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Nuclear Weapons Surety

Annual Report to the President (u)

1988

Redacted Version

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SEPTEMBER 1989

Joint Report by the U.S. Department of Defense and the U.S. Department of Energy

Nuclear Weapons Surety

Annual Report to the President

1988

Prepared by:
The Associate Director
for Weapons Program Safety
Defense Programs
Department of Energy

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JOINT DEPARTMENT OF DEFENSE/DEPARTMENT OF ENERGY
ANNUAL REPORT TO THE PRESIDENT ON NUCLEAR WEAPONS SURETY, 1988

EXECUTIVE SUMMARY

At the request of the President, the Department of Defense (DoD) and the Department of Energy (DOE) report annually on the status of nuclear weapons surety. This report responds to guidance in National Security Decision Directive (NSDD) 309 and summarizes surety progress made during 1988 in the areas of: nuclear weapons safety, security, use control; personnel reliability and assurance programs; emergency preparedness and response; and, inspection and evaluation programs. Budget constraints are also discussed. As part of its preparation, this report was reviewed by the Nuclear Weapons Council. There are no significant issues of disagreement between DoD and DOE concerning dual-agency judgments and responsibilities for safety, security, and control of nuclear weapons.

The Nuclear Weapons Council (NWC) is now a key player in nuclear weapon surety. The NWC considers policy matters and safety rules for nuclear weapon system operations as appropriate prior to Secretary of Defense approval. The NWC considers tradeoffs between safety and improved deterrence acquisition actions in the Nuclear Weapon Stockpile Plan. The Stockpile Improvement Program Review examines those nuclear weapons planned for retention by the Department of Defense. In this process, a review is performed of all deployed weapons, their operating environment, present stockpile improvement efforts, Service retirement plans/replacement programs, and recommendations and suggested priorities for nuclear safety improvements are made. The NWC also recommends the development of new warheads, approves their safety design requirements, and reviews DOE warhead safety development performance. These recommendations are consistent with the fiscally constrained 1989-1994 Nuclear Weapons Stockpile Plan.

Nuclear weapon testing is an important aspect of the continuing program to enhance the safety of new warheads. Safety features such as insensitive high explosives, fire-resistant pits to contain plutonium, and electrical safety devices integrated in the nuclear package are basic features of new warheads and improve the safety, security, and reliability (surety) responses in all credible environments. The introduction of these and

other safety features into the stockpile is only possible if continued underground nuclear testing is permitted to assure proper performance.

Significant nuclear surety improvements took place in 1988, including actions to address all concerns identified in the 1987 report. Specifically:

> Field retrofits have been completed on those B28 and B53 strategic bombs used in SAC ALFA Alert operations. These bombs are now equipped with improved nuclear detonation safety subsystems. However, these retrofits still do not meet modern nuclear design safety criteria. Prior to the retrofit, these bombs had been judged by the DoD/DOE to have unpredictable or undesirable safety behavior in credible abnormal environments. The DoD has restricted nonretrofitted B28s from being used in the high risk environments of ALFA Alert and force generation exercises. All B28 and B53 bombs are scheduled to be retired in the early 1990s and replaced with modern weapons (B83 bombs and ACM[EPW]/W61).
>
> B61-7s have replaced all of the B61-1s on ALFA Alert aboard B-52 and B-1B aircraft. Retrofit of remaining B61-1 bombs to the B61-7 with a modern nuclear detonation safety subsystem, insensitive high explosive, and Category D PAL continued.
>
> Full-scale engineering development was authorized for both the W89 warhead for the SRAM II missile and the B90 Nuclear Depth/Strike Bomb. These weapons are replacements for the SRAM A/W69 and the Navy B57 bomb respectively. Both the W89 and B90 will incorporate modern design safety features including insensitive high explosive, fire-resistant pits, Category D PAL devices, and modern electrical nuclear safety subsystems. When deployment begins in 1993, a significant improvement in the nuclear safety of the stockpile will be recognized with the phased removal of the W69 and B57 from the stockpile.

The DoD and the DOE agreed, that by the year 2000, all U.S. nuclear-capable tactical aircraft will be equipped with cockpit Unique Signal Generation capability. This capability permits the aircraft to fully utilize the nuclear detonation safety features designed into modern weapons in all operations including alert and flight. This capability will be compatible with all B61-6,8,9 and B90 bombs. Until this capability is achieved, the Navy concept of operation for tactical aircraft will be procedurally constrained.

Older tactical B61 bombs (B61-0, 2, and 5) are planned for upgrade as part of the Stockpile Improvement Program to incorporate modern safety, security, and control features for Navy, Air Force, and Marine Corps aircraft applications. These improvements will result in all B61 bombs incorporating insensitive high explosives, modern electrical safety subsystem, command disablement, and Category D Permissive Action Link devices as appropriate for overseas deployment.

In 1988, the Navy accelerated the retirement of remaining W45 Terrier Missiles and nearly all of the W44 Anti-Submarine Rocket-Thrown Depth Charge (ASROC), with the balance to be retired in FY 1989.

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[redacted] This improvement increases ~~security, reduces~~ security manpower, enhances weapon survivability, and improves operational readiness by collocating weapons and delivery aircraft. DNA physical security technology is also being applied in laser engagement training for security forces, detection and assessment systems for mobile weapons, and pier-side/water side detection.

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Recommendations from the joint DoD/DOE Stockpile Improvement Program (SIP) 1988 review meeting and current initiatives responding to each of those recommendations have been reviewed by the NWC. Among these initiatives is the establishment of a 1989 joint DoD/DOE study to investigate additional measures that could reduce the possibility that weapons without modern nuclear design safety features could be involved in an air transport accident.

Technical solutions for the following major nuclear surety concerns have been developed for both new production and stockpile improvement programs and depend on adequate continued funding for completion. The two departments will continue to provide adequate support for stockpile safety modernization of: SRAM II missiles and W89 warheads; B61, B83, and B90 bombs; ACM(EPW) missiles and W61 warheads; Follow-On-To-LANCE missiles and replacement warheads; and initiatives to lift Artillery-Fired Atomic Projectile (AFAP) production restrictions so that older projectiles can be replaced.

Some older weapons designed prior to the mid-1970s do not meet the design criteria for modern nuclear weapons that assure, by themselves, that DoD Safety Standards are met. Both Secretaries will continue to pursue expeditious replacement of these older systems through stockpile modernization and, until that time, will continue to require the addition of restrictive operational rules and procedures to achieve maximum safety consistent with operational requirements.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

Figures

Table

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I. Introduction. At the request of the President, the Departments of Defense and Energy report annually the status of safety, security, and control of nuclear weapon systems. The first joint report covered calendar year 1980. Subsequent annual reports provided updates. This report, which responds to tasking by National Security Decision Directive 309, dated June 27, 1988, describes the progress made in 1988 and considers:

A. Nuclear Weapons Security: The prevention of unauthorized actions, vandalism, sabotage, malevolent damage, and unauthorized access to nuclear weapons; and the prevention of theft or diversion of a nuclear weapon or a nuclear component.

B. Nuclear Weapons/Explosive Safety: The protection against accidental or unauthorized actions involving nuclear weapons/explosives which could result in a detonation (high explosive or nuclear) or disperse/release of hazardous radioactive materials.

1. Nuclear Detonation Safety: The protective measures taken against accidental or unauthorized actions involving nuclear systems in order to preclude a nuclear detonation. (Modern nuclear safety design criteria is discussed on page 36.)

2. Radioactive Material Dispersal Safety: The protective measures taken to minimize the risk to the public health by the accidental dispersal or release of hazardous radioactive materials in nuclear weapons.

C. Nuclear Weapons Use Control: Positive measures consisting of systems, devices, removable components and procedures which allow timely and reliable authorized use of a nuclear weapon while precluding or delaying unauthorized nuclear detonation. (Physical access controls, which always apply to nuclear weapons, were intentionally excluded from this definition.)

D. Personnel Assurance

1. Personnel Reliability Program (PRP): The DoD program that ensures the suitability and reliability of individuals who are responsible for nuclear weapon activities.

2. Personnel Assurance Program (PAP): The DOE program that establishes the requirements and responsibilities for screening, selecting, and continuously evaluating employees being considered for assignment or assigned to critical duties under the Department of Energy's nuclear weapons program.

3. Personnel Security Assurance Program (PSAP). The DOE program that establishes requirements for the personnel (not covered under the PAP) who protect, transport, or have direct access to significant quantities of special nuclear material, who operate nuclear material production reactors, or who can cause unacceptable damage to nuclear weapon production with a significant impact on national security.

E. Nuclear Safety Oversight. These activities conducted by the DoD, the Services, and DOE to assure effective implementation of the defined nuclear safety programs.

F. Emergency Response: The capability to respond to accidents or incidents involving nuclear explosives, including improvised nuclear devices, or radioactive dispersion devices, and to neutralize or minimize the adverse consequences.

G. Inspection/Evaluation Programs: The programs that ensure compliance with Department and Service nuclear surety regulations.

H. Budget Constraints: The impact of budget decisions which limit the joint DoD and DOE nuclear weapons program.

II. Background

A. Roles and Responsibilities

The Department of Defense (DoD) and the Department of Energy (DOE) are charged with and share responsibility for our Nation's nuclear weapons program and the safety, security, and control of the resulting nuclear stockpile. They conduct joint activities, coordinated through the NWC, and operations required to maintain an effective nuclear deterrent in the interest of National security. Various aspects of their respective responsibilities are addressed from both a joint and departmental position, based on the details and requirements of each specific activity or operation.

Paramount in their efforts is the inherent responsibility to protect public health and minimize danger to life and property. A dual-agency judgment role regarding safety, security, and control exists and is actively exercised throughout the lifetime of all U.S. nuclear weapon systems.

Specific views of the Department of Defense are contained in Section III, and those of the Department of Energy are in Section IV. Joint views on emergency preparedness and response activities are provided in Section V, and the impact of budget constraints is provided in Section VI.

B. Glossary of Acronyms

ACM	Advanced Cruise Missile
AFAP	Artillery-Fired Atomic Projectile
AMBS	Advance Marine Biological System
ARAC	Atmospheric Release Advisory Capability
ARG	Accident Response Group
ARTEP	Army Training and Evaluation Program
CONUS	Continental United States
DITDS	Defense Intelligence Threat Data System
DIA	Defense Intelligence Agency
DNA	Defense Nuclear Agency
DoD	Department of Defense
DOE	Department of Energy
DOS	Department of State
DSR	Defense Senior Representative
DUL	Deliberate Unauthorized Launch
EPW	Earth Penetrating Weapon
FBM	Fleet Ballistic Missile
FEMA	Federal Emergency Management Agency
FRERP	Federal Radiological Emergency Response Plan

FRMAC	Federal Radiological Monitoring and Assessment Center
FRP	Fire-Resistant Pit
GLCM	Ground-Launched Cruise Missile
HARC	Helicopter Accident Resistant Container
ICBM	InterContinental Ballistic Missile
IHE	Insensitive High Explosive
IND	Improvised Nuclear Device
INF	Intermediate Nuclear Forces
ITOC	Interim Transportation Overpack Container
JCS	Joint Chiefs of Staff
JROC	Joint Requirement Oversight Council
MASS	Maintenance and Assembly Secure Storage
M&A	Maintenance and Assembly
MC&A	Material, Control, and Accountability
MIDAS	Mobile Intrusion Detection and Assessment System
MOU	Memorandum of Understanding
MSSA	Master Safeguard and Security Agreements
NAIT	Nuclear Accident/Incident Team
NATO	North Atlantic Treaty Organization
NESSG	Nuclear Explosive Safety Study Group
NEST	Nuclear Emergency Search Team
NIDS	NATO Intrusion Detection System
NTS	Nevada Test Site
NWC	Nuclear Weapons Council
NWSM	Nuclear Weapons Stockpile Memorandum
NWSSG	Nuclear Weapons System Safety Group
NWTI	Nuclear Weapons Technical Inspection
OIG	Operational Impact Group
OSD	Office of Secretary of Defense
OSR	Operational Safety Review
PAL	Permissive Action Link
POG	Project Officer Group
PSE	Physical Security Equipment
RDD	Radiation Dispersal Device
SAC	Strategic Air Command
SAK	Shield Assembly Kit
SDS	Supplemental Data System
SIDS	Swimmer Identification System
SIP	Stockpile Improvement Program
SLCM	Surface-Launched Cruise Missile
SLWPG	Senior Level Weapons Protection Group
SRAM	Short Range Attack Missile
TESS	Tactical Engagement Simulation System
TIDS	Tactical Intrusion Detection System
TLAM-N	TOMAHAWK Land-Attack Missile-Nuclear
U.K.	United Kingdom
USANCA	U.S. Army Nuclear and Chemical Agency

USNCCS	U.S. Nuclear Command and Control System
VLS	Vertical Launch System
WSV	Weapons Storage Vault
WADS	Weapons Access Delay System

C. Review of Major Concern from the 1987 Surety Report. The 1987 Surety report noted a continuing concern regarding the nuclear safety of older weapons on strategic (ALFA Alert) aircraft. Updated for 1988, the status is:

1. B28FI.

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The Air Force withdrawal of unmodified B28 bombs from ALFA Alert, or use in force-generation exercise, has also significantly enhanced the nuclear safety posture of this system.

