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April 30, 1987

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

Nuclear Weapons Surety

Annual Report to the President (U)

1986

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MEMORANDUM FOR THE PRESIDENT

SUBJECT: Joint DoD/DOE Annual Nuclear Weapons Surety Report

Attached is the joint Department of Defense/Department of Energy Annual Report to the President on Nuclear Weapons Surety for 1986. The report summarizes the progress during 1986 and discusses issues where appropriate. The Department of Defense and the Department of Energy will continue to emphasize improvements in the safety, security, and control of nuclear weapons.

Caspar W. Weinberger
Secretary of Defense

Date: 30 APR 1987

John S. Herrington
Secretary of Energy

Date: April 24, 1987

Attachment
As stated

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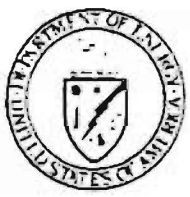
April 30, 1987

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

Nuclear Weapons Surety



Annual Report to the President

1986

Prepared by:
Safety, Environment and
Emergency Actions Division
Office of Military Applications
Department of Energy

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JOINT DEPARTMENT OF DEFENSE/DEPARTMENT OF ENERGY
ANNUAL REPORT TO THE PRESIDENT ON NUCLEAR WEAPONS SURETY, 1986

EXECUTIVE SUMMARY

At the request of the President, the Department of Defense (DoD) and the Department of Energy (DOE) report annually on the surety status of nuclear weapons. [redacted] 61 DOE

Both DoD and DOE have a number of programs underway to enhance the safety, security, and positive control of nuclear weapons and special nuclear materials. These include: (1) security facility upgrades; (2) installation of electronic intrusion detection systems; (3) nuclear weapon safety and use control improvements; (4) specific anti-threat personnel security training programs; (5) better inspection procedures; (6) improved, coordinated accident response capability; and (7) renewed efforts to work with our Allies to proceed with modernization of theater nuclear systems.

Significant efforts include:

The North Atlantic Treaty Organization-funded program for intrusion detection systems is continuing. U.S.-funded programs such as the Weapons Access Delay System, the Weapon Survivability and Security System, and the Supplemental Delay System are progressing. Also, the DoD's Long-Range Security Program is nearly complete. A joint study continues to evaluate and capitalize on new and emerging technologies beneficial to the survivability and security of the nonstrategic nuclear forces in the 21st century.

Both Departments are working together toward incorporating present-day, modern safety features into the stockpile, primarily by replacing older weapons with ones having improved safety features. In order to reduce the potential consequences of an accident, DoD will, to the extent feasible, continue to allocate weapons with modern upgraded safety features to those operations with the highest risk potential.

New plutonium limits were established for transportation of weapons by Air Force cargo aircraft and by DOE's Safe Secure

Trailers. The new limits result in fewer movements being required, thereby decreasing the probability of an accident resulting in plutonium scatter. The continued deployment of weapons utilizing insensitive high explosives provides the greatest improvement in this area.

The DOE continued its check-and-balance role for nuclear weapons and weapon systems in the custody of the DoD. Design studies of the Short Range Attack Missile II (SRAM II), that maintain physical compatibility between the proposed warhead and the present SRAM missile system, are continuing. This approach provides a safety improvement option should the SRAM II system development be substantially delayed. DOE also completed concept and feasibility studies and initiated design development on accident-tolerant containers that could be used for transportation of nuclear weapons utilizing conventional high explosives. The use of these containers will lessen the concern of nuclear material dispersion in abnormal environments.

Continuing issues that were addressed in 1986 include the following:

Both Departments have been concerned about the risk of jet aircraft colliding with rotary wing aircraft used to transport nuclear weapons.

[redacted]

The DOE believes that a more permanent dual-agency national policy relative to the safety of nuclear weapon systems would better serve the program.

[redacted]

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DOE

The DoD and DOE recognize that the existence of nuclear weapon systems is necessary for national security and that extraordinary measures for the protection of the public health and safety are required. Significant progress has been made in nuclear surety during the last year and

[redacted]

TABLE OF CONTENTS

I. Introduction. At the request of the President, the Departments of Defense and Energy report annually on the status of the safety and security of nuclear weapon systems. The first joint report covered calendar year 1980 and provided comprehensive information for the new Administration; subsequent annual reports provided updates. [redacted] b1 DOE

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 Safety: Protection against accidental or unauthorized actions involving nuclear explosives which may result in detonation (high explosive or nuclear). This includes minimizing the possibility of dispersal or release of hazardous radioactive materials in order to preclude endangering public health.

1. Nuclear Explosive Safety: The protective measures taken against accidental or unauthorized actions involving nuclear systems which may result in a nuclear detonation.

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

C. Nuclear Weapons Use Control/Use Denial: Design features incorporated into nuclear warheads and their supporting delivery systems to inhibit unauthorized nuclear detonation and system features or procedures which prevent unauthorized launch, release, or arming of nuclear warheads.

