unlike chemical and solid state lasers, FEL technology "allows the wavelength to be selected and is tunable," McGinnis said. "This means that the Navy can select the best wavelength for propagation in the maritime environment." No laser is "all weather" but being able to select the appropriate wavelength for operating "will give the Navy a tremendous capability," he said. Major defense contractors are already busy conducting FEL studies for the Navy.

Raytheon Missile Systems in Tucson, AZ, is looking into the power requirements, cooling requirements, weapons interfaces, and other weapon-type requirements that would need to be included in designing a high-energy laser weapon, said McGinnis. The company stood up a new directed-energy product line last year, he said. With Navy funding, Raytheon is looking at all the system-level aspects required to intelligently develop the requirements and design for a naval laser weapons system, regardless of whether the core technology is FEL, a solid state laser or a chemical laser. "This includes looking at beam control, lethality, and system level requirements," McGinnis said. Northrop Grumman's Electronic Systems in Baltimore, MD, is specifically looking at the design requirements that would be involved in incorporating a free-electron laser into a surface ship, he said. "Some of this study includes looking at the vibrating and shaking environment a laser would have to operate in if it were incorporated into a ship," he said. Results from this year's study are due out in early summer. Northrop is also being funded by the Navy to look at the various subsystems of a FEL and the disparate constraints on those subsystems, he said.

The Dahlgren, VA, division of the Naval Surface Warfare Center and the contractors Resource Consultants Inc. and Whitney, Bradley & Brown are looking at mission

analysis and possible concepts of operations for a high-energy laser weapon. A first report on the results of some of these studies is due out this coming spring, McGinnis said. Additionally, the Navy's directed-energy program office, PMS 405, is conducting high-energy laser tests in White Sands Missile Range, NM, using the Navy's Mid-Infrared Advanced Chemical Laser (MIRACL) against various drone and real-world cruise missile targets, McGinnis said. The primary purpose of these tests is to "develop and verify the tracking and aim point maintenance algorithms" needed for a high-energy laser weapon engagement against a maneuvering cruise missile target, he said. This is an ongoing effort, and to date the Navy has completed tracking tests against two drones and one cruise missile-like target.

**'SCI-FI' WEAPONS GOING TO WAR**, Los Angeles Times, December 8, 2002. On April 30, 2001, more than 30 square miles of the rolling Maryland countryside that make up the Aberdeen Proving Grounds were cleared of all nonessential personnel for the first full-scale test of a new weapon. Planners also took care to remove all unnecessary electronic equipment, because electronic equipment was exactly what the new weapon was designed to destroy. At 6:13 p.m., the antenna on the exotic new device was switched on and a high-powered beam of microwaves was fired at a nearby truck -- the first field deployment of a "directed energy" weapon. It fried the truck's ignition and air-fuel mixing system, bringing the hapless vehicle to a halt. About the same time, at Kirtland Air Force Base in New Mexico, field demonstrations were being wrapped up on another microwave weapon, this one mounted on a truck and designed to inflict intense pain on human skin. The weapon sprang from a program devoted to what military researchers call "active-denial technology." Now, a year and a half later, an enormous effort is underway to move these speed-of-light weapons from the realm of research to combat readiness. The same is true for an array of exotic new weapons, including new generations of so-called "agent defeat" bombs. Among the latter is a guided cluster bomb that scatters 4,000 titanium rods capable of penetrating chemical and biological bunkers and storage tanks with lethal effect. Most promising is a new incendiary device that generates a firestorm so intense it cannot be quenched with water.

What lies behind this rush to bring these exotic new weapons into the American arsenal is the Bush administration's almost obsessive determination to eradicate nuclear, chemical and biological weapons in Iraq -- and potentially in other rogue states -- as part of its war on terrorism. The new devices, along with the development of highly secret special operations units and new tactics, are intended to help the armed forces seize or neutralize the so-called weapons of mass destruction (WMD) with greater speed and security -- as well as with less damage to surrounding areas or people, and less danger of inadvertently spreading toxic materials.