2. B53. The B53, which entered the inactive reserve status in 1984, was returned to active status in 1987, due to operational requirements. Based on the operational requirement for the B53 to stand ALFA Alert aboard B-52 aircraft, the DOE started an accelerated development program in February 1987 to provide retrofit kits that incorporated a single strong link arming subsystem to provide increased nuclear detonation safety but not fully meeting modern design safety criteria. These field retrofit operations on the B53 were completed in October 1988, which fully supported the Air Force operational requirements.

3. W69. The SRAM A/W69s continue to be used on ALFA Alert (loaded aboard alert aircraft ready for immediate deployment) aboard B-52s, FB-111s, and B-1Bs. In 1988, full-scale engineering development for the W89 warhead for the SRAM II missile was initiated noting its importance because of design inadequacies of the SRAM A/W69. The W89 incorporates modern nuclear safety features and is scheduled to replace all the W69s starting in 1993 and ending in 1998. The SRAM A/W69 is the only U.S. nuclear weapon system standing ALFA Alert that does not have an improved nuclear detonation subsystem. The safety of this system while on alert is of great interest and concern to both departments. An associated issue was that the W89 would remain compatible with the SRAM A, so a contingency to backfit the W89 to the SRAM A could be available on a later schedule, should the SRAM II missile development schedule slip. The status and priority assigned to this matter will be frequently reviewed.

D. 1988 Major Actions, Concerns, and Issues

1. Guidance Actions. In May 1988, the DOE Assistant Secretary for Defense Programs issued a new nuclear explosives and weapons safety policy. The policy reinforces the DOE weapons program's commitment to the dual agency responsibility for protecting public health and safety. The policy applies to all nuclear weapons program activities conducted by the Department of Energy and its contractors. To assure effective implementation of this policy, a review of all DOE orders pertaining to the nuclear explosives and weapon safety was completed. Action was initiated to update current orders, and where applicable, to develop new orders to assure compliance with the new policy and to further strengthen the DOE's overall program.

2. SRAM A/W69 Concern. Although action has been initiated to replace the SRAM A/W69 system with the SRAM II/W89, the continued use of the SRAM A to stand ALFA Alert remained a joint DOE/DoD safety concern in 1988. In 1988, a decision was made to accelerate the delivery of the final SRAM II systems from 1999 to 1998.

3. Air Transport Issue. The increased attention being given to plutonium scatter has again drawn attention to the area of air transport of non-IHE weapons in the CONUS. DOE studies have shown, based on the severity of typical accidents, the probability of plutonium dispersal to be two orders of magnitude smaller for a surface vehicle accident than for an aircraft crash. In 1988, about 1,000 weapons containing conventional high explosive were military air transported in the CONUS with 40% of these movements in support of, and paid for, by the DOE. The Nuclear Weapons Council has agreed to study the operational, logistic, cost, safety, and security tradeoffs associated with air and surface transport and recommend appropriate changes.

E. Nuclear Weapons Council (NWC)

1. Background. The Joint Nuclear Weapons Council, which was established in 1986, is composed of three members as follows: The Director of Defense Research and Engineering; the Vice Chairman of the Joint Chiefs of Staff; and one senior representative of the Department of Energy. The NWC is responsible for various matters regarding the Nation's nuclear weapons program, which includes the consideration of safety, security, and control issues related to existing or proposed nuclear weapons systems.

2. Activities. The NWC continued to take actions related to the assurance of safety, security, and use control (surety) standards for the national nuclear weapons stockpile.

a. During 1988, the NWC prepared the Nuclear Weapon Stockpile Memorandum and conducted the Stockpile Improvement Program (SIP) review in accordance with national security directives. Such activities permit review of the stockpile for timely retirements, efficient modernizations, and development for newer systems.

b. Specific NWC activities in 1988, which address these objectives are:

(1) Recommended development of an earth penetrating capability (new technology) for a modified B61 strategic bomb (latest surety features) to be used with the Advanced Cruise Missile, which is planned to replace the B53 bomb (now on alert), when it enters the stockpile in the early 1990s.

(2) Reviewed and supported acquisition of the SRAM II missile to replace SRAM A with specific emphasis on our objective of having modern safety features on all weapons on alert aircraft at the earliest practicable time.

(3) They approved the military characteristics for weapons in development or modification to ensure that they incorporate appropriate surety features to meet modern safety standards and, where appropriate, consider emerging technology. One example is the approval of the incorporation of fire-resistant features to reduce the risk of plutonium scatter in the SRAM II/W89 design.

F. Nuclear Command and Control. National Security Decision Directive 281, dated August 21, 1987, was issued to ensure that the United States continues to maintain effective command and control of nuclear weapons operations by building systematically on present capabilities. In the past, policies concerning command and control for nuclear weapon operations have existed in various forms and places. NSDD 281 is a codification of these policies into a comprehensive national nuclear command and control policy to ensure more effective command and control for nuclear weapon operations. Specific areas germane to NSDD 281 reported by DoD and DOE in this Surety Report are physical security of nuclear warheads and weapon systems, unauthorized launch analysis, and warhead use control.

The Nuclear Command and Control System (NCCS) Support Staff published their 1988 Annual Report in February 1989, which focused on the Department of Defense. The report cited the current status of the NCCS program, identified those 1989

priorities needed to accomplish the tasks listed in NSDD 281, and made a number of recommendations on how to enable the NCCS to meet the NSDD objectives.

III. Department of Defense Programs

A. Security

1. Background. The upsurge in world-wide terrorist activities has serious implications for security should terrorists determine that attacks against nuclear weapons and related facilities can further their objectives. To counter this threat, the DoD nuclear security program integrates policy, procedures, people, equipment, and facilities to provide more than just physical barriers. It is essential that our security systems must evolve at a rate equal to or faster than the threat. During the 1980s, the changes in our security posture can be characterized by: major improvements in facilities, equipment, and training; increased participation by our European Allies in implementing enhancements; an active and innovative security research and development program; and a 50% reduction in numbers of land-based storage sites.

(b) (3)

The improvement programs currently ongoing to support these regions and weapons afloat are discussed in the next paragraphs.

2. Programs

a. Europe

(b) (3)

While simplifying the peacetime overall security situation in Europe, it should be recognized that this reduction does not lessen the risk to any one specific storage site. Furthermore, in wartime, fewer sites may initially impact weapon survivability by providing the Warsaw Pact with a reduced target set. This is one reason why security enhancements are regularly evaluated to ensure that they do not unduly impact on wartime survivability and operational readiness.

(2) The threat to European-based nuclear weapon storage sites receives constant examination by Allied nations, NATO, and the U.S. security community. Terrorist capabilities have increased in sophistication and weaponry in recent years,

and we expect them to continue to do so in the future. To enhance our ability to analyze terrorist intent, the Defense Intelligence Threat Data System (DITDS) relational data base capability is being developed by the DIA. Designed to provide world-wide early warning of impending terrorist acts, part of this program specifically focuses on the threat to nuclear weapons. When completed in 1990, the system will have a mainframe computer at DIA Headquarters and terminals at each of the major nuclear commands, including the U.S. European Command and U.S. Pacific Command (USPACOM). Concurrently, NATO, through the U.S. chaired Senior Level Weapons Protection Group (SLWPG), is addressing the respective U.S., NATO, and Allied warning systems in Europe to ensure that once a warning is given, it is transmitted expeditiously to the applicable nuclear weapon storage sites. Also, the SLWPG is specifically addressing additional improvements to offset potential current and future storage site vulnerabilities to terrorist acts. The intense and concerned participation by our Allies in these activities demonstrates their interest in maintaining the highest level of security for our nuclear weapons deployed in Europe and their recognition of the necessity to stay ahead of the evolving threat.

(3) Significant progress continued to be made to implement storage site improvements in the 1980s, including

(a) Long-Range Security Program (LRSP)

(1) The civil works construction program included construction of hardened site security control centers, guard towers, as well as installation of new fences and lighting. This program began on U.S. sites in 1976 and transitioned to NATO sites in the 1980s. Facilities upgrades were completed at the last NATO site in July 1988.

(2) The second phase of LRSP provides an intrusion detection system (IDS). It consists of electronic sensors for fence lines and building interiors, closed circuit TV, magnetic door switches, and control panels separately located with both security and custodial forces. Installation of IDS on U.S. sites was completed in 1984. The NATO IDS (NIDS) program fell behind the original schedule due to delays caused by poor contract management, and equipment problems. These problems have been resolved by NATO, and the NIDS program is now 50% complete. Full completion is expected in fall 1989.

(b) Weapons Access Delay System (WADS). This program delays unauthorized access to Army ground-delivered weapons through the installation of passive and active features on storage bunkers, such as entrance and interior barriers, dead bolt door locks, barbed-wire blankets, and cold smoke generators.

(b) (3)

(c) Supplemental Delay System (SDS). This program installs antihelicopter poles, defensive fighting positions, and vehicle crash barriers on Army storage sites.

(b) (3)

(4) Weapon Storage

(b) (3)

WSV provides increased weapons survivability, tighter security from the terrorist threat, and greatly increased operational readiness and security through the collocated storage of the nuclear weapon with its delivery aircraft. Currently six of the 18 U.S./NATO nuclear-capable airbases are funded by the U.S. through FY 1989. The first site, located in Germany, is scheduled to be completed in early 1990. The entire program will be completed in 1994.

(b) As a prerequisite for construction funds appropriations, the House Appropriations Committee required a certification from the Secretary of Defense that the WSV was eligible for NATO common funding. Following extraordinary steps by NATO, the Secretary of Defense provided the certification in June 1988. The House Appropriations Committee then proceeded to insert language in the FY 1989 Appropriations Conference Report stating that future requirements (i.e., FY 1990 and beyond) should be funded directly by NATO. DoD recognizes the need for burdensharing, but opposes this switch from U.S. to NATO direct funding. This action would reverse the U.S. position to fund the entire program, which was the basis for NATO agreeing to the use of a U.S. contractor vice a NATO contractor. The U.S. Air Force let the WSV contract in August 1988. To transfer to NATO-direct funding would cast doubt on U.S. credibility and would cause severe program delays while NATO contractual and direct funding arrangements were being established. Therefore, it is DoD's intent to proceed as originally planned. This approach is deemed

in the best interests of the U.S. especially in view of the extraordinary actions by NATO to initiate repayment actions as early as CY 1991 vice CY 1995, as originally forecast.

(5) Tactical Engagement Simulation System (TESS). TESS is an improved laser engagement system developed by DNA specifically to enhance force-on-force training of U.S. and NATO nuclear security forces. Designed to operate on all U.S./NATO small arms used by nuclear security forces, TESS is transitioning to the U.S. Army for advanced development and ultimate deployment to the Service. TESS technology will also be shared with our NATO Allies.

(6) DNA completed exploratory development and adversary testing of the Survivability Overpack Container (SOC) for the Army to provide additional security and survivability for Artillery-Fired Atomic Projectiles (AFAPs). The container is hardened against small arms and fragmentation, is fitted with entry delay (locks and barriers), and is suited for wartime transport on most U.S. and NATO vehicles. Storage of AFAPs in the SOC provides increased survivability and security on the battlefield. The NATO-endorsed program should be available for production in FY 1992. Peacetime transport of AFAPs is carried out in Helicopter Accident Resistant Containers (HARCs) and in Interim Transportation Overpack Containers (ITOCs).

b. Pacific

(b) (3)

The Air Force site on Guam closed in response to a Strategic Air Command (SAC) change in mission.

(b) (3)

The Navy continues to operate sites in Guam, Hawaii, and Adak, Alaska.

(2) All storage sites in the Pacific have completed physical security construction and intrusion detection system upgrades similar to those installed in Europe.

(b) (3)

c. CONUS

(1) As of the end of 1988, DoD stores nuclear weapons at 34 locations in the CONUS (2 Army, 10 Navy, and 22 Air Force). Each of these sites have the full complement of physical facilities, security systems, and equipment. There are ongoing programs in progress to further enhance security at specific locations, and the most significant programs by Service are described below.