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

The views of the Department of Defense are primarily contained in Section II and those of the Department of Energy are in Section III. Joint emergency response activities are provided in Section IV.

II. Department of Defense Programs

A. Security

1. Progress

a. Long-Range Security Program

(1) The Long-Range Security Program (LRSP) was initiated in 1975 to enhance security by upgrading guard forces and storage site facilities. The LRSP provides an integrated electronic intrusion detection system (IDS) around nuclear weapon storage sites, facilities for security forces, and improved lighting and communications.

(2) LRSP is complete at the two Army sites located in the Continental United States (CONUS). At North Atlantic Treaty Organization (NATO) sites, civil construction is complete at all but one Army site; construction there will be completed in late 1987.

(3) In NATO, installation of [redacted] U.S. prefinanced intrusion detection systems [redacted] has been completed. A NATO-funded program to provide an additional [redacted] systems at [redacted] GLCM sites, [redacted] airbases, and [redacted] Army sites is ongoing. One system being used as a prototype installation was completed in May 1986 and the remaining [redacted] systems are scheduled for completion in 1989.

(4) The Navy LRSP upgrade is complete. All electronic installations and civil construction planned under the program have been completed and certified. Additional modernization is taking place at sites which were completed early in the program. [redacted]

(5) The Air Force continues to upgrade security under the LRSP in Europe and in the CONUS.

(a) At Air Force aircraft main operating bases (MOBs) in Europe, [redacted] weapon storage areas (WSAs) have been upgraded with exterior sensor systems, closed-circuit television (CCTV) systems on the perimeter, and by replacing interior sensors on the storage structures and maintenance facilities. Installation of interior sensors on maintenance facilities and storage structures is well underway at the last two WSAs and should be completed in 1987.

(b) [redacted] Ground Launched Cruise Missile (GLCM) MOBs have achieved initial operational capability (IOC). [redacted] of the bases are in permanent facilities with exterior and interior sensors and CCTV and have missiles stored in semihardened shelters. The other [redacted] bases achieved IOC in interim facilities which meet DoD security standards.

(c) In the CONUS, introduction of new weapon systems such as the Air Launched Cruise Missile, the B-1 Bomber, and the PEACEKEEPER missile has resulted in numerous continuing upgrades to WSAs and bomber alert areas within the Strategic Air Command (SAC).

b. The Access Delay Improvements

(1) A variety of access delay improvements have been, and continue to be, developed. These systems are designed to delay unauthorized access to stored nuclear weapons until a backup response force can be employed. As storage sites vary in physical characteristics, the access delay systems are tailored to specific site security needs and supplement the LRSP.

[redacted]

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(3) The Supplemental Delay System (SDS) is programmed for European sites (on a site-by-site basis) to complement LRSP and WADS. SDS will provide additional delays to intruders and provide increased protection of security forces. Examples of SDS devices are anti-helicopter poles, large concrete blocks in front of storage igloo doors, and concrete fighting positions. All Army sites in Europe have been surveyed to develop specific requirements. The U.S. prefinancing statement was sent to NATO in July 1986, and initial construction contracts were awarded in October 1986.

[redacted]

c. Other Initiatives

[redacted]

b3 DOE

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(2) Security Force Training. Improved training for nuclear weapons security forces continues to be of major importance; the goal being to provide the most realistic training possible within necessary safety and OPSEC considerations. Revised DoD directives will make force-on-force security training mandatory. This force-on-force training consists of free play scenarios using multiple integrated laser engagement system (MILES) equipment. Concurrent with the planning for this force-on-force training, new enhanced MILES equipment is being developed which will meet the special applications unique to this type of training. All Services are planning to conduct this training either at active sites or at mock-up sites.

[redacted]

b3 DOE

(4) Future Look

(a) There has been a continuing effort through joint DoD/DOE studies to assess the safety, security, and survivability of nuclear weapons. During the 1976-1979 period, the Forward Look study was completed and identified needed improvements to the safety, security, and survivability of the nuclear weapons in NATO in the 1980-1990 time frame. Many of the recommendations have since been implemented; others are currently under development. For example, WADS was a result of this study.

(b) A follow-on study, called Future Look, has been initiated to look beyond current activities and to capitalize on new and emerging technologies beneficial to the survivability and security of the nonstrategic nuclear forces (NSNF). The goal is to provide a basis for a survivability and security posture for the twenty-first century. All elements and aspects of the forces are open to consideration. Thus far, several concepts and technologies have been identified, and their feasibility and applicability are now under study. This work is endorsed and monitored by the DoD NSNF Survivability Steering Group and has been briefed to the Senior Level Weapons Protection Group of NATO's Nuclear Planning Group.