There are risks, however, because some of these new weapons could arguably be construed as violating established codes of wartime conduct. And the risks of a backlash, whether at home or abroad, are magnified by the administration's almost total

refusal to talk about what it is doing and thereby build public understanding and support. Unfortunately, one side effect of framing the war on terrorism in terms of weapons of mass destruction is that it instills in government officials a sense of moral certainty so great that they feel no need to explain or justify themselves. And, for all the talk of withering air strikes on thousands of Iraqi targets and of armored divisions racing toward Baghdad, what really distinguishes Washington's preparation for war with Iraq is its focus on finding and destroying Saddam Hussein's weapons of mass destruction.

Deputy Secretary of Defense Paul D. Wolfowitz made this crystal clear last week when he said, "Our goal is to achieve the disarmament of Iraqi weapons of mass destruction, peacefully if possible, voluntarily if possible, by force if necessary." And the administration clearly sees high-powered microwave, or HPM, weapons and other such devices as potentially useful in Achieving that goal. When Secretary of Defense Donald H. Rumsfeld was asked at an August press briefing how promising he considered HPM technology, he replied in his characteristically elliptical way by recalling the unexpected emergence of unmanned aerial drones in the Afghanistan war. "You never know," he said. Drones "that were used in Afghanistan had not reached their full development. In the normal order of things, when you invest in research and development, you don't have any intention or expectations that one would use it. On the other hand, the real world intervenes from time to time." The real world that drives current war planning is the absolute imperative of thwarting Iraqi use of chemical or biological weapons. For many years, the military and the defense industry have dreamed of directed-energy weapons -- lasers, microwaves and electromagnetic pulses that would operate in milliseconds and leapfrog over the current generations of conventional and nuclear weapons.

Microwave weapons work by producing an intense surge of energy, like a lightning bolt, that short-circuits electrical connections, interferes with computer motherboards, destroys memory chips and damages other electronic components. As antipersonnel weapons, active-denial HPMs send a narrow beam of energy that penetrates about 1/64th of an inch into the skin, where nerves that cause pain are located. By instantaneously heating the skin to above 50 degrees Centigrade (122 degrees Fahrenheit), the microwaves inflict intense pain; often, the reaction they produce is panic. "All the glossy slide presentations in the world cannot prepare you for what to expect when you step in the beam," a high-ranking officer commented last year after experiencing it. His account was contained in military documents. As a result of the attacks of Sept. 11, these and other highly classified HPM prototypes are being evaluated for use against facilities involving weapons of mass destruction. "We are looking for a boutique of capabilities," Sue Payton, deputy undersecretary of Defense for advanced systems and concepts, told the Pentagon press corps in March, describing the agent-defeat mission. HPMs are being tested against mock targets with the hope of

being able to disable them with a minimum of blast effects, civilian death or external physical damage, military sources say.

In fact, HPM weapons technology has now returned to its nuclear roots. In the mid-1980s, the Air Force's Strategic Air Command called for a new weapon able to protect storage bunkers from mobs of anti-nuclear protesters. A "repel demonstrator" device using high-powered microwaves was built and tested in 1996. The focus of the program shifted to crowd control missions for places such as Somalia and Bosnia; two vehicle-mounted prototypes were tested in New Mexico and built before Sept. 11. While these devices can perform at close quarters, developers of long-range HPM weapons still have had to overcome huge problems in making them combat-ready. They require large power sources. They are small and lack ruggedness. And they have a tendency to inadvertently harm friendly forces. In April 1999, the Joint Command and Control Warfare Center oversaw the first military HPM weapon successfully demonstrated against electronics on a small scale. The prototype was described at the time as "elegant, safe, well built, and user friendly." Last October, a Defense Department briefing extolled its ability to stop vehicles at hundreds of meters, and military sources hint that at least three different prototypes are available for what might be one-time use in Iraq.