(2) Army. Weapons Access Delay System (WADS) are in place at both Sierra and Seneca Army Depots. CONUS WADS consists of steel cages on exterior head walls, new steel doors secured with pneumatic deadbolt locks, and smoke generators. Upgrades are to be completed by the end of 1990.

(3) Navy

(b) (3)

(b) Nuclear weapons are typically stored in Naval magazines when not allocated to ships. From an access perspective, magazine doors are the path of least resistance. A new, cost-effective door, currently in development, will significantly increase delay time. Installation of these doors is scheduled to begin in 1992.

(c) In 1987, the Navy completed a program to upgrade intrusion detection systems at its shore facilities in CONUS. Some systems, installed early in this program, have reached or exceeded expected life and are of questionable reliability. In FY 1988, the Navy began to systematically replace older detection equipment. While the funding for these necessary improvements has been identified, it is susceptible to budget constraints and has been stretched out over a number of years. Further delay could result in less effective systems.

(4) Air Force

(a) The Air Force deploys nuclear weapons on bomber aircraft at 15 SAC bases. Many of the bomber alert areas are near base perimeters where alert aircraft are susceptible to direct line of sight off-base attack. As part of a program to upgrade the security of flight-line areas, an obscuration screen has been developed to protect nuclear-loaded aircraft from the direct, line-of-sight threat of small arms or rocket-propelled grenades. Additionally, the program includes flight-line fencing, improved lighting, and crash barriers across alert area taxiway. The latter precludes vehicles from crashing into alert aircraft. This ambitious program to upgrade flight-line security began in part in FY 1987 but has since been impacted by budget cuts. Fiscal constraints will stretch the program completion to no earlier than FY 1995.

(b) The Air Force began installing an improved sensor system in and around MINUTEMAN and PEACEKEEPER launch facilities in 1987. These systems minimize false alarms caused by small animals and environmental effects. Installation is complete at 315 of the 1,000 facilities programmed to receive it, and overall completion is scheduled for FY 1997.

(c)

(b) (3)

The $54 million cost of the new storage site will be amortized over the first four years of operation from the savings realized from a reduction of 346 security personnel. This facility will serve as a model for future underground storage structures.

d. Afloat

(1)

(b) (3)

(2) To counter such threats, the Navy relies on a defense in-depth concept which provides the earliest possible warning. Threat conditions in a particular area at any given time determine the exact security posture of a ship. Nuclear weapons security afloat begins with the ship's security watches which safeguard the ship and ship's company from sabotage, danger, or compromise. These security watches control access to the ship, maintain security patrols, and have watch personnel posted at key positions on the ship's decks. Security watches are augmented by the Self-Defense Force which will react immediately in emergency situations aboard ship, at pier side or in surrounding water. It continues with the on-board nuclear weapons reaction force responding rapidly to alarms in the affected area. The second major security envelope begins at the shipboard nuclear weapons magazines where weapons are secured with high-security locking and alarm systems.

(3) Even with the defense in-depth security provided, weapons stored aboard nuclear weapons-capable ships remain vulnerable. Shipboard magazines only meet minimum standards which were originally set to meet available capabilities, not demonstrated threats. In response, the Navy has instituted a long-range program that will provide reduced susceptibility of alarm systems to tampering, a dedicated data-encrypted security force communication system, improvements to magazine intrusion detection systems, and upgrades to security system monitoring capabilities.

(a) Existing shipboard security systems depend upon simple electrical circuits and locks. While it is expected that these systems will delay or frustrate amateur efforts at intrusion, a trained and determined individual will meet with little interference or delay. Reduced susceptibility of shipboard alarms systems to tampering has been effected by installation of a redesigned access panel and accompanying alarms. This upgrade has been completed on all ships except those with recent operational commitments. These ships will be upgraded during 1989. The Navy will further enhance shipboard magazine storage by implementing a Magazine Security System, which will begin the operational testing in 1989. It includes improved door locks, volumetric intrusion detection, and additional alarm system improvements. This program has been assigned a Priority Level One for ship alteration. Initial procurement, installation, and support is scheduled for 1990 and will be at an acceptable level of protection for all ships by the year 2000.

(b) Presently, the only way for the shipboard security patrol, quarterdeck watch, and reaction force to communicate is through the ship's internal voice communication equipment. A dedicated, data encrypted, security force communication system to overcome this disadvantage is under a production contract. Initial operational capability will be achieved in 1989.

(4) There is no single security system for waterside applications that is effective against the total range of known threat capabilities. The Navy has initiated development, in coordination with DNA, of a Waterside Security System to provide protection to critical assets located on or near the waterfront. Conceptually, the system is designed to detect, localize and classify threats such as submerged swimmers and small surface boats and automatically alert security forces. Major components of this system consist of sonars, short range ground surveillance radars, forward looking infrared systems, closed circuit television and a command and control console. The Waterside Security System is nearing implementation phase for selected key locations. Naval Submarine Base, Bangor will serve as the prototype test bed and will be fully operational in 1991.

e. Ongoing Research and Development

(1) DNA and the Services have a number of programs being evaluated for possible implementation in the future. DNA typically funds the research and development effort to evaluate concepts through proof of principle. It draws on the expertise of the national laboratories and industry in developing technological and procedural measures. Services then conduct the advanced and engineering development of the most promising concepts and subsequently implement procurement or construction. A number of the programs, such as WADS, WSV, and SOC, have previously transitioned from DNA to the Services. The following programs are currently being evaluated for potential applications.

(2) The Army, with DNA, has initiated a program to harden maintenance and assembly (M&A) buildings at its storage sites in Europe. Using available techniques and technologies, the Maintenance and Assembly Secure Storage (MASS) program hardens M&A facilities against forced entry. MASS efforts in 1988 included component testing of new composite barrier

materials. Proof-of-concept testing will be conducted in 1989. Funding is programmed, and the hardening of M&A facilities should be initiated in 1990.

(3) The Tactical Intrusion Detection System (TIDS) is a DNA development project to field a portable sensor system for use in crisis/war to enhance security of dispersed tactical weapons. TIDS will provide a high probability of detecting intruders, and the system is designed for rapid deployment and recovery by two soldiers. Originally conceived to protect PERSHING II field firing locations, TIDS technology will be available for use with deployed mobile missile systems and for possible use in the Air Force's lateral dispersal program. TIDS will be evaluated by DNA in 1989.

(4) The Mobile Intrusion Detection and Assessment System (MIDAS) is being developed by DNA and the Sandia National Laboratories to reduce the vulnerabilities of CONUS-deployed mobile missile systems (small ICBM and PEACEKEEPER Rail Garrison) to attack by a small, well-armed and determined group. Using thermal imagery and machine intelligence interface, MIDAS will identify the type of threat, determine range and azimuth to the target, and track the target at ranges from 300 to 2,500 meters. Proof-of-concept demonstration is scheduled for late 1989. The Navy will also test MIDAS for possible inclusion in the Waterside Security System Program.

(5) As part of its Waterside Security System and Integrated Shipboard Physical Security Program, the Navy has a coordinated development effort to improve shipboard security by detecting and identifying underwater threats (primarily swimmers) to anchored or moored ships.

(a) The Acoustic Lens Sonar System has the potential of detecting a moving, swimmer-sized underwater threat, and differentiate it from fixed and transient clutter at ranges in excess of 300 yards. Proof-of-principle demonstration was conducted in 1988 by DNA, and the program transitioned to the Navy in early 1989 for further development within the FY 1991 Sonar Improvement Program.

(b) For use in conjunction with the Acoustic Lens Sonar System, research is in progress to develop signal processing algorithms for use in extracting and classifying swimmer characteristics from active sonar echoes. The Swimmer Identification System (SIDS) will provide an autonomous alarm to alert shipboard and Naval shore facility security personnel of

the approach of surface and subsurface swimmers, while ignoring sea life and background noise. A proof-of-principle demonstration by DNA could occur as early as FY 1990.

(6) DNA is developing a concept for a lightweight floating barrier system to protect nuclear-capable ships while moored or at anchor. The barrier will be designed to protect these vessels against explosive-laden, high-speed boats. The program began in FY 1988 and should transition to the Navy for advanced development in FY 1991.

3. Management of Physical Security R&D. In 1988, DoD took action to respond to continuing Congressional interest in the management of DoD Physical Security Equipment (PSE) RDT&E programs, of which nuclear physical security is a subset.

a. A contract for the development of a DoD Physical Security Master Plan was initiated in October 1988. Based on this plan, strategies for the employment of security forces and development of equipment will be formulated to meet the security threat posed for FY 1990-1994 and beyond.

b. A DoD directive was updated to clarify requirements for total physical security equipment program management and administration. Procedurally, this directive directs the Services to quickly implement program guidance and to communicate, coordinate, and effectively provide security equipment for systems needed to support nuclear and nonnuclear security forces.

c. In addition, the FY 1989 Appropriations Bill directed the consolidation of the Services and the Defense Nuclear Agency PSE RDT&E funds under the Office of the Secretary of Defense (OSD) to strengthen program management and ensure coordinated and timely acquisition of physical security equipment. Implementation is complete, and actions are underway to further improve the process of planning, programming, and budgeting to more efficiently fulfill PSE requirements.

4. Impact of Budget Constraints. The security program discussions demonstrate the progress made to improve nuclear weapons security programs. The improvements realized in the 1980s were only possible through a balanced program of research and development, procurement, and installation. This approach must be sustained in the 1990s to maintain security at necessary levels. However, as the threat continues to evolve and as many of the current security systems and much of the specialized

security force equipment reach their serviceable life, we find the DoD ability to develop, procure, and field new and replacement security systems at the current pace is diminishing through more constrained budgets. Furthermore, burdensharing actions to NATO to directly fund improvements may delay the implementation of a crucial enhancement in the future. Considering the potential implication of a nuclear security incident, the requisite priority must continue to be applied to security improvements even with constrained budgets.

5. Security Appraisal. The nuclear weapons security posture of DoD is satisfactory. However, the nature of the threat is one of ever evolving capability. Therefore, the DoD must ensure its weapons security programs improve at a rate equal to or faster than the changing threat.

(b) (3)

New initiatives such as the acoustic underwater warning and protection containers for weapons have the potential to further enhance security. The DoD program will continue to seek to apply new technology while reducing manpower and costs. The continued funding of these programs is crucial in view of the threat, but budgeting constraints and the position of the Congress for increased burdensharing by our Allies, restrict our ability to implement timely improvements. Our nuclear-capable ships and the highly vulnerable waterside location used for weapons loading will remain at high risk until ongoing and planned enhancements are completed.

B. Nuclear Safety and Use Control

1. Background. All nuclear weapon systems are protected against abnormal environments, which could result in nuclear detonations or dispersal of radioactive material by a combination of design features, operational procedures, and special administrative safety rules. Missiles with nuclear warheads are also protected against deliberate or accidental unauthorized launch, and selected nuclear warheads contain use control design features that ensure authorized weapon use while inhibiting unauthorized nuclear detonations and preventing or delaying unauthorized use of the warhead in its intended mode. Modernization of the stockpile with improved safety and use control design technology is a continuing process achieved through: acquisition of new warheads with modern safety and control features; retirement of older, less capable warheads; and stockpile improvement program (SIP) modification of existing warheads planned for retention. Restrictive operational

procedures and safety rules supplement the less robust design features of older warheads to ensure that the weapon systems satisfy DoD Safety Standards and can be operated safely. The principal aspects of nuclear detonation and radioactive material dispersal safety, warhead use control, and weapon system safety evaluation follow.

2. Nuclear Detonation Safety. During 1988, the overall nuclear detonation safety of the stockpile continued to improve.

(b) (3)

a. Production of new modern design criteria weapons systems, the B61-3, the B61-4, the B83, W80-1, W80-0, and the W-87, continued to improve nuclear detonation safety of the stockpile. The safe, predictable response of these modern weapons to threatening accidents/incidents allows them to be safely deployed with much less need for restrictive operational procedures and administrative rules than the older, less modern systems that must be retained in the stockpile to satisfy operational requirements.

b. Retirement of older weapons with less capable safety design features continues. In 1988, B43 (Y1 only), W31/NIKE HERCULES, and the W45/Terrier were retired, and plans were made to accelerate the retirement of W44/ASROC, W55/SUBROC, and B54/ADM.