(5) Strategic Air Command Security Upgrade Program. This program will provide improvements in security of strategic alert aircraft, command and control, facilities, strategic reconnaissance aircraft, and flightline complexes. It includes building taxiway barriers at bomb alert areas to protect against a Beirut-type bombing incident, providing protective/obscuration screening for bomber alert aircraft, and erecting additional fences around critical areas. In 1986, the initial operational test and evaluation was completed on the taxiway barriers.

2. Appraisal. Security of nuclear weapons is always of great concern because of the weapons' political and military importance, the consequences of the loss of a weapon, and the terrorist threat. The nuclear weapons security posture on land continues to improve as the LRSP and installation of the access delay system progress. The other new initiatives mentioned will enhance nuclear weapons security on land even more. The security posture at sea remains as it was last year when the security environment for nuclear weapons at sea met minimum standards.

B. Nuclear Safety

1. Progress

a. Nuclear Detonation Safety. During 1986, the overall detonation safety of the nuclear weapons stockpile continued to improve. [redacted]

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DOE

[redacted] Deployment of the Ground Launched Cruise Missile, the PERSHING II, and the TOMAHAWK Cruise Missile systems continued and deployment of the new PEACEKEEPER ICBMs began. All of these new bombs and warheads for the missile systems contain modern nuclear detonation safety features. [redacted]

Emphasis continues on safety studies and unauthorized launch analyses. During 1986, the Navy Nuclear Weapon Safety Program directive was revised to provide a clearer definition of the program. The Army convened the PERSHING Unauthorized Launch Analysis Committee to assess possible changes in system vulnerability. The Air Force completed an unauthorized launch analysis on the PEACEKEEPER and started another on changes to the Ground Launched Cruise Missile system. The resulting recommendations have been, or will be, incorporated in safety rules, technical publications, and procedures.

b. Radioactive Material Dispersal

(1) All nuclear warheads contain radioactive material. Any event that causes the detonation of the high explosive in these weapons could result in radioactive contamination of the surrounding area. The traditional approach to this potential problem has been to exercise careful control of all nuclear weapon operations to prevent accidents and to provide a secure environment that precludes attacks by adversaries. This effort has been successful; no radioactive material dispersal incidents have occurred since 1968.

(2) The greatest improvement in radioactive material dispersal safety is in the use of new insensitive high explosive (IHE), which resists detonation in accident environments. [redacted]

(3) The Joint DoD/DOE Plutonium Dispersal Steering Group completed its task of determining limits for both the storage and transportation of nuclear weapons containing plutonium. [redacted]

destination points. [redacted]

c. Helicopter Safety. The vulnerability of rotary wing aircraft to collisions with military jet aircraft flying at low altitudes has been highlighted by the last three Army operational safety reviews. Although USAREUR initiated positive action to reduce this vulnerability for U.S. aircraft, it was determined that this problem involves both U.S. and non-U.S. aircraft. On November 25, 1986, DOE addressed this issue in a letter to the Assistant to the Secretary of Defense for Atomic Energy (ATSD(AE)). The ATSD(AE) is investigating the severity of the issue and will initiate appropriate corrective action. [redacted]

e. Nuclear Safety Studies and Operational Safety Reviews. During 1986, 11 nuclear weapon system safety studies (2 Army, 3 Navy, and 6 Air Force) and 9 operational safety reviews (2 Army, 6 Navy, and 1 Air Force) were conducted. Recommendations to improve safety were provided to Service Headquarters. All the Services have developed a reporting process that periodically provides the status of study and review findings to appropriate agencies within both Departments.

f. Nuclear Weapon System Safety Rules

(1) Nuclear weapon system safety rules govern all operations with nuclear weapons. They provide the procedural safeguards necessary to ensure that the weapon system meets DoD nuclear weapon system safety standards. Safety rules are developed during formal safety studies or reviews conducted by safety study groups made up of specialists from the military department fielding the weapon system, the DOE, and the Defense Nuclear Agency (DNA). Before they become effective, these rules are approved by the cognizant military department, coordinated with the DNA, approved by the Joint Chiefs of Staff (JCS), coordinated with the DOE, and finally approved by the Secretary of Defense.

(2) During 1986, the Secretary of Defense approved safety rules for four new nuclear weapon systems

(PEACEKEEPER, B-1B, Common Airborne Launch Control System (ALCS), and ALCS Phase II) and revisions to safety rules for 12 existing nuclear weapon systems (NIKE HERCULES, PERSHING 1a, TOMAHAWK, TRIDENT, ASROC, F-4, F-16, GLCM, and four Minuteman systems). A brief description of each follows:

(a) The PEACEKEEPER weapon system safety rules allow operation of the weapon system with the W87 warhead and Mk21 reentry system.

(b) The safety rules for the B-1B weapon system permit operations with the B61-0, -1, and -7 and the B83 bombs, as well as the Short Range Attack Missile.