Meantime, the Pentagon has not put all its eggs in the technology basket. It is training special combat units too. Since Sept. 11, the mission of the U.S. Special Operations Command has focused on combating terrorism and countering weapons as dual priorities. The command's mission, according to Defense Department documents, is to "prevent/limit/minimize the development, possession and employment of weapons of mass destruction [and] to seize, destroy, render safe, capture or recover WMD [weapons of mass destruction]." The use of Special Forces in this role actually has its roots in the Cold War, when the still-top-secret Delta Force was created. In fact, its first "certifying" exercise, code-named Joshua Junction, took place at a mock nuclear weapons facility on Jackass Flats at the Nevada Test Site. In that exercise, Delta Force teams were to recover a stolen U.S. nuclear weapon from a Middle East terrorist group. Over more than 20 years, what is now called the Joint Special Operations Command has honed its ability to conduct surgical missions against WMD production, storage and other facilities, using techniques and weapons designed to minimize environmental damage and the danger of dispersal.

Putting new weapons together with these highly trained teams of special operators, Pentagon planners have developed detailed scenarios for dealing with any WMD facilities encountered in Iraq. Unmanned vehicles with special sensors keyed to detect radioactive or chemical emissions would scout the site. HPMs would then be employed. Spreading soundlessly along water pipes, air vents and antennas, they would attack electronic equipment, causing the facility to freeze up. HPMs might also be used to

drive the enemy out of bunkers and other secure sites without the destruction and possible collateral damage that come with high explosives.

Cluster and smart bombs could also bring about pinpoint destruction of above-ground facilities. New incendiaries, combined with penetrating munitions and chemicals, could burn up chemical or biological agents. Under a program originally dubbed Vulcan Fire, the Navy and Lockheed Martin are furiously working to field 20 inter-metallic incendiaries. Called HTI-J-1000, these penetrator weapons combine high-temperature explosives to ignite and burn chemical agents, with disinfectant chlorine and acids to neutralize biological agents.

Many of the boutique weapons and special operations remain highly classified not only to preserve the element of surprise, but also because -- politically -- they are highly controversial. This year's classified Nuclear Posture Review talked of a classified weapon under development that uses "radiological neutralization" of chemical/biological materials in production or storage facilities. "Radiological neutralization" suggests something awfully close to a nuclear weapon. And HPMs intended to destroy military electronics and disrupt civilian electrical power systems might also knock out electrical service to hospitals, for instance, and attack backup generators. Even people with pacemakers might be affected.

Similarly, high-tech antipersonnel devices must inflict pain while avoiding burning, eye damage or other prolonged effects that could be considered "unnecessary suffering," which is banned under existing treaties and international law. The Bush administration justifies use of the new weapons on grounds that hitting WMD sites with conventional weapons might create large-scale disasters, because hazardous chemicals, toxins and biological agents could be dispersed over a wide area. This line of thinking may stem in part from the fact that, during the 1991 Gulf War, when Hussein had an enormous chemical and biological arsenal, the United States took huge risks in attacking WMD sites. American intelligence had no idea which targets actually contained chemical and biological agents; only after the war did we discover how little correlation there'd been between actual and suspected WMD sites.

Today, U.S. intelligence about the location of Hussein's illicit materials is no better. The hope is that Iraq will do something to "expose" its weapons, providing the opportunity for a clear American shot. The goal -- reducing the risk of nuclear, chemical or biological disaster -- is important. But good intentions may not be a good enough answer if units such as Delta Force are sent into action with weapons and tactics that appear to cross the threshold of what is considered lawful and acceptable. Especially if the U.S. government does not begin to make its case to the American public and the rest of the world until after the fact. Secrecy seems to be the Bush administration's favorite operating style. In the end, however, events may prove that its momentary convenience comes at a heavy price.