(b) (3)

c. The Stockpile Improvement Program (SIP) identifies outdated weapons to be improved/updated with modern features. The 1988 conversion to the B61-7 from the B61-1 to add IHE and modern detonation safety and the completion of retrofit of the B28FI to B28-0 and B53 to B53-1 to add some modern detonation safety features are examples of SIP efforts.

d. Older weapons lacking modern safety design features that are utilized in aircraft ALFA Alert operations have heightened vulnerability to accidents and incidents. Recognizing these inherent hazards, the B83 in production, the SRAM II/W89 in development, and the ACM[EPW]/W61 in pre-development, which will replace the ALFA Alert B28, SRAM A/W69 and B53-1, will continue to have high DoD acquisition priority. In 1988, the Nuclear Weapons Council submitted to Congress, at their request, a

certification that the design of the W89 warhead for SRAM II is compatible with SRAM A, with changes to some nonnuclear components and could replace the SRAM A/W69 warhead on a later schedule.

e. The DoD has established a policy for all nuclear-capable U.S. tactical aircraft to have a cockpit capability by the year 2000 to generate and send unique signal warhead prearming messages to the nuclear weapons it carries. This will enable all of the nuclear detonation safety features in B61 and B90 bombs to be fully utilized. Until then, tactical aircraft will operate under a restrictive concept of operations.

3. Radioactive Material Dispersal Safety. Nuclear warheads contain radioactive material in combination with high explosives. An accident or terrorist attack causing detonation of the high explosive in these weapons would result in radioactive contamination of the surrounding area. No radioactive material dispersal incidents have occurred since 1968. The approach to this potential problem for weapons containing conventional explosives has been to prevent accidents by careful control of all nuclear weapon operations and to provide a secure environment that precludes successful attacks by adversaries. Most new nuclear warhead designs utilize insensitive high explosives (IHE), that do not detonate in fire and shock impacts, and are not prone to plutonium dispersal in most credible accident scenarios. IHE is in 24% of 1988 stockpile. In 1987 the quantity was 21%, and in the 1998 59% of the stockpile weapons are planned to have IHE. Technology and operational requirements have precluded incorporation of IHE in AFAPs and Fleet Ballistic Missiles (FBMs).

a. New production weapons, the B83, B61-3, and B61-4 bombs employ IHE, as do the warheads for the PEACEKEEPER/W87, PERSHING II/W85, the GLCM/W84, ALCM/W80-1 SLCM/W80-0 Cruise Missile systems and the B61-7 modification of the B61-1 bomb.

b. A second contributor to plutonium dispersal safety for insensitive high explosive weapons is the utilization of fire-resistant pit (FRP) technology, which reduces the likelihood of dispersal in fire accidents.

(b)(3)

This crucible-like combination will provide molten plutonium containment protection against radioactive material dispersal for warheads exposed to fires. The B83 bomb and the W84 and W87 warheads were the first to have FRPs incorporated by the DOE. The SRAM II/W89 is the

first system with DoD military characteristics (MC) that require the FRP as part of the design. Incorporation of FRPs in all new design warheads having IHE will be studied.

c. The 1988 Stockpile Improvement Program (SIP) review noted the desirability of reducing or eliminating air transportation of non-IHE weapons where there is viable and secure ground transportation alternatives. A study in this regard will be completed in 1989.

d. The Joint Technical Assessment and Operational Impact Groups (TAG and OIG) previously associated with the Military Liaison Committee's DoD/DOE Plutonium Dispersal Steering Group, continued to advise the Nuclear Weapons Council (NWC) on safety issues during 1988. The TAG and OIG members evaluated plutonium storage limits for one CONUS storage site and reevaluated several existing NATO storage sites for future deployments.

e. Transportation Overpack Containers. The Army will soon field the Interim Transportation Overpack Container (ITOC) for W79 and W82 Artillery-Fired Atomic Projectiles (AFAPs), as a complement to the W48 AFAP Helicopter Accident Resistant Container (HARC). These containers provide plutonium scattering accident protection for the conventional high explosive AFAPs carried in helicopters.

f. Shield Assembly Kits. DoD and DOE have developed a two-stage program to provide sympathetic detonation protection for adjacent Army and Marine Corps W48 AFAPs. The first stage fielded the Shield Assembly Kit (SAK), consisting of protective shields mounted on the exterior of warhead storage containers. The second stage installed an Inner Shield Assembly consisting of steel plates permanently mounted on the inside of the warhead storage container. Final installation of the second stage was completed for all weapons in August 1988, and all trainers were completed by early CY 1989.

4. Use Control. All nuclear weapon systems are protected against deliberate, accidental, or unintentional arming, launching, or firing without the receipt and authentication of a valid nuclear control order conveying proper release authority. This is accomplished through a combination of weapon system design features, operational procedures, and administrative safety rules. In addition to the weapon system design features, many nuclear warheads contain permissive action links (PAL) and command disable devices that protect the warhead,

in case physical security is breached and unauthorized possession of the warhead gained. These are reported herein, whereas other weapon systems aspects of nuclear command and control are not.

(b) (3)

a. All weapons stored on foreign soil are locked by mechanical combination locks or PALs. Stockpile warheads for all CONUS fixed-site strategic missile and for some nuclear weapons for strategic bombers, do not have PAL devices. However, these warheads are afforded similar protection by coded switch systems, which prior to unlock, prevent transmission of arming and fuzing signals. Some Navy weapons incorporate PALs and all Navy nuclear weapons aboard ships and submarines have physical and procedural controls to afford use denial protection.

b. New weapons in development, SICBM/W87-1, SRAM II/W89, and NDSB/B90 incorporate warhead use control capabilities. Use control and PAL capabilities of stockpiled weapons are discussed in Chapter IV of this report.

c. The Nuclear Weapons Use Control Project Officer Group (POG) provides a joint DoD/DOE forum to review and make recommendations for use control support equipment that best integrate policy, technology, procedures, and requirements. The POG was established in 1986 and reports to the Nuclear Weapons Council. POG members come from the Services, Unified and Specified Commands, Joint Chiefs of Staff, Defense Nuclear Agency, National Security Agency, Department of Energy and the DOE national laboratories. In 1988, the POG completed specifications for the next generation PAL controller. The Joint Requirement Oversight Council (JROC) approved a mission-need statement for this controller, which will be usable by all Services.

5. Nuclear Weapon System Safety Studies. Military Department safety studies of systems in development and safety reviews of operational nuclear weapon systems are the principal means by which nuclear weapon system safety is evaluated and safety rules are established. These studies and reviews are conducted by Military Department nuclear weapon system safety groups (NWSSGs) who evaluate the adequacy of the design features, operational procedures, and special safety rules that comprise the positive measures that ensure safety. Defense Nuclear Agency and the Department of Energy members add independent viewpoints

to the Military Department NWSSGs. Both agencies review Military Department and NWSSG findings and conclusions in the coordination process supporting Secretary of Defense weapon system safety rules approval.

a. Nuclear weapon system safety rules developed by NWSSGs govern all operations with nuclear weapons systems. They provide weapon system-specific procedural safeguards, when necessary, to ensure that operational weapons systems meet DoD nuclear weapon system safety standards. Safety rules are developed during formal safety studies and safety reviews conducted by NWSSGs made up of specialists from the Service employing the weapon, the DOE, and the Defense Nuclear Agency (DNA). These rules are coordinated by the cognizant military departments, DNA, DOE, the Joint Chiefs of Staff (JCS), and the Assistant to the Secretary of Defense (Atomic Energy).

b. During 1988, the Secretary of Defense approved several changes to existing nuclear safety rules. The following is a brief description of those changes:

(1) Provided updated guidance for operations involving the collocation and prepositioning of selected nuclear and nonnuclear munitions and for operations involving the on-base dispersal of nuclear weapons for the: F-4E, F-16A/B/C/D, F-111A/D/E/F, NATO F-104G/S, NATO F-16A/B, and NATO PA-200 TORNADO.

(2) Updated safety rules for the A-6E and A-7B/E aircraft.

(3) Updated safety rules for the B-52G/H when handling the B53.

(4) Safety rules were updated for the Howitzer, 8-inch W33, the W79, and the 155mm W48. The W79 safety rules were modified to reflect the field retrofit.

(5) Administrative (format) changes were completed for the LANCE and NIKE HERCULES.

(6) A revised format that added guidance for cyclic operations for the P-3A, P-3B, and the S-3A aircrafts.

(7) New rules that mandated separate storage and shipment of the explosive plane wave generator for the Special Atomic Demolition Munition/B54.

(8) Updated rules that provided for operations with the submarine torpedo tube-launched TOMAHAWK and application for the TOMAHAWK in use with Surface and VLS launch systems.

(9) Revised applications for the SH-3D and the SH-3H Navy helicopters.

c. During 1988, the Air Force completed operational safety reviews of the PEACEKEEPER and MINUTEMAN weapons systems. The rules were modified in both instances to clarify operators actions in the event status of the missile and launch facility is not available to monitoring personnel.

d. Rules for the B1-B were revised to include accelerated nuclear generation, operational and technical procedures including the Strategic Air Command's operational concept for refueling with one aircraft's engine running and aircraft-to-aircraft fueling procedures when carrying nuclear weapons.

e. Work on the revision of the DoD Directive 3150.2, Safety Studies and Reviews of Nuclear Weapon Systems, has continued throughout the year. Inputs from all Services and DNA have been forwarded to OATSD (AE) for compilation and publication of a coordinated draft copy. The new directive is scheduled for publication by the end of FY 1989.

f. In a follow-on action to the new safety rules and guidance from the Secretary of Defense, the Army established a data-base structure at the Nuclear and Chemical Agency (USANCA) to ensure that approved safety recommendations and deficiencies identified as changes during inspections are fully implemented at all the nuclear sites. An initial baseline report has been prepared with semiannual reports to follow.

6. Safety, Control, and Evaluation Appraisal. Modernization of the stockpile with improved safety and control capabilities is achieved through the acquisition of new and modified weapons and retirement of older weapons. Progress in this regard depends on the adequate and continued support of the DoD and DOE for: SRAM II missiles and W89 warheads; B61, B83, and B90 bombs; ACM(EPW) missiles and W61 warheads; Follow-On-To-LANCE missiles and replacement modern warheads; and initiatives to lift Artillery-Fired Atomic Projectile (AFAP) production restrictions so that older projectiles can be replaced.

Risk of plutonium scattering transportation accidents with non-IHE AFAPs has been reduced by the Army through the use of accident-resistant transportation containers. Increased use of ground, rather than air, logistical movement of non-IHE weapons may also reduce the risk of scattering plutonium.

The Military Department NWSSG process for evaluating the safety of operational weapon systems and developing safety rules is strong and provides independent DoD and DOE participation.

C. Personnel Reliability Program

1. Background. Every individual assigned to a nuclear duty position who has access to, or controls access to, nuclear weapons, nuclear weapons systems, nuclear components, or sealed authenticators must be certified formally in accordance with the procedures and standards of the Personnel Reliability Program. Such Certification is granted only after the completion of a required security investigation, a favorable review of personnel and medical records, and a personal interview by the certifying official.

2. Progress. During 1988, there were a total of 82,736 DoD military, civilian, and contractor personnel in the program; this represents a decrease of about 12% from the total number certified in 1987, primarily as the result of nuclear weapons storage site consolidations and closures. The program requires continuous observation and evaluation of certified individuals in order to assure their reliability and suitability for nuclear-related duties. During 1988, this observation and evaluation process resulted in the permanent decertification of 2,294 personnel, or about 2.8% of the total number of personnel in the program. This overall DoD decertification rate has decreased from its nearly 5% in 1982, and has been consistently less than 3% for the past four years. Drug and alcohol abuse account for nearly 17% of the overall number of decertifications. The majority of decertifications, over 65%, are the result of physical disqualifications or patterns of behavior inconsistent with continued nuclear-related duties.

3. Appraisal. During 1988, OSD conducted an independent review of the effectiveness of the Personnel Reliability Program. Initial findings of the civilian contractor conducting the review indicate the program is effective in assuring the reliability and suitability of individuals assigned to nuclear-related duties. In addition, there was evidence that

both the DoD drug testing program and the high quality of armed forces personnel have contributed to the overall decline in the decertification rate. Service technical inspection programs and DoD oversight visits continue to indicate that the Personnel Reliability Program is meeting its required high standards.

D. DoD Nuclear Weapons Technical Inspection (NWTI) Program

1. Background. The DoD Nuclear Weapons Technical Inspection (NWTI) system mandates Service or Defense Nuclear Agency (DNA) inspections of nuclear-capable units. These inspections assure compliance with pertinent DoD and Joint Service publications and, as applicable, portions of Service publications. Inspections include, as a minimum, the examination of: management and administration, technical operations, tools, test, tie-down and handling equipment, storage and maintenance facilities; condition of stockpile; security, safety supply support, personnel reliability program, logistic movements, and special interest items as tasked by the Office of the Secretary of Defense and the Joint Chiefs of Staff.