(c) The Common ALCS safety rules allow operation of airborne launch control centers in support of the Minuteman and PEACEKEEPER weapon systems.

(d) The ALCS Phase II safety rules allow operation of interim airborne launch control centers in support of the Minuteman and PEACEKEEPER weapon systems. The ALCS Phase II system will span the period between the previous ALCS and completion of full transition to the Common ALCS.

(e) The revised NIKE HERCULES rules allow the use of modified W31 Mod 3 warheads that have enhanced safety and use control features.

(f) The PERSHING 1a safety rules were revised to incorporate recommendations that provide additional protection against certain unauthorized launch scenarios.

[redacted]

(h) The safety rules for the TRIDENT I weapon system were expanded to allow verification testing of the fire control system.

(i) The safety rules for the ASROC weapon system were expanded to allow use of an updated fire control system.

(j) The F-4 safety rules were updated to delete references to the B43 bomb and the F-4C aircraft, revise terminology, include the revised DoD Nuclear Weapon System Safety Standards, and clarify the requirement that all technical orders used with the system be USAF-approved.

(k) The F-16 safety rules were changed to add the F-16C/D weapon system, revise terminology, include the

revised DoD Nuclear Weapon System Safety Standards, and clarify the requirement that all technical orders used with the system must comply with the safety rules.

(l) The revised GLCM safety rules increase survivability in the dispersed mode by allowing more flexibility in accordance with a newly developed system operational concept. The revision enhances operations without detracting from compliance with safety and security requirements.

(m) The revised safety rules for the Minuteman weapon systems incorporate guidelines for complying with new DoD standards for security and incorporate provisions to allow production of code materials used in the Minuteman systems on the Wing Code Processing System (WCPS). The WCPS was designed intially for the PEACEKEEPER weapon system.

2. Appraisal. Significant progress was made in nuclear safety during 1986.

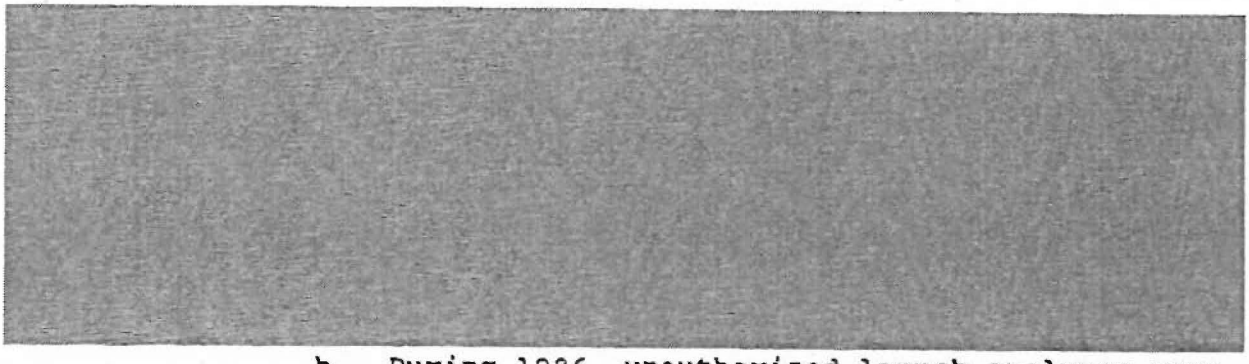
a. Recommendations from nuclear safety studies and operational safety reviews were implemented via hardware, software, procedural, and safety rule changes. The Navy issued its safety rules in an approved directive format. These changes not only enhance overall nuclear safety but also reduce the potential for unauthorized launches.

b. New plutonium limits were established for transportation.

c. The deployment of new weapons with modern safety features and retirement of old weapons enhanced the overall safety of the nuclear weapon stockpile.

C. Use Control

1. Progress



b. During 1986, unauthorized launch analyses were completed as described in the Safety Section. In response to a special study on the W33 Artillery Fired Atomic Projectile (AFAP)

completed in 1986, the DoD requested DOE to conduct a Production Impact and Cost Assessment of use control enhancement options.

c. There has been increasing emphasis on defining use control requirements for the Small Intercontinental Ballistic Missile and for the B-1B/SRAM II system. Various options are in the respective Phase 2A study requirements. Another significant use control application initiative is the enhancement of the W82 PAL feature.

d. DoD is drafting a proposed directive on use control. When issued, this directive will provide a comprehensive policy statement on use control of nuclear weapons and will provide a means for continuing assessment of use control application.

e. A new joint DoD/DOE Use Control Project Officers Group has been established and will review use control application.