**FIRMS STUDY SUBORBITAL REUSABLE ROCKETS**, Defense Week, December 9, 2002. A number of companies are positioning themselves to take advantage of a potential market for launching reusable rockets into space—but not into orbit—to deliver payloads for the military and other customers, a new government report says. Entrepreneurial companies that previously had focused on delivering satellites into orbit—or more than 115 miles up—are shying away from that market because of high development costs and a shrunken commercial satellite-launch business. Now, those companies are considering delivering payloads to "suborbital" altitudes up to 100 miles high and returning to Earth. The military could use such a rocket as a kind of ballistic U-2: flying over a hot spot, snapping a spy picture and returning to base. It would get there and back faster than an airplane, and commanders would not have to wait for a satellite to pass overhead. Other possible markets include, commercial/civil earth imagery, fast package delivery and high-speed transportation, said the report titled, "Suborbital Reusable Launch Vehicles and Applicable Markets," by the Commerce Department's Technology Administration and The Aerospace Corp., a private, non-profit think tank. However, Marco Caceres, senior space analyst at the Teal Group, is not so sure it's going to be a booming market, saying few companies are proposing new concepts. "I don't think those are going anywhere in the next 20 years," Caceres said. Even the orbital market is "no sooner than 20 years away in terms of developing a real market." Currently there are no suborbital reusable launch vehicles, or SRLVs, and the current market involves only expendable sounding rockets, used for missile defense tests and scientific research. If a common SRLV could be used for civilian and military purposes, it could save a "significant" amount of money, the report said.

### **Military interest**

The Pentagon has long been interested in reusable launch vehicles. The feasibility of such vehicles was proven 40 years ago, the report said, with the development of the X-15 space plane, a research vehicle. The X-15 now sits in the U.S. Air Force Museum at Wright Patterson AFB in Dayton, Ohio. In the 1960s and 1970s, the Defense Department's focus shifted to ICBMs and NASA focused on manned, orbital programs, such as Apollo. In the 1990s, the Defense Department renewed interest in a reusable rocket to transport troops or equipment much more rapidly than by aircraft. In 1995, the DOD reusable Delta-Clipper Experimental program moved to NASA as the X-33 and X-34 programs, but the programs were cancelled for technical and costs reasons in March 2001.

Now, the report said, several companies (it examined 10 in the United States and four abroad) are working on SLRV concepts, because compared to expendable rockets, reusable vehicles might provide "lower operating costs, shorter turn-around times, greater reliability and safety and more versatile performance."

### **Current market**

DOD and NASA currently conduct most suborbital missions using expendable rockets, not reusable ones. But future potential opportunities for reusable launch vehicles exist in ballistic missile defense tests and high altitude and astronomical research, the report said. For missile defense, reusable launch vehicles could be used in risk-reduction flight tests, particularly in testing system components such as sensors and releasing simulated warheads, the report said. NASA could use reusable rockets on some of the issues it now uses expendable, suborbital rockets, such as reaching the area of the atmosphere too high for research balloons and too low for orbiting satellites, where component testing is done as well as materials science and processing.

### **Emerging markets**

Several suborbital markets exist that are not being served by current rockets, the report said, particularly for SRLV concepts designed for both government and commercial customers. For the military, the ability to fly high-resolution cameras at extremely high altitudes along border regions is a valuable reconnaissance tool, the report said.

"Whereas surveillance satellites' orbits are fixed," the report said, "suborbital RLVs could provide "pop-up" reconnaissance capability, a fleet of suborbital RLVs could provide hourly surveillance of areas of interest." Furthermore, since the imagery could be retrieved once the rocket landed, "this type of surveillance method would not impose any bandwidth requirements on an already saturated battlefield communication network," the report said. However, Teal Groups' Caceres is doubtful. The military has a lot of reconnaissance resources, from military satellites, leased capability on commercial satellites, high-altitude aircraft or unmanned aerial vehicles, he said, and "at some point it seems like it may be overkill."

### **Fast packages**

Reusable rockets could also be used for fast package delivery, transporting freight—which could include military equipment—over transoceanic distances, the report said. Here, the reusable rockets would have the speed and shorter flight time to make such an on-demand or scheduled flights, but would need to have the range to deliver across the Atlantic or Pacific, the report said. "It all comes down to applications," Caceres said. "If you can find a worthwhile application for suborbital [reusable rockets] that can make money for a company," then a market will grow. Caceres agrees with the Commerce Department report that development of SRLVs will become a "stepping stone" towards orbital RLV development. Development of suborbital RLVs could be used "to get the whole market used to a concept that actually does work, get the market excited," he said, thus providing impetus toward reusable orbital vehicles.