2. Progress

a. The Air Force and Navy continued their respective Minimum-Notice NWTI programs. The Army conducted nuclear surety inspections of all custodial units and noncustodial units without an approved Army Training and Evaluation Program (ARTEP) during 1988. In addition, the Army Inspector General conducts reactor facility inspections of Army facilities and limited scope surety inspections of Explosive Ordnance Disposal units and organizations whose missions directly support the Army nuclear weapons and surety programs.

b. At the request of the Office of the Under Secretary of Defense (Policy), the following special interest items were evaluated during regular inspection during 1988:

(1) Impact of waivers, exceptions variances, and compensatory measures to the overall security of weapons storages and movements.

(2) The adequacy of intrusion detection sensors systems and testing of same.

The above special interest items displayed a significant improvement. Based on this success, a final report in December 1988 recommended these items be dropped from the list.

3. Appraisal. As directed by JCS, DNA continues to inspect 20-25 percent of each Service's certified nuclear-capable units annually. The number of certified nuclear-capable units subject to DNA inspections during the calendar year of 1988, was 488 (277 Navy, 147 Army, 48 Air Force and 16 Marine Corps). This represents a decrease of 86 units from last year and is directly a result of retirement of older systems in Europe and the reductions from the INF treaty. DNA conducted 106 inspections, 22 percent of the total units eligible. Units scoring a satisfactory or above remained constant throughout the year. Instances of conflicting or inadequate security guidance from higher headquarters continued to decline.

IV. Department of Energy Programs

A. Security

1. Background. The Department of Energy's security responsibilities involve the protection of nuclear weapons in the Department's custody and protection of the entire nuclear weapons complex, comprising the facilities and materials required for the design, development, fabrication, production, testing and assembly/disassembly of all U.S. nuclear weapons. The Department maintains responsibility for the security of nuclear weapons until custody is transferred to the Department of Defense, usually at a first military destination. The Department has an active program for developing technology to enhance physical security and for implementing improved physical security at these facilities. This technology is shared, where appropriate, with the DoD per the Memorandum of Understanding (MOU) between the DoD and DOE on Objectives and Responsibilities for Joint Nuclear Weapon Activities, dated January 17, 1983. The following paragraphs provide a summary of the Department's Safeguard and Security (S&S) Program.

2. Physical Security

a. Goals/Requirements. The continuing goal of the Department's Safeguards and Security (S&S) Program is to provide balanced and cost-effective protection for nuclear explosives, nuclear weapons, and components under the control of the Department. Requirements in place are based upon the 1983 Generic Threat Statement, along with recently issued supplemental guidance on insider and espionage threats and recently updated safeguards and security directives. During 1988, high-level management attention continued on developing and implementing sound planning policy as a baseline for the S&S Program.

b. Improvements/Upgrades. The Department's major thrust in safeguards and security during the past several years has been to fortify its facilities against the potential outsider threat by adapting a variety of new and advanced techniques and physical protection systems to detect and prevent acts of theft and sabotage. As a result of these and other efforts, the Department's ability to mitigate the outsider threat is at an acceptable level.

DOE continues to address concerns about the potential threats posed by an insider, a knowledgeable and trusted individual who has been granted access to classified information or sensitive facilities. This threat is potentially more difficult to address than that of the outsider; thus, the Department has adopted a defense-in-depth approach to insider protection. Measures for deterring and reducing the probability of an insider threat, detecting such a threat, and mitigating the consequences of an insider act, should one be attempted, have been developed.

During 1988, the Department continued to make progress in improving the protection posture of its facilities and operations involved with assembled nuclear weapons and nuclear test devices. This included the completion of protection enhancements as well as identification of additional construction upgrades at the Pantex Plant in Amarillo, Texas, and the Nevada Test Site (NTS), in Mercury, Nevada. The nationwide nuclear weapons transport operation conducted by the Albuquerque Operations Office, Transportation Safeguards Division (TSD), has also been upgraded.

c. Technology Development Program. The Technology Development Program is a component of the S&S commitment for cost effectiveness. It provides a technology base for developing new systems to ensure that a viable nuclear S&S Program is sustained. The program's basic strategy is to support DOE program managers in the cost-effective application of state-of-the-art technologies for protecting DOE facilities, property, classified matter, and special nuclear material.

In the past year, the Technology Development Program continued to emphasize a balanced effort that provides for protection against the entire spectrum of threats. Advanced techniques, equipment, and systems were developed, tested, and evaluated for DOE-wide S&S enhancements with emphasis on protection against potential acts of sabotage and theft by insiders.

d. Other Development Programs

(1) Device Assembly Facility. Construction on the new Device Assembly Facility (DAF), located in Area 6 of the NTS, is approximately forty (40) percent complete. This new facility, which is expected to be complete in the latter half of 1991, will employ state-of-the-art safety and security technologies for the assembly and processing of nuclear test devices to be detonated at the NTS. The DAF will also have the unique capability for processing/disassembling damaged war reserve weapons that might

have been involved in accidents. The facility will include five (5) "gravel gerty" containment cells (for the assembly/-disassembly of uncased nuclear explosives) plus numerous high bays, a pit processing laboratory, radiography facilities, and storage areas.

(2) Device Transport Vehicle. The DOE has continued its efforts to develop and field a new hardened Device Transport Vehicle (DTV). The DTV will provide enhanced safety and security for nuclear devices during transport to various locations at the Nevada Test Site (NTS). The DTV is in the final development stages with operational testing and evaluation at the NTS planned for the summer of 1989.

B. Nuclear Safety

1. Background. It is DOE policy that the protection of public health and safety is of paramount concern in the planning and conduct of the Department's nuclear weapon program. The primary goal is to assure adequate safety while effectively conducting the weapon program in the National security interest.

2. Research and Development. The DOE and the nuclear weapons design laboratories have ongoing R&D activities in safety, security, and use control that lead to technical progress and concomitant operational and logistical flexibility. These activities will assist the Nation in meeting evolving criteria. For example, earlier research into IHEs, fire-resistant pits, and electrical safety has provided the technical bases for nuclear weapons safety improvement programs. An area of research identified as requiring additional DOE attention, and appropriate collaboration with the DoD, is rocket propellant safety as it impacts nuclear warhead safety.

3. Nuclear Explosive Safety. The term nuclear explosive refers to any assembly or subassembly containing fissionable or fissionable and fusionable material and high explosives or propellants capable of producing nuclear detonation. Besides nuclear weapons, this term is associated with nuclear test devices, which are produced by the DOE to evaluate and verify design or performance criteria/data. Nuclear explosive safety is addressed by the Department throughout all phases of the nuclear weapons program. The DOE requires that a nuclear explosive safety study/survey be conducted prior to the approval of any activity (fabrication, assembly, transportation, testing, modification, retrofit, and disassembly) involving nuclear explosives.

4. Nuclear Weapon Safety

a. Background. A nuclear weapon can exist in various configurations from the time it is produced until it is retired; e.g., as a bare warhead or bomb being delivered to the DoD, or a warhead or bomb mated with the delivery system and standing alert. Figure 1 provides a graphic representation of nuclear safety oversight that takes place throughout the weapon's life cycle. For each configuration, Military Department nuclear weapon system safety studies and reviews are periodically required. DOE provides membership to these studies and reviews. These safety studies must include a determination if the nuclear weapon systems safety standards are met, given that the safety rules (which result from such studies) are followed. The safety rules, including the determination if the safety standards are/are not met, are coordinated in by the DoD and DOE and must be approved by the Secretary of Defense prior to any operation taking place on or involving a stockpile nuclear weapon.

b. Qualitative Safety Standards. The DoD and DOE have separate, but similar, sets of qualitative safety standards that prescribe positive measures to be taken to attain maximum safety (and security). The Nuclear Weapon Systems Safety Standards, defined in DoD Directive 3150.2, apply to the weapon system of which the DOE designed and produced warhead is part. The combination of design safety features, operational concept and procedures, and general and specific safety rules for each nuclear weapon system must be assessed by the respective Nuclear Weapon Systems Safety Group (NWSSG) to determine if the weapon system meets these standards. Coupled with meeting the standards, the goal of the nuclear weapon systems safety process is to provide maximum safety consistent with DoD operational requirements throughout the stockpile-to-target sequence (STS).

c. Quantitative Design Criteria. The criteria that specify the minimum nuclear safety design to which the DOE warhead portion of the nuclear weapon system must conform are expressed quantitatively in probabilistic risk terms and incorporated in the Department of Defense approved and Department of Energy accepted Military Characteristics (MCs) of each weapon. The following is a summarization of the quantitative modern nuclear safety design criteria that were developed in 1968 and have been part of the MCs for each new warhead (bomb) developed since.

Safety Oversight in Weapons Programs

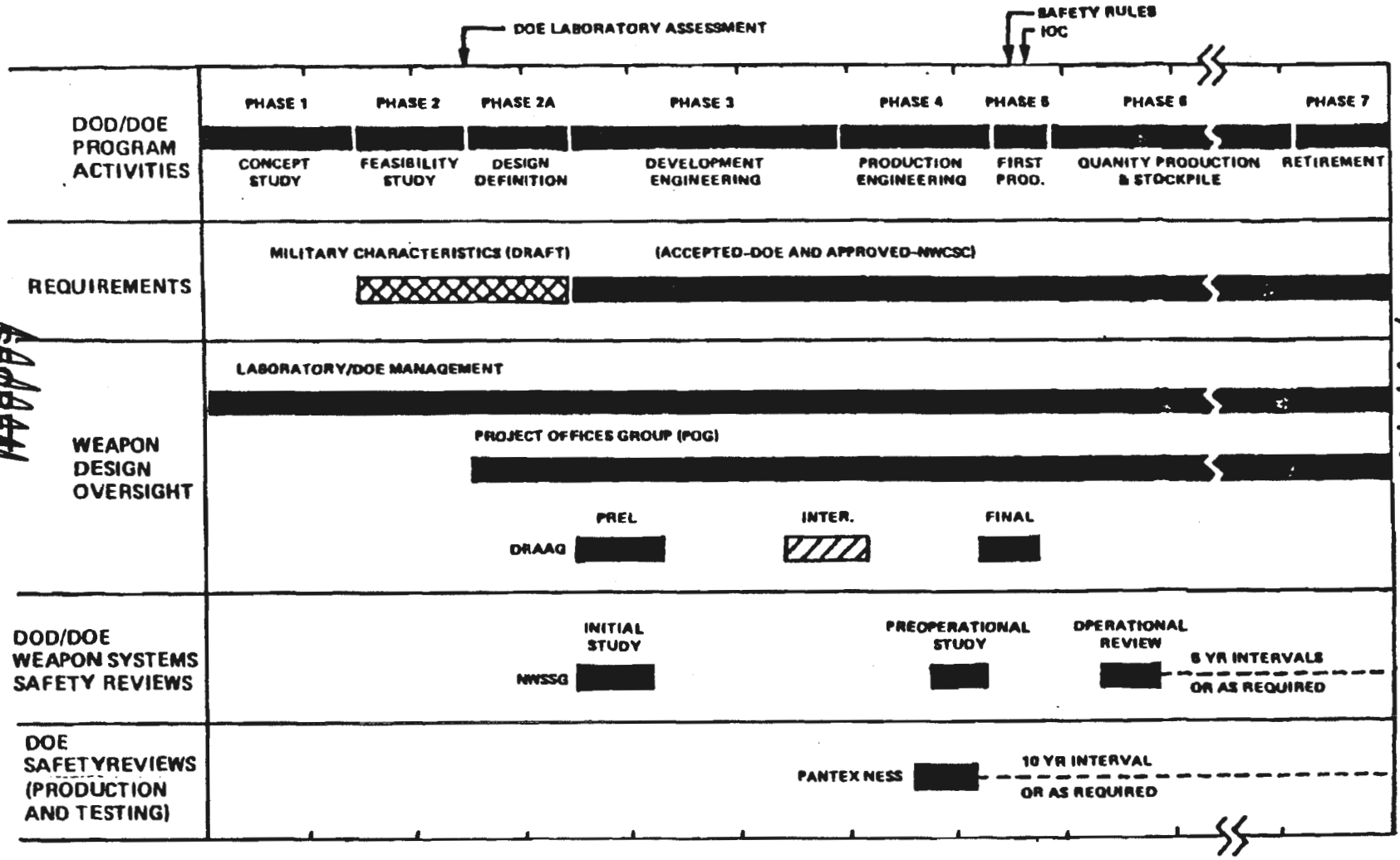

FIGURE 1

(1) Warhead One-Point Safety Criteria. In the event of a detonation initiated at any one point in the high explosive system, the probability of achieving a nuclear yield greater than four (4) pounds TNT equivalent shall not exceed one in one million. One point safety shall be inherent in the nuclear design; that is, it shall be obtained without the use of a nuclear safing device.