2. Appraisal. Implementation of improved use control measures continued in 1986.

D. Personnel Reliability Program

1. Progress. Every individual assigned to a nuclear duty position must be formally certified in accordance with the standards of the Personnel Reliability Program. This certification is given only after a review of personnel records, a favorable medical evaluation, an interview by the certifying official, and completion of a required security investigation. Strict adherence to this policy continued and resulted in the DoD having a total of 97,693 certified personnel in the program in 1986. A significant strength of the program is that the certification process is continuous. Continued observation and evaluation of each individual is required; this resulted in 2,530 personnel (2.59 percent) being permanently decertified in 1986. The percentage of decertifications has steadily declined from 4.95 percent in 1982. We believe this can be attributed to the rise in the quality of our armed forces and the improvement and impact of drug testing policies and procedures.

2. Appraisal. Review of the effectiveness of the Personnel Reliability Program through technical inspection programs and oversight visits continues to assure that the program is providing excellent results. We continue to look to personnel security research for new methods of enhancing the suitability and reliability of personnel who perform nuclear weapon related duties.

E. DoD Nuclear Weapons Technical Inspection Program

1. Progress

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

b. Three methods intended to provide a better assessment of nuclear-capable units and the NWTI system were continued during the 1986 period. These were:

(1) Short-notice NWTIs.

(2) DNA surveillance of Service-conducted inspections.

(3) DNA evaluation of security measures.

c. DNA initiated surveillance inspections of Navy shore-based units. Efforts are in process to expand the surveillance agreement to include all Navy and Marine Corps units.

d. The Air Force and Navy have continued their respective Minimum-Notice NWTI programs. The Army conducted Minimum-Notice Physical Security Inspections of nuclear storage sites during 1986.

e. At the request of the Office of the Under Secretary of Defense for Policy, the issues of use of deadly force and experience level of nuclear weapons technicians were subjectively evaluated in conjunction with Defense Nuclear Surety Inspections. Evaluation results were favorable in both areas.

f. In May 1986, a working level symposium was held at Kirtland Air Force Base, Albuquerque, New Mexico, to review the current NWTI system as outlined in Technical Publication (TP) 25-1, "DoD NWTI System." The overall theme was "Whether the Services and DNA have the tools to identify the fundamental causes of NWTI failures and the mechanisms to take corrective action when necessary." Symposium attendees felt that the Services and DNA do identify the fundamental causes of NWTI failures at the lowest levels.

g. DNA inspection teams began an aggressive liaison program in 1986. The purpose of the program was to exchange information, coordinate, and accomplish the JCS goal of standardizing the DoD NWTI system between DNA and the Services. These visits, combined with the positive relationships established during the NWTI symposium, have had several benefical side effects. For example, the Navy has made procedural changes which begin to standardize its fleet inspection program.

h. Although tasking exists for providing information on the DoD NWTI program to the Office of the Secretary of Defense, the JCS, and the Services (DoD Directive 5105.31, TP 25-1, and DNAI 5100.16A), the specific information required is not defined. The adoption of "like" unit categories in 1985 was the first step in the effort to provide timely, relevant information to DoD and JCS. Introduced in 1986, the concept of generic subcategories, keyed to the ten primary inspection areas of TP 25-1, will permit the evaluation of potential systemic problems.

2. Appraisal

a. The DNA continues to inspect [redacted] percent of each Service's certified nuclear-capable units annually. The number of service-certified, nuclear-capable units subject to Defense Nuclear Surety Inspections (DNSIs) during the period was [redacted] Following correction of noted deficiencies and, in some cases, reinspection by the Service involved, none of the units rated UNSATISFACTORY was decertified from performing its wartime mission.

b. Significant improvements were made in the NWTI program at all levels during 1986. Working relationships, standards, and information exchange have improved markedly. Continued efforts in these areas through the planned triennial NWTI symposium ensure high levels of nuclear surety.

III. Department of Energy Programs

A. DOE Responsibilities for Nuclear Surety

1. Dual-Agency Responsibility

a. Institutional arrangements between the Department of Defense and the Department of Energy, under a concept known as "dual-agency judgement and responsibility," were reaffirmed and codified in early 1983 by a DoD/DOE memorandum of understanding and were found in 1985 to be appropriate and working well by the President's Blue Ribbon Task Group on Nuclear Weapons Program Management. Responding to a task group recommendation,

[redacted]

Since this directive was issued primarily to establish the requirements for the 1986 Surety Report, the DOE believes that a more permanent dual-agency national policy relative to weapon safety would be helpful.

b. In monitoring the Services' nuclear weapon safety programs, as part of its dual-agency responsibility, the DOE notes that progress has been made in responding to recommendations generated by the Nuclear Weapon Safety Study Groups (NWSSGs) in accordance with DoD Directive 3150.2. DOE weapon safety personnel will continue their monitoring role to insure appropriate implementing actions by the Services.