### **Firms Developing SRLVs**

- Armadillo Aerospace
- Andrews Space and Technology
- Kelly Space and Technology

- Lone Star Space Access
- Pan Aero
- Pioneer Rocketplane
- Starcraft Boosters, Inc.
- TGV Rockets
- XCOR
- Space Launch Corporation
- Bristol Spaceplanes-(UK)
- Starchaser Industries-(UK)
- Canadian Arrow-(Canada)
- Myasishchev Design Bureau (Russia)

**WAR PREPARATIONS REVEAL PROBLEMS**, Aviation Week & Space Technology, December 9, 2002. Inter-agency conflict over the Pentagon's plans to penetrate, spoof and manipulate Iraq's computer networks are being resolved slowly, and they may not be smoothed out in time to fully exploit the military's non-lethal capability. Senior U.S. Air Force officials have complained for years that their forces can be used to kill people at crucial air defense, communications or command facilities with bombs, but they aren't allowed to "attack with ones and zeros," lamented a senior commander. The Pentagon is seeking approval for long-standing plans to carve out a major role for computer network attack (CNA) and information operations (IO) in any conflict with Iraq. But a problem that has surfaced in every conflict since the 1990-91 Persian Gulf War is how to get civilian approval for such operations. The impasse between war planners and civilian policy enforcers is repeating itself as senior combatant commanders struggle to win approval of their plans for "getting at the computer infrastructure, inserting disinformation and attacking a lot of their networks," the Air Force official said. A key target will be tightly integrated air defense systems that rely on networking to survive attack. However, any request from the military to employ computer network attack has to be approved by an inter-agency policy group that includes the State and Commerce departments, and many other agencies.

"That is becoming very frustrating," the Air Force official said. "Trying to normalize computer network attack with policy is difficult. The civilians are afraid to say yes to anything." In a recent conference call with a combatant commander, "it took 40 min. just to get through the roll call of participants in the approval chain," he said. Meanwhile, Iraq has accepted the renewed work of United Nations inspection teams in searching for the manufacturing and storage of weapons of mass destruction and the vehicles to deliver such weapons. However, inspections will take time to complete and analyze. As a result, Pentagon planners have pushed back the date for large mobilization of reserves in anticipation of a conflict with Iraq to mid-January. The call-up of 87,000 reservists--many of them fighter, tanker and transport aircrews and support staff--is being delayed to keep costs down and lessen the impact of pulling reservists away from

their civilian jobs. Many of the reservists will replace active duty personnel who will move into Europe and the Middle East. Some plans are already in place. B-52 aircraft and crews will set up operations at RAF Fairford, England, to shorten the flight to Baghdad by an hour or two over flying out of Diego Garcia in the Indian Ocean. However, B-2 operations will move to Diego Garcia to take advantage of the new environmentally controlled hangars installed there to cure repairs to the low-observable bombers' stealthy skin coatings.

In addition, B-1s and crews will return to Oman, but plans are in place, during combat operations, to keep two aircraft forward deployed to Kuwait and two in the air over western Iraq to maintain a fast response, precision-bombing capability if ballistic missile or air defense missile launchers begin operating there to threaten Israel and Jordan. The bombers will be networked with long-endurance intelligence-gathering and surveillance aircraft like Predator, Rivet Joint, Joint-STARS and AWACS to locate mobile and moving targets, track them and strike when appropriate. Britain, the European nation that has so far proved Washington's closest ally in terms of any escalation of operations against Iraq, has also begun to examine the mobilization of reserves. British Secretary of State for Defense Geoffrey Hoon told Parliament late last month: "As the House is well aware, however, any substantial military operation would require a contribution from the reserves. As part of our contingency planning, therefore, we are clarifying the requirement for such a contribution in support of any military operations in Iraq."