(2) Weapon System Premature Probability Criteria. The probability of a premature nuclear detonation of a warhead (bomb) due to warhead component malfunctions shall not exceed:

(a) Prior to launch (prior to receipt of pre-arm signal) for the normal storage and operational environments described in the STS, one in one billion per warhead lifetime.

(b) Prior to launch (prior to receipt of pre-arm signal) for the abnormal environments described in the STS, one in one million per warhead exposure or accident.

The first nuclear weapon to fully meet this quantitative design criteria was the B61-5, which initially entered the stockpile in 1977. By design warheads (bombs) produced before this date, unless appropriately modified, cannot be assured to react predictably in abnormal environments. Therefore, weapon systems utilizing warheads or bombs that do not meet these design criteria require restrictive procedures or safety rules. Both Secretaries will continue to assure maximum safety consistent with operational requirements.

C. Use Control. Warhead use control, as discussed in this section, is only one part of the overall nuclear command and control requirements covered in Section II.F. of this report. The goal of warhead use control is to provide a high level of assurance that nuclear weapon systems can be used for their intended purpose only if properly authorized by the National Command Authority. To achieve this goal, combination locks or permissive action links (PALs) have been incorporated in selected warheads/bombs deployed on foreign soil since the early 1960s. The PALs are code-controlled devices incorporated in the warhead/bomb electrical system. Categories A and B PALs employ and control a single code out of a ten-thousand code population and do not have a limited-try feature. (Limited-try precludes attempts to unlock the PAL by trying all codes.) The Category D PAL incorporates a million code population, multi-code capability, and the limited-try feature.

(b) (3)

Use control in the form of combination locks are much more vulnerable to defeat than the Category D or F PAL systems found in modern weapons.

D. Weapons Systems Review. This section provides a concise synopsis of safety, security, and control aspects for all U.S. nuclear warheads or bombs found in the stockpile or currently in the development stage.

1. Stockpile Weapons

a. Weapon Stockpile Summary. At the end of 1988, the stockpile consisted of 26 different types of warheads/bombs.

(b) (3)

However, progress needs to continue to improve the remaining deficiencies. The most notable 1988 stockpile surety improvements are: (a) (b) (3) in addition, the remaining unmodified bombs were restricted by the DoD from standing ALFA Alert or being used in force-generation exercises; (b) the factory retrofit of B61-1s to B61-7s with an enhanced nuclear detonation safety subsystem, IHE, and Category D PAL continued; in addition, the unmodified B61-1s were restricted by the DoD from standing ALFA Alert; (c) the field retrofit of the B53 with an improved nuclear detonation safety subsystem was completed, and the B53-1 is now standing ALFA Alert on B52 aircraft; (d) a development program was authorized for the warhead (W89) for SRAM II, which will replace the SRAM A/W69; in addition, the development option to backfit the W89 into a W69 replacement in the SRAM A is being maintained by the DOE but not on the same timescale; and (e) the B61-4 production program and a development program were authorized for the B90 nuclear depth/strike bomb (NDSB), which will replace the Navy B57. The latter two cases are very important and have the full acquisition support of DoD and DOE. However, because of the large quantities of weapons and appropriate modifications of delivery aircraft, it will be near the end of the century before replacement is complete. Under current plans, the SRAM A/W69 will continue to stand ALFA Alert and be used in force generation exercises until replacement is nearly complete (circa, 1998).

b. Stockpile Improvement Program (SIP) Weapons. The Stockpile Improvement Program, which addresses safety and use control concerns, continued in 1988 for the following stockpile weapons.

(1) B28. All B28 nuclear bombs that stand ALFA Alert on SAC B-52 aircraft have been field retrofitted, (now B28-0,1), with an improved nuclear detonation safety subsystem and Category D PAL. The retrofitted bombs, while providing an improved level of safety in abnormal environments, still do not fully meet modern nuclear safety design criteria.

(b) (3)

(2) W31.

(b) (3)

(3) B53. The B53 bomb, which was placed in the inactive reserve status in 1984, was returned to active status in FY 1987. Because of an Air Force operational requirement to place a limited number of these weapons on ALFA Alert aboard B-52 aircraft, the DOE undertook an accelerated development program in February 1987, to incorporate significant nuclear detonation safety improvements. Field retrofit operations for the B53s (now B53-1s) were completed in mid 1988, which supported alert requirements. (b) (3) They are currently scheduled to remain in the stockpile for only five more years and are to be replaced by the Interim Earth Penetrator Weapon.

(4) B61-1. All B61-1 bombs are deployed with the Strategic Air Command (SAC) and are scheduled for factory retrofit to B61-7s with modern nuclear detonation safety subsystem, insensitive high explosive (IHE), a Category D PAL and a command disablement system. Delivery to the Air Force of the first B61-7 occurred in 1985.

(b) (3)

(5) B61-0, 2, and 5 Navy. Development activity continued for the planned factory retrofit of B61-0, 2, and 5 nuclear bombs scheduled to commence in FY 1991. (b) (3) These weapons will incorporate a modern nuclear detonation safety subsystem, IHE, Category D PAL, and a command disablement system. On an interim basis, the bomb will incorporate a unique signal generation (USG) override capability. (See discussion on the B90, page 46.)

(6) B61-0 Air Force.

(b) (3)

The remaining Air Force B61-0s will be used in the B61-6 program mentioned above for the Navy.

c. Stockpile Weapons (Group 1).

(b) (3)

(b) (3)

The W82 is planned to replace some W33s and W48s. The FOTL warhead is planned to replace the W70.

(1) W33. The Army and DOE have conducted a production impact and cost assessment of a use control upgrade for the W33 (eight inch) Artillery-Fired Atomic Projectile (AFAP) to replace the existing combination lock. Various options featuring a mix of active and passive protection schemes along with command disablement were examined. The decision on which option to field is expected in 1989. The W33 is currently stored and transported in its unassembled configuration, which allows it to meet nuclear detonation safety requirements. The W33 contains a propellant but no high explosives when fully assembled for strike.

(2) B43. The B43s, which have a Category B PAL, are all in the Navy inventory.

(b) (3)

Current plans indicate that all B43s will be retired by the end of 1991.

(3) W44. The W44 warhead for the Navy ASROC missile is not equipped with any PAL device.

(b) (3)

Retirement of the W44 system has been accelerated and should be completed by the end of 1989.

(4) W45. The W45 nuclear warhead for the Navy Terrier anti-aircraft missile was retired in 1988.

(5) W48.

(b) (3)

The W48 is stored and transported with the fuze, containing the electrical power supply, disconnected. Because of Congressional restrictions, insufficient W82s will be produced to replace all W48s. Consequently, it is projected that the W48 will remain in the stockpile for the foreseeable future.

(6) W50. The W50 for the NATO PERSHING 1a missile will be retired by the end of 1992, as a result of the INF agreement. The W50 has a Category A PAL.

(7) B54. All B54 Special Atomic Demolition Munitions are being maintained in storage sites in CONUS and on Naval vessels, pending expected 1989 retirement.

(8) W55. The retirement of the W55 for the Navy's SUBROC missile is scheduled to be completed by 1990. The W55 does not have a PAL and incorporates a nuclear safing device for one-point safety.

(9) W56. The MINUTEMAN II/W56 system, which stands alert does not have a PAL. Use control is provided by the MINUTEMAN missile system. This weapon incorporates a nuclear safing device for one-point safety.

(10) B57. There are no retrofits planned for the B57. The B57-1 does not have a PAL, while the B57-2 has a Category B PAL. A Phase 3 (development program) for the B90, a new Navy nuclear depth/strike bomb (NDSB) to replace the B57, was authorized in 1988. (See discussion on the B90, page 46.)

(11) W62. The MINUTEMAN III/W62 system, which stands alert, has no plans for retirement or retrofit. The W62 does not have a PAL; use control is provided by the MINUTEMAN system.

(12) W68. The POSEIDON/W68 system is scheduled to be retired by 1999. The W68 does not have a PAL; use control is provided by the POSEIDON missile system.

(13) W69.

(b) (3)

A Phase 3 development program for the W89 warhead was initiated in 1988. (See discussion on the W89, page 46.)

(b) (3)

(14) W70. The LANCE/W70 incorporates a Category D PAL and a command disablement system. A Phase 2 study of a nuclear warhead with modern nuclear detonation safety, IHE, and improved use control for the Follow-On To LANCE (FOTL) program has continued and is expected to be complete in 1989. This weapon system is planned to replace the LANCE/W70 in the 1995 timeframe.

d. Stockpile Weapons (Group 2). The following warheads do have modern nuclear detonation safety subsystems and were designed to meet the 1968 safety criteria but do not contain IHE. Use control features are appropriate for current and planned deployments. There are no plans for replacement, modification, or retirement of these weapons.

(1) W76. The W76 is a nuclear warhead for the Navy's C4 and D5 missiles for the POSEIDON backfit and TRIDENT submarines. This warhead is not air transported and does not have a PAL. Use control is provided by the POSEIDON and TRIDENT missile systems.

(2) W78. The W78 warhead for the MINUTEMAN III incorporates enhanced nuclear detonation safety but does not have IHE or PAL. Use control is provided by the MINUTEMAN missile system.

(3) W79. The W79 AFAP electrical system incorporates modern nuclear detonation safety, Category D PAL, and a command disablement system. IHE could not be used in this system because of energy requirements and the small projectile volume.

(b) (3)

e. Stockpile Weapons (Group 3). The following systems have modern nuclear detonation safety subsystems, meet the 1968 safety design criteria, incorporate IHE, and use control features appropriate to the deployment environments.

(1) B61-3,4. The B61-3,4s incorporate a Category F PAL and a command disablement system. These bombs were produced at a reduced rate in FYs 1986, 1987, and 1988 due to budget reductions. Production continues to eventually replace all of the B57s and B61-2,5s in the Air Force inventory with B61-3,4s. Transfer of B61-2 and 5s to the Navy permits the retirement of B43s.

(2) W80-0,1. The W80-0 for the Sea-Launched Cruise Missile and the W80-1 for the Air-Launched Cruise Missile incorporate a Category D PAL and a command disablement system. This system continues in production.

(3) B83. The B83 bomb incorporates a Category D PAL and a command disablement system. These bombs continue in production and replace B28s. The B83 is required for use with high performance modern aircraft, i.e., B-1B and B-2.

(4) W84. The W84 for the Ground-Launched Cruise Missile (GLCM) incorporates a Category F PAL and a command disablement system. The GLCM missile is being destroyed as a result of the Intermediate Nuclear Forces (INF) treaty, and the W84 assets, which have the most modern safety and use control features may be used for other weapon systems. The W84 warheads are currently being held in JCS reserve.

(5) W85. The W85 warhead for the PERSHING II missile incorporates a Category F PAL and a command disable system. The PERSHING II missiles are scheduled to be destroyed under the INF agreement, and the W85 assets, which have the most modern safety and use control features, may be used for other weapon systems. The W85 warheads are currently being held in JCS reserve.

(6) W87-0. The W87-0 nuclear warhead for the PEACEKEEPER intercontinental ballistic missile first entered the stockpile in 1986, and production was completed in January 1989. Use control is provided by the PEACEKEEPER missile system.