2. Department of Energy Role. DOE has the primary responsibility for identification, design, development, and implementation of the nuclear weapon hardware features that provide assured nuclear safety and use control. It has an active program for developing technology to enhance physical security and for implementing improved physical security at DOE facilities. This technology is shared with the DoD for use at its facilities. High-level oversight of nuclear surety issues is provided by the DOE Safety, Security, and Control (S^2C) Committee. DOE provides members to two joint DoD/DOE safety groups, the Services' NWSSGs, and the joint DoD/DOE Plutonium Dispersal Steering Group.

B. Physical Security for Nuclear Facilities

1. Goals/Requirements. The continuing goal of the Department's safeguards and security program is to provide balanced, cost-effective protection for nuclear weapons under the control of the DOE. To date, the generic threat policy statement issued in January 1983 has been the baseline for developing, implementing, and testing our protection programs. The threat statement will continue to serve as a major element in our safeguards and security program; however, the Department is now considering an assessment of risk and consequences (in addition

to the threat statement) as the basis for the development of its protection strategy. The objective of this new approach is to strike a balance between inherent risk and incremental costs associated with additional protection measures. The DOE believes this can best be accomplished through the development of Master Safeguards and Security Agreements (MSSAs) which will define protection requirements on a site-specific basis and serve as major DOE policy instruments as well. It is anticipated that MSSAs will be in effect for all major DOE nuclear installations of national security significance by the end of 1988.

2. Improvements/Upgrades. DOE facilities and operations which protect assembled nuclear weapons and nuclear test devices consist of the Pantex Plant in Amarillo, Texas; the Nevada Test Site (NTS) in Mercury, Nevada; and the nuclear weapons transport operations administered through Albuquerque Operations Office's Transportation Safeguards Division (TSD). During 1986, the Department continued to make excellent progress toward improving the protection posture for these facilities and operations as efforts to complete short-term improvements and long-term major construction projects continued at an aggressive pace. However, countering today's perceived threat is difficult, costly, and time-consuming, especially when attempting to effectively upgrade the 35-40 year-old Pantex and NTS facilities. It will require several years to complete ongoing construction projects and implement enhanced insider protection measures. In this regard, the Department continues to work hard to develop and implement an insider protection program which will include elements such as human reliability, additional security measures, compartmentalization of operations, and procedural enhancements. Even when the construction projects are completed in the 1987 to mid-1990 time frame and enhanced insider protection measures are implemented, the Department will never be completely satisfied with the protection programs at Pantex and NTS, nor can we afford to relax. The Department is committed to an efficient safeguards and security program designed and operated to prevent acts of theft or sabotage which could disrupt or endanger the Nation's nuclear weapons stockpile or threaten public health and safety.

Highlights of major upgrades for these facilities, TSD operations completed in 1986, and planned improvements are discussed below. A more detailed review of these facilities and operations is contained in the DOE Annual Report to the President on Domestic Safeguards and Security.

a. Pantex Plant - Amarillo, Texas

(1) Description. The mission of the Pantex Plant is to fabricate chemical explosives, assemble nuclear weapons, and perform weapon operations such as modification, repair, quality testing, and disassembly.

(2) Highlights - 1986.

(a) Began incorporating approximately 800 personnel (including security inspectors) into the Personnel Assurance Program; completion is expected by June 1987.

(b) Completed the transfer of all weapons assembly/disassembly operations to more modern, hardened facilities.

(c) Developed and implemented an automated tracking system using bar code technology for weapon assemblies, subassemblies, and classified components. This system allows bay-to-bay tracking of all special nuclear material components at the Pantex Plant.

[redacted]

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(3) Planned Upgrades

(a) Complete an MSSA for safeguards and security interests at the Pantex Plant.

(b) The DOE is proposing a new FY 88 construction project (88-D-123) to further enhance the protection posture at Pantex. The project will provide for enhancements to the existing Perimeter Intrusion Detection and Assessment System; improved access controls, training facilities, and Special Nuclear Material (SNM) control and accounting systems; an enhanced helicopter deterrent system; and a new Weapons Special Purpose Bay Replacement Complex.

b. Nevada Test Site - Mercury, Nevada

(1) Description. The NTS serves as the United States nuclear explosive test facility. Test device assembly operations of both weapons design laboratories, Los Alamos National Laboratory and Lawrence Livermore National Laboratory, are carried out at the NTS. Nuclear explosive components are brought on-site via a Safe Secure Trailer.

[redacted]

(2) Highlights - 1986.

(a) The new hardened Security Control Center in the Area 6 Command Post Complex was completed and is now operational.

(b) Completed construction of a new Security Force Training Center.

(c) Components of the Sandia Acoustic Low-Altitude Aircraft Detector were installed and are undergoing evaluation.

(3) Planned Upgrades.

(a) Complete an MSSA for safeguards and security interests at NTS.