The U.K. also announced at the end of November the deployment of a naval task group, built around the aircraft carrier HMS Ark Royal. Under the banner of exercise Flying Fish, the task group will take part in exercises in the Asia-Pacific region beginning in June 2003. However, it will depart this month and will route via the Gulf. Defense Ministry officials declined to discuss the exact nature of the fixed- and rotary-wing platforms embarked. However, they indicated Royal Air Force Harrier GR7 ground attack aircraft could be deployed on board if required. A 1-billion-pound (\$1.56-billion) contingency fund was set aside in late November by the British government to cover the cost of any unanticipated military operations. This could also be used to fund emerging urgent operational requirements (UOR) in areas such as precision strike. The Defense Ministry may look at bolstering its precision-guided weapons inventory by purchasing additional Enhanced Paveway GPS/laser-guided bombs, possibly along with a limited stock of Joint Direct Attack Munitions under the aegis of a UOR.

In addition to RAF strike weaponry, the Defense Ministry could also look to further supplement--in the near term--its submarine-launched Tomahawk cruise missile inventory. After they were used in Yugoslavia and Afghanistan, a follow-on order to the initial 65 was placed. While the U.K. will eventually almost certainly buy the Tactical Tomahawk, a further interim purchase of Block III missiles could prove attractive.

Going more smoothly now is the approval process for U.S. and allied aircraft to use bases, airspace and facilities in the Middle East. Kuwait, Bahrain, the United Arab Emirates, Qatar and Oman have agreed, and Saudi Arabian officials have promised, that when the time comes, they will support the U.S., say U.S. Air Force officials. Meanwhile, both the U.S. and Israel have been fine-tuning their ballistic missile detection capabilities. Two Scud missiles were launched from Vandenberg AFB, Calif., in recent weeks, and more launches are expected soon. Strict security rules were in force because the closely scrutinized launches were attended by 50 Israeli government, military and industry officials, some of whom helped prepare the tests, according to the *Lompoc (Calif.) Record*.

U.S. aerospace industry officials said the Scud tests are not unusual, except for the Israeli presence, and have been conducted for years using surrogates and actual missiles. The latter have been procured from former Soviet-Bloc or Soviet-client nations in Eastern Europe and the Middle East along with fighter aircraft, anti-aircraft weapons, armored vehicles and other military equipment.

The tests give U.S. military and industry researchers a chance to calibrate their equipment and hone their skills. They are developing networking schemes so they can pinpoint ballistic missile launch sites for attack before mobile launchers can move out of lethal range. The network can also pass predicted missile impact points to air defense systems in nearby friendly nations. A recent operational addition to this capability is the Theater Airborne Warning System (TAWs) that combines information from Defense Support Program (DSP) satellites and medium wave infrared arrays (MIRA) carried by RC-135S Cobra Ball aircraft. Fusing MIRA and DSP data can cut the satellite's ellipse error by 1/20 and plot target locations to within less than a mile. Researchers say those are very conservative numbers. Moreover, airborne infrared observations are made much more often than the DSP satellite, thereby allowing a more accurate determination of the point at which the missile's engine cuts off, a key data point for predicting the impact point. TAWs was initially demonstrated in 1997 against Scud surrogates launched from the Kwajalein Island missile facility. However, lack of funding had held up installation of the capability on additional aircraft until just recently.

TAWs is in the process of being installed on the two most recently upgraded RC-135V/W Rivet Joint aircraft that in the past have been dedicated solely to signals intelligence gathering. They should be operational within weeks. With at least three aircraft (one Cobra Ball and two Rivet Joints) capable of providing wide area infrared surveillance and precision targeting, the U.S. could provide around-the-clock coverage of western Iraq. The area is the site of at least two "Scud boxes" from where the Russian-built, Iraqi-modified missiles could be fired into Israel and Jordan. Quick location of a missile-firing vehicle would allow warfighters at least two options: destroy the transporter as soon as possible, or follow it back to its reloading site and perhaps find an entire missile supply facility to attack. The TAWs scheme uses satellite

communications links to tie into ground stations, other manned and unmanned surveillance aircraft, attack aircraft and even special operations ground forces for real-time response to mobile targets.