2. Development Weapons

a. W82. The W82 (155mm) AFAP, currently in Phase 3 (full-scale development engineering), is expected to replace some of the W33 and W48 (155mm) AFAPs. The system incorporates a modern nuclear detonation safety subsystem, a Category D PAL, and a command disablement system. The W82 will not incorporate IHE due to energy requirements and size constraints. The present design for the W82 is being modified to meet one-point nuclear safety criteria. DOE has recommended the Initial Operational Capability (IOC) for the W82 be slipped.

b. W87-1. The W87-1 is the warhead for the Small Intercontinental Ballistic Missile (SICBM). The DOE accepted the DoD request for full-scale engineering development in November 1987, but minimal activities are underway pending a decision on

future funding for the SICBM. As with the fielded W87-0 in the PEACEKEEPER application, the W87-1 will incorporate a modern nuclear detonation safety subsystem, IHE, and a fire-resistant pit. In addition, the W87-1 will include use control devices to delay unauthorized use of the warhead.

c. W88. The W88 warhead for the Navy's TRIDENT II/D5 missile incorporates modern nuclear detonation safety but does not use IHE. Conventional HE was used to meet the Navy's reentry body performance requirements, and thus, the W88 presents the same concern of plutonium scatter associated with other non-IHE systems. The Initial Operational Capability (IOC) date for the W88 is late 1989, and there are no plans to use air transportation for this system.

d. W89. The W89 is the nuclear warhead for the air-to-ground Short Range Attack Missile II (SRAM II), which will be carried by strategic aircraft, i.e., B-1B and B-2. Phase 3 (full-scale engineering development) for the W89 started in early 1988. The SRAM II/W89, which is a replacement for the SRAM A/W69 weapon system, incorporates a modern nuclear detonation safety subsystem, IHE, a fire-resistant pit, Category D PAL, and a command disablement system. Compatibility of the W89 with SRAM A missile is possible with appropriate modification of the electrical system and interface structures. This capability would allow for the redirection or extension of the development program on a later timescale into a W69 replacement program should the SRAM II missile program be cancelled, significantly delayed, or the SRAM A be retained after SRAM II deployment is complete. To protect this option, the DOE intends to maintain physical compatibility of the W89 with the SRAM A missile. Should this option be implemented, the scheduled IOC for the W89 would, in all probability, be delayed. This backfit capability will require the Air Force to incorporate features in the SRAM A missile and the aircraft to deliver the unique arming signals. This situation will be reviewed by both the DoD and DOE on a continuing basis.

e. B90. The B90 Nuclear Depth/Strike Bomb (NDSB) incorporates a modern nuclear detonation safety subsystem, IHE, Category D PAL, and a command disablement system, and entered Phase 3 (full-scale engineering development) in mid-1988. Its deployment, which is expected to start in 1993, is one of the keys to retiring the B57 weapons in Navy custody. Certain Navy nuclear-capable aircraft must be modified to include the cockpit unique signal generation (USG) capability to achieve compliance with nuclear detonation safety standards. The F/A-18 and United Kingdom Nimrod aircraft have this capability, and the new A-TF is

programmed to receive it. However, the A-6E, P-3, S-3, and Italian Atlantic are not so equipped. This means that if a B90 is made compatible with these latter aircraft and is loaded for strike on any of those carriers, nuclear detonation safety standards in accident environments would not be met. The DOE and DoD have agreed to equip the B90 with a unique signal override feature until the year 2000. This would provide compatibility with the aircraft not equipped with the unique signal capability on an interim basis (until the year 2000). During this period (until 2000), the Navy would operate under a more restrictive concept of operations to achieve adequate safety. After the year 2000, any U.S. tactical aircraft lacking this unique signal capability would not be nuclear certified.

3. Other Developments

a. Fire-Resistant Pits. During 1988, DOE continued to evaluate fire-resistant pits as a means for protection against radioactive material dispersion in the event of an accident and/or fire involving an Insensitive High Explosives (IHE) nuclear weapon. In June 1988, the Department initiated a comprehensive study to investigate the feasibility and need for incorporating fire-resistant pits in all new war reserve designs. A report providing the results of this study, identifying the overall value of IHE in conjunction with Fire-Resistant Pits (FRPs), and recommending policy for DOE in guiding the application of fire-resistant pit technology to future weapons was completed in early 1989.

b. Three-Dimensional Hydrodynamics. This program will facilitate cost-effective 3-D hydrocalculations in support of one-point nuclear detonation safety assessments for our nuclear weapons. For a number of years, the DOE has pursued a program to develop a full three-dimensional (3-D) hydrodynamics simulation capability. The success of developing a predictive capability is highly dependent on computer capability, the current generation of which has been fully stressed by the 3-D codes. Using two recently acquired Cray X-MP computers, the Department has begun to benchmark these 3-D hydrodynamic simulation codes with data obtained from the radiographic experimental facilities and nuclear tests at the NTS.

4. The Future. In March 1988, the DOE published the results of a 1987 study of the stockpile with emphasis on safety and use control. Table 1 is the rank order relative to safety and use control concerns of the stockpiled weapons from that study. Included in the table is an indication of the future status under current plans.

TABLE 1

Priority Listed per 1987 DOE
Stockpile Study for Safety and Control

Weapon	Current Plans	Actions Completed in 1988
B28FI	Retired by 1991	Off ALFA Alert
B53	Retrofit to B53-1	Retrofit Completed
W69	Replacement by SRAM II/W89 (1992-1998)	
B61-1	Retrofit underway--B61-7 (1985-1990)	Off ALFA Alert
B28-0,1	Replacement by B83; retired by 1993	
B53-1	Strategic Earth Penetrator by (To Be Determined)	
W56		
W62		
W48	Partial replacement by W82	
B57	Replacement by B90 (1993-2000)	
B61-0	Retrofit authorized -- B61-6 (1991-1995)	
W50	Retired by 1992	
B61-2	Retrofit authorized -- B61-8 (1993-1999)	
W70	Follow-On To LANCE	
W78		
W82		
B54	Retired by 1989	
W79		
W31-3	Retired	
B61-5	Retrofit authorized -- B61-8 (1995-2001)	
W68	Retired by 1999	
W76		
W88		
W33	Product improvement development program underway. Partial replacement by W82 by (To Be Determined)	
W44	Retired by 1989	
B43	Retired by 1991	
W45	Retired	
W55	Retired by 1990	

(This list does not necessarily reflect the position of the Department of Defense.)

The following recommendations, derived in the joint DoD/DOE stockpile review/stockpile improvement review meeting held in March 1988, and current initiatives responding to each recommendation were reviewed by the NWC.

- "Fund all aspects of the SRAM II program, including aircraft integration, on a high-priority basis to ensure expeditious replacement of W69 warheads (SRAM A) on alert.

- Dedicate resources to maintain ongoing B28-0,1; B53-1; and B61-7 retrofits and enhance B83 production schedule.

- DoD and DOE unite in identifying a program to eliminate the operational need for alert use of B53s.

- Support timely replacement of Navy B57 bombs with NDSB.

- For safety and control reasons, support initiative to lift restrictions on modern AFAP production to accelerate the replacement of W48 and W33 AFAPs and continue initiative to improve AFAP transportation and storage containers.

- Air transport of weapons, when there is viable and secure ground transport, should be eliminated or, at least, minimized. Jointly investigate additional steps that could reduce the consequences of air transportation accidents with weapons not having modern nuclear safety features. (Note: There will be a joint DoD/DOE study to investigate additional measures that could reduce the possibility that weapons without modern nuclear design safety features could be involved in an air transport accident.)

- Recommend that the priority order of weapons/concerns presented in the 1987 stockpile study be used in developing future stockpile trade-off decisions."

According to the 1989-1994 Nuclear Weapons Stockpile Memorandum (NWSM), Figures 2, 3, 4, and 5 depict the future makeup of the stockpile relative to nuclear detonation safety, radioactive material scatter, and use control features.

Enhanced Nuclear Detonation Safety

Total Stockpile

(b) (3)

FIGURE 2

Insensitive High Explosive

Total Stockpile

(b) (3)

FIGURE 3

Permissive Action Link

Total Stockpile

(b) (3)

FIGURE 4

Command Disable

Total Stockpile

(b) (3)

FIGURE 5

E. Personnel Assurance

1. Personnel Assurance Program (PAP). The Department's PAP continues to provide a high level of confidence in the reliability and stability of individuals performing critical duties in nuclear explosive operations. Approximately 250 additional personnel will be added to the PAP in 1989, at the DOE's Pantex Plant. This addition will increase the total number of PAP employees at the Pantex facility to approximately 1800 and to nearly 2200 for the Department's PAP as a whole. The DOE is currently reviewing its operations and activities involving nuclear explosives to assure all personnel conducting critical duties are integrated in the Department's PAP.

2. Personnel Security Assurance Program (PSAP). During 1988, DOE's Personnel Security Assurance Program , which was entitled the Human Reliability Program (HRP) in last year's report, was approved in January 1989, for implementation throughout the Department. The PSAP implementation will be phased over the next two years. A proposed rule for the PSAP was published in the Federal Register, and public comments are being reviewed and discussed. In the interim, implementation plans for the PSAP will be developed at affected DOE sites. The PSAP affects personnel (not covered in the above PAP) who: protect, transport, or have direct access to significant quantities of special nuclear material; operate nuclear material production reactors; or can cause unacceptable damage to nuclear weapons production with a significant impact on national security. Elements of the PSAP include initial and periodic supervisory review, medical assessment, management evaluation (including drug testing), and security review.

F. Oversight Activities

1. Background. The DOE conducts or participates in various activities to assure that an adequate level of oversight is provided for the safety, security, and control of the Nation's nuclear stockpile. Many of the activities are conducted in conjunction with the DoD, in keeping with their dual-agency judgment and responsibility roles.

2. Appraisal Program. DOE conducts annual appraisals of all operations and organizations involved with nuclear explosives, nuclear components, and special nuclear assemblies. These appraisals are conducted to assure compliance with applicable DOE policies and procedures found in the Department's Orders; provide management with objective, timely, and factual

information on program performance; and identify deficiencies and recommend appropriate corrective actions. In order to assure that the entire program is reviewed and evaluated, the appraisals are conducted on two levels; Field Operations Offices appraise Area Offices and contractors, while Headquarters appraises the Field Operations Offices. Management was informed of all shortcomings and deficiencies noted during the appraisals, and appropriate corrective actions were implemented to resolve the findings. During 1988, the overall appraisal results indicated that the DOE nuclear explosives and weapons safety program met established safety requirements.

3. Nuclear Weapon Systems Safety Groups (NWSSGs). In accordance with DoD Directive 3150.2, each of the Military Services has a Nuclear Weapon Systems Safety Group (NWSSG) to review each of the weapon systems for compliance with DoD Nuclear Weapon Systems Safety Standards. The DOE, as part of its dual-agency responsibility and per DoD Directive 3150.2, participates as an active voting member of each of Military Services' NWSSGs. During 1988, the DOE participated in all thirty-three (33) NWSSG studies and operational safety reviews conducted by the Services. DOE participation in this process continues through review and concurrence on each nuclear weapon system safety rules package prior to its submission to the Secretary of Defense for approval. In the late 1970s, studies by joint DoD/DOE (then Energy Research and Development Administration) technical working groups found most then-stockpiled weapon systems to have unpredictable performance in abnormal environments. Based on this review, the Secretaries of Energy and Defense will continue to pursue expeditious replacement of these older weapons through stockpile modernization. DOE plans to assure that both Secretaries, along with the Nuclear Weapons Council, are fully apprised of the safety risks within the DoD concept of operations prior to DOE concurrence and DoD approval of future safety rules for these weapon systems.

The DOE believes that continued progress was made by the Services in responding to NWSSG's recommendations and in the processing of the nuclear weapon systems safety rules. Furthermore, a positive step has been taken regarding the revision of DoD Directive 3150.2. DoD/DOE coordination on this effort has been established and the DOE has provided, at DoD's request, comments, concerns, and recommendations to improve the effectiveness of the NWSSG process.

4. Nuclear Explosives Safety Study Group (NESSG). In accordance with DOE Order 5610.3, the NESSG provides a nuclear safety study/survey of all DOE operations and activities, at the Pantex plant and the NTS, involving nuclear explosions to assure compliance with nuclear explosives safety standards and criteria. During 1988, sixty-three (63) nuclear explosive safety studies/surveys were conducted. The studies/surveys included master studies for certain aspects of various operations, transportation activities, and tests involving nuclear explosives.

5. Security Inspections and Evaluations. The Office of Security Evaluations (OSE) carries out an important safeguards and security (S&S) oversight mission for the Department. OSE conducts a management level, performance/compliance-oriented Inspection and Evaluation Program (I&E), which includes: Inspections of DOE operations offices, protection systems under their cognizance, and independent reviews of protective systems and operations of major DOE nuclear facilities located throughout the DOE complex.

During 1988, OSE conducted eight inspections involving six operations offices and two naval reactor offices. The inspections also included reviews at 17 contractor facilities. Topical areas addressed included: Computer security, information security, material, control, and accountability (MC&A), personnel security, protection program operations, and S&S survey programs. OSE also completed evaluations during 1988, in the areas of delay systems, personnel security, and protection program planning.

Overall, while many strengths were noted, improvement is needed in the areas of MC&A and personnel security. Findings support the conclusion that in 1988, the DOE protection program met identified protection needs, and protection has improved in several topical areas when compared with previous inspections.