(b) Complete the Device Assembly Facility under construction project 85-D-105. The new facility will satisfy all security, safety, and operational requirements through the 1990s.

c. Transportation Safeguards Division (TSD) - Albuquerque, New Mexico.

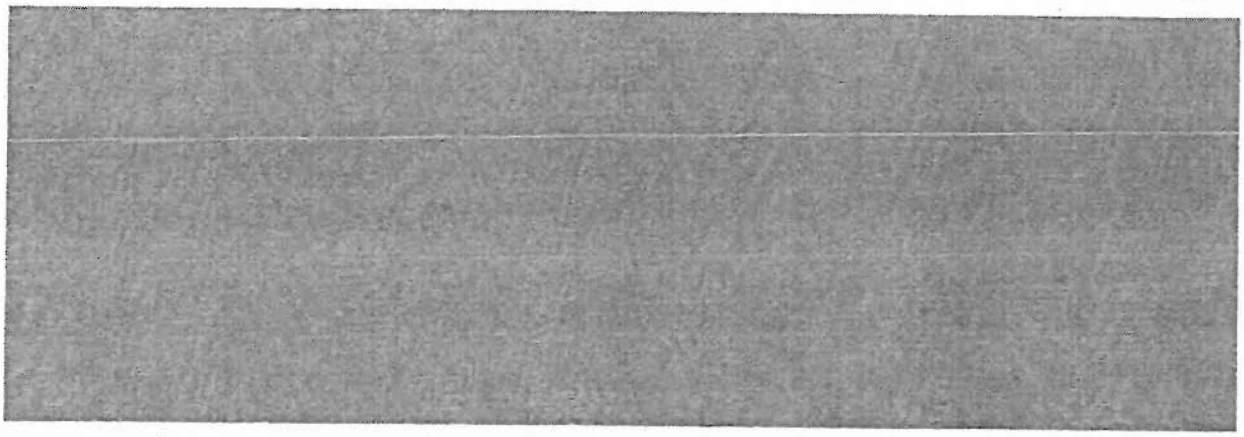
(1) Description. The TSD, using a fleet of specially designed highway and rail transport vehicles, moves large quantities of government-owned SNM and all complete nuclear explosives over public highways and railways throughout the continental United States. DOE-owned, contractor-operated aircraft are also used to transport selected SNM. Resources for the TSD include:

[redacted]

(2) Highlights - 1986

(a) As previously discussed in the DoD section, the plutonium limits were raised for highway nuclear weapons shipments, thereby significantly enhancing safety and security of this mode. This action also allows the DOE to minimize the future use of special trains which have been the target of numerous antinuclear demonstrations.

[redacted]



(3) Planned Upgrades

(a) Complete an MSSA for safeguards and security interests under TSD operations.

(b) Complete installation of the SECOM III system in the remainder of the TSD fleet.

3. Technology Research and Development (R&D). The DOE Physical Security R&D program had its beginnings in the mid-1960s when concerns were first expressed regarding the terrorist threat. The original effort -- aimed at developing a security system for the transportation of nuclear weapons and special nuclear materials -- eventually resulted in the development of the Safe Secure Trailer. In the early 1970s, the Air Force Base and Installation Security System program funded DOE to evaluate intrusion sensors and conduct systems studies. The DOE Fixed Facility Security R&D program was initiated in the mid-1970s with the objective of providing a technology base to upgrade the protection at sensitive DOE installations. In the late 1970s and early 1980s, this technology base was used to develop and implement security systems at a number of DOE facilities. The present thrust is to address the insider threat, reduce operational impact and costs, and provide relief from manpower-intensive systems. Since many of the results have widespread applications, the DOE-sponsored R&D program is coordinated with DoD and other agencies to ensure there is no unnecessary duplication of effort. Highlights of 1986 work are as follows:

a. Systematic Assessment of Vulnerability to Intrusion (SAVI) and Safeguards Evaluation Tool (ET). User-friendly computer models have been developed that enable an analyst to conduct a rapid assessment of vulnerability to outside and inside attacks. Both SAVI and ET are currently being taught at DOE's Central Training Academy as part of the MSSA program.

[redacted]

c. Insider Threat.

[redacted]

d. Entry Control.

[redacted]

e. Intrusion Detection.

[redacted]

f. Display Technology.

[redacted]

g. Airborne Threat Assessment.

[redacted]

h. Security Communications.

[redacted]

[redacted]

i. Security Robotics. [redacted]

C. Weapon Safety and Use Control

1. Goals/Requirements. 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 as a warhead or bomb mated with the delivery system and standing alert. For each configuration, nuclear weapon system safety studies and reviews are periodically required; they are always required before a proposed operation on, or involving, a nuclear weapon may be undertaken.

a. Weapon Safety. The goal of the Nuclear Weapon System Safety process, as stated in DoD Directive 3150.2, is to provide "... maximum safety consistent with operational requirements" throughout the stockpile-to-target sequence (STS). The DoD and DOE have separate, but similar, sets of safety standards which prescribe positive measures to be taken to attain maximum safety (and security). Although the safety standards are qualitative in nature, each safety rule or procedure which is developed must be measured against them.