V. Joint Emergency Preparedness and Response

A. Preparedness for Weapons Accidents

1. Background

a. In the event that a nuclear weapon is involved in an accident, DoD or DOE (depending on custody of the involved weapon) will be the lead agency in charge. DoD and DOE work together in the safing of weapons and the removal of classified material from the accident scene. In the event of a nuclear accident in the United States or its territories, the Federal Emergency Management Agency (FEMA), as outlined in the Federal Radiological Emergency Response Plan (FRERP), is charged with coordinating the federal response to protect the health and safety of the civilian populace. In the event of a domestic malevolent nuclear incident involving the loss or theft of a nuclear weapon, or receipt of a credible threat concerning an improvised nuclear device (IND) or radiation dispersal device (RDD), DOE is prepared to provide technical assistance to the Federal Bureau of Investigation (FBI) in conducting search, diagnostic assessment, and disablement operations by deploying its Nuclear Emergency Search Team (NEST). Should a malevolent nuclear incident occur overseas, the DOE NEST, in coordination with DoD's Overseas Nuclear Emergency Search capability, is prepared to assist foreign governments through the Department of State (DoS) in locating and recovering such weapons or devices.

b. Exercises concerning nuclear weapon accident, theft, and loss, as well as IND and RDD threats are conducted to improve coordination between all participating federal agencies. These exercises provide a means to develop procedures for the interaction between those agencies and state and local governments. In 1988, exercises were conducted to test: Notification procedures, multi-agency command and control structures, deployment of the newly formed Federal Radiological Monitoring and Assessment Center, the Defense Senior Representative (DSR) concept, effectiveness of the NEST Technical Operations Center (TOC), and the capability of new technology to effectively locate and prevent detonation of lost or stolen nuclear weapons or INDs, should such events occur.

2. Response Capabilities

a. Accident Response Group (ARG). The ARG is a group of DOE weapons design engineers and technical and management

specialists with a capability to provide response to peacetime accidents and significant incidents involving nuclear weapons. The ARG program successfully ties the world-wide DOE emergency preparedness and response into Federal emergency plans and operations.

b. Nuclear Emergency Search Team (NEST). The NEST is a DOE capability prepared to provide technical assistance for nuclear weapons incidents or to assist in locating lost or stolen U.S. nuclear weapons or INDs. DOE supports the DoD's overseas nuclear emergency search capability by training DoD personnel on search techniques and maintaining limited in-country technical capability to assist in locating weapons.

c. Atmospheric Release Advisory Capability (ARAC). ARAC is a DOE and DoD Federal real-time computer emergency response calculation system designed to estimate the dispersal patterns and contamination levels of an accidental release of radioactive material. Seven DOE and 42 DoD facilities contribute directly to the system via computer networking. ARAC supports the ARG and NEST organizations and would also be called upon to assist with estimates from accidents at U.S. civilian facilities or foreign nuclear sites (e.g., Chernobyl) that could affect the health of U.S. citizens.

d. Aerial Measurements System (AMS). DOE maintains an AMS capability consisting of several rotary and fixed-wing aircraft fitted with high-sensitivity, high-resolution radiation detectors, computers, and analyzers. This capability can respond in minimal time to search for lost or stolen nuclear weapons, special nuclear material (SNM), or INDs and RDDs and to measure contamination levels at an accident site. When the capability is not deployed for emergency purposes, it is used to gather baseline data that can be used should an emergency arise, i.e., multispectral remote imaging, baseline radiological surveys, and high-resolution aerial photography.

e. Site Folder Program. In 1988, Defense Nuclear Agency (DNA) was given national-level oversight for the site folder project. This program maintains country, site, magazine, and building plans for all the U.S. nuclear storage sites to assist with security and safety forces in the event of a incident or accident. DNA initiated the planning for this comprehensive project and for an annual update cycle. Along with the annual updates, they assist with exercise planning.

3. Exercises

a. ELITE STORM/PROPER WATCH. Planning progressed during 1988 for exercise ELITE STORM and PROPER WATCH, scheduled for January and May 1989, respectively. These exercises are intended to evaluate the coordination between U.S. and U.K. response forces in the event of a U.S. nuclear weapon accident in the U.K. They are also intended to validate the Third-Tier Arrangement, a U.S./U.K. agreement on mutual rights and responsibilities in the event of a U.S. nuclear weapon accident in the U.K. ELITE STORM will be predominantly a U.S.-only exercise conducted as a precursor to the bilateral exercise PROPER WATCH.

b. PREMIER TASK 88. Development of this exercise was 75 percent complete when planning was suspended in July 1988, at the request of the Office of the Secretary of Defense. The exercise has been renamed DISTINCT ACTION and will be an expanded Command Post exercise tentatively scheduled for Plattsburg AFB, NY, in August 1989.

c. COMPASS ROSE. Exercise COMPASS ROSE was a DOE-sponsored joint nuclear counterterrorism exercise involving the DoD, DOE, FEMA, and FBI, conducted in May 1988, at Camp Pendleton, California. This exercise provided a unique opportunity to combine the command and control and technical elements from DOE's Nuclear Emergency Search Team (NEST), Accident Response Group (ARG), and the regional Radiological Assistance Program (RAP).

This exercise provided the first opportunity to test the role for involvement of a Defense Senior Representative (DSR) in a counterterrorism situation. This exercise validated the need for a general/flag officer in the DSR role in the event of an incident involving nuclear weapons and terrorists. It also provided the DOE with its first opportunity to have active participation of an interagency-manned Federal Radiological Monitoring and Assessment Center (FRMAC) in a nuclear weapon scenario, with good results.

d. JOINTEX II. Planning progressed during 1988 for exercise JOINTEX II, scheduled for March 1989. This is a joint CINCPAC/FEMA exercise to be held on the island of Guam. The exercise is intended to evaluate specific aspects of U.S. command, control and communications, civil and military coordination, and U.S. and Guamanian Government capabilities to exercise joint emergency plans in response to a nuclear weapon accident.

e. TINDERBOX II. NEST conducted a command post exercise to evaluate deployment and call-out procedures. The exercise concentrated on the established policies and procedures for a rapid and timely deployment of personnel and equipment. Exercise play was limited to Emergency Operations Centers within the DOE programs.

f. SEARCHEX88. This exercise allowed the DOE NEST to evaluate its hand-held and vehicle search techniques and resources in Phoenix, Arizona.

A round-the-clock search of Phoenix was executed with the support and participation of the FBI and local government agencies.

g. SRFX88. This was a service response force exercise conducted at Sierra Army Depot, California, and was sponsored by the U.S. Army. This exercise evaluated the interaction between a service response force (SRF) and various federal and state agencies during a nuclear weapons accident. The DOE, the Federal Emergency Management Agency (FEMA), the State of California, and the Defense Nuclear Agency participated. This was the first exercise in which the joint hazards evaluation center (JHEC) was used for onsite command and control. A Federal Radiological Monitoring and Assessment Center (FRMAC) was used for offsite command and control.

4. Training

a. The emergency preparedness and response capability of the DoD and DOE for responding to nuclear accidents or malevolent incidents continues to be maintained at an operative level through effective training and exercise programs conducted individually and jointly. Training activity in 1988 consisted of classroom and field training for the response elements and Service and facility training exercises that employ the response assets.

b. The Department of State (DOS) initiated a program in 1985 to provide information and guidance for selected embassies worldwide on their contingency plans requiring response to an accident involving nuclear weapons. At the request of the DOS, DNA is providing primary assistance in the form of institutionalized training and exercise programs for U.S. Ambassadors, Deputy Chiefs of Mission, and their Nuclear Accident/Incident Teams (NAITs). In 1988, training and follow-on

command post exercise programs were administered to the embassies in Rome, Ottawa, Lisbon, Copenhagen, the Hague, and Paris.

5. Initiatives with Allies

a. France. During 1988, progress was made with the ongoing program of cooperation between the Republic of France and the United States with respect to nuclear accident/incident matters. The program consists of an exchange of information between the U.S. (DoD/DOE) and the French Commiserate A L'Energie Atomique (CEA). In June 1988, the fourth in a series of bilateral symposiums was held in Tours, France. The exchange was primarily technical in nature, but an agreement was reached to discuss contingency operations at future meetings. In addition, formal efforts are progressing between the DOS, DoD, and DOE to establish a Memorandum of Understanding (MOU) with the French CEA regarding procedures to address possible malevolent nuclear incidents.

b. Australia. During 1987, a MOU was entered into between the U.S. and Australia for purposes of performing an aerial radiological survey of former British nuclear weapons test areas near Maralinga, South Australia. Approximately 1200 square kilometers were surveyed by DOE Aerial Measurement System (AMS) capability at the request of the Australians. The field effort was completed by mid-year 1987 and was funded by the Australians. However, the MOU remained in force during FY 1988 to allow for interpretation and analysis of the data collected during 1987.

c. Sweden. Overtures were made by Sweden to the U.S. for exchange of information and assistance in developing a nuclear emergency response capability. Their primary interest is in the DOE's AMS capability (aerial radiological detection methods), diagnostics capabilities, and command and control procedures for dealing with RDD threats and nuclear power plant problems. A MOU was signed in early 1988 allowing for discussions to take place. Sweden sent a two-man contingent to the DOE Nevada Operations Office in February 1988, for such discussions.

d. United Kingdom (U.K.). Cooperative agreements continue in place with the U.K. under the aegis of JOWOG 41, Nuclear Weapon Accident Technology, and JOWOG 29, Nuclear Terrorism Technology. U.K. personnel participated in NEST working groups and exercises, and the U.S. and U.K. exchanged

observers for exercises in both countries. In 1988, JOWOG 29 meetings were held in the U.K. and included participation in a U.K. exercise.

e. Others. Joint DoD/DOE staff, worked with the DOS, to develop emergency response Memorandums of Understanding with Belgium and the Federal Republic of Germany. Work progressed well during 1988, and most issues were resolved and signatures are expected in the near future.

6. Accidents/Significant Incidents. In 1988, there were no nuclear weapon accidents or significant incidents.

B. Threat Assessments. Lawrence Livermore National Laboratory (LLNL) is program manager for the DOE's Credibility Threat Assessment Program. This program, conceived shortly after NEST was established, was developed to preclude costly, time-consuming, and unnecessary deployments of assets and manpower. When a nuclear threat is received, it is assessed for credibility, and quickly, but comprehensively, analyzed by both weapon laboratories and psychologic/psycholinguistics experts. The LLNL Threat Assessment Center averages about 40 inquiries per year of various types, ranging from data base searches to credibility assessments of nuclear threats and "black market" nuclear materials sales attempts. The only significant incident in 1988 was a threat perpetrated by an individual claiming to have three INDs in three undisclosed locations in the U.S. The individual sent threat letters to the Director of the FBI, The Los Angeles Times, and The New York Times threatening to detonate the devices. The threat was assessed to be a hoax, and no NEST assets were deployed. The perpetrator was identified and arrested.

VI. Impact of Budget Constraints

The joint DoD/DOE nuclear weapons program provides our Nation with a sound nuclear deterrent against foreign adversaries. The DoD and DOE, through the NWC, established an annual weapons production plan in the 1989-1994 NWSM that reflects tradeoffs made between new builds for new operational capabilities versus modifications and or replacements of the older systems that lack modern safety features. To assure continued progress in this area, a priority commitment must be made to meet the needs of scheduled as well as ongoing surety program improvements. A list of those programs/activities directly applicable to nuclear surety of the stockpile follow:

SRAM II/W89, which will replace the SRAM A/W69 system that stands alert.

The B83 production schedule, which provides the continued retirement of the B28s.

ACM[EPW]/W61 schedule for which Phase 2A has been completed (Phase 3 is planned in the next few months) and will permit the removal of the B53 from standing alert.

B61 Stockpile Improvement Program, which replaces the B61-0,2, and 5s with B61-6,8, and 9s.

Continued production of B61-3,4s, as scheduled, permitting the retirement of B43s and B57s.

Completion of the factory retrofit of the B61-1 to the B61-7.

Produce sufficient W82s to replace aging W33 and W48 AFAPs.

Follow-on-to LANCE (FOTL) program.

B90 development program to assure replacement of the remaining B57s in stockpile.

In this time of necessary fiscal restraint, concerns exist with regard to the continuing availability of funding to fully support all of these programs, particularly in the face of many other competing high priority requirements. Both the DOE and DoD remain committed to supporting enhanced nuclear surety in the stockpile.

This will be accomplished after priority consideration of relative benefits of new warhead builds for new operational capabilities versus modernization of older systems in the stockpile and in recognition of the fiscal resources available versus the relative costs of these options. For the foreseeable future, resources - funding and production capacity - will determine the pace at which nuclear surety enhancements are introduced to the stockpile.