The criteria that specify the minimum degree of nuclear safety to which the nuclear weapon must conform are expressed quantitatively in risk (probability) terms in the Military Characteristics (MCs). MCs contain requirements similar to the following:

The probability of a premature nuclear detonation of a warhead due to warhead component malfunctions shall not exceed: [redacted]

These quantitative requirements have been a part of all MCs since early 1968.

b. Use Control. The goal of use control is to provide U.S. national leadership high assurance that nuclear weapon systems can be nuclearly detonated only if authorized by the National Command Authorities. To achieve this, permissive action links (PALs) have been incorporated in selected weapons since the early 1960s. Category B through F PALs are code-controlled locks incorporated in the weapon electrical system.

[redacted] b3 DOE

2. Weapons Systems Review

a. Stockpile (Post-Production) Concerns/Status

(1) Stockpile Improvement Program (SIP)

(a) [redacted] b3 DOE

[redacted] b3 DOE

(b) [redacted] b3 DOE

Production of the retrofit kits started in 1985 and was completed in 1986.

[redacted] b3 DOE

(c) [redacted] b3 DOE

[redacted] b3 DOE

(d) [redacted] b3 DoE

These bombs will receive nuclear detonation safety upgrades, IHE, improved use control, and command disable features. Both DOE and DoD agree that older nuclear-certified aircraft (designed to utilize these bombs) would take full advantage of these safety features if a [redacted] (See the discussion in the nuclear depth/strike bomb (ND/SB) section -- subparagraph (3), page 23). [redacted] b3 DoE

(2) Other Stockpile Weapons

[redacted] b3 DoE

[redacted]

(c) W50. A joint Army/DOE study has determined that it is technically feasible to modify existing W85 nuclear warheads [redacted] for use on PERSHING 1a missiles. A modified W85 would still retain its compatibility with the PERSHING II or PERSHING 1b missiles if a later decision is made to retire all PERSHING 1a missile systems. The Army and the DOE are currently conducting a Production Impact and Cost Assessment study of converting some W85 warheads to this configuration for use with PERSHING 1a missiles. No new production of W85s is anticipated to support this plan.

(d) [redacted] b3 DoE

[redacted]

[redacted]

b. Production Status

[redacted]

(2) W79. Production of the W79 AFAP was completed in 1986. This system incorporates [redacted] b3 DOE The design of an accident-tolerant transportation container to reduce the likelihood of a plutonium scatter accident has been initiated by the DOE.

(3) W87. The W87 nuclear warhead for the PEACEKEEPER intercontinental ballistic missile began entering the stockpile in 1986. Modern nuclear detonation safety features, [redacted]

(4) Other Production. Production continues on the B61-3,-4 and B83 nuclear bombs, W80-0, -1 nuclear warheads for the sea- and air-launched cruise missiles, and the W84 nuclear warhead for the ground-launched cruise missile. [redacted]

c. Development

(1) W82. The W82 APAP entered the production phase in 1986. This system will replace the W48 APAP. The design includes [redacted] b3 DOE

[redacted] The design of an accident-tolerant transportation container to reduce the likelihood of a plutonium-scattering accident has been initiated by the DOE.

[redacted]

[redacted]

[redacted]

(4) Short Range Attack Missile II (SRAM II). Phase 2 for a nuclear warhead for the air-to-ground SRAM II, carried by strategic aircraft, was completed in 1986, and Phase 2A has been initiated. SRAM II is a replacement for the W69/SRAM A weapon system. The baseline SRAM II warhead incorporates [redacted] It is DOE's intent that the SRAM II warhead maintain physical compatibility with the present SRAM missile. This will allow redirection of the development program into a W69 replacement program, should the SRAM II be cancelled or its introduction be substantially delayed.

(5) Small Intercontinental Ballistic Missile (SICBM). Phase 2 for a nuclear warhead for the SICBM was completed in 1986, and Phase 2A is underway. The SICBM warhead will be virtually identical to the W87 design [redacted] but use control features will be included.

d. Weapon System Related Activities

(1) DCU-254. Production of this new aircraft monitor and control (AMAC) system controller for the F-111E aircraft has started with the first aircraft modification scheduled for 1987. This program will equip all F-111E aircraft with a capability to unlock [redacted] and to provide a unique prearming signal. The latter is required to fully realize the enhanced nuclear detonation safety designed into modern nuclear weapons. After completion of this program and a similar one on the B52 aircraft, all Air Force nuclear-capable aircraft (except the F-111A, F-111D, and F-4 series) will have the cockpit unique signal generation capability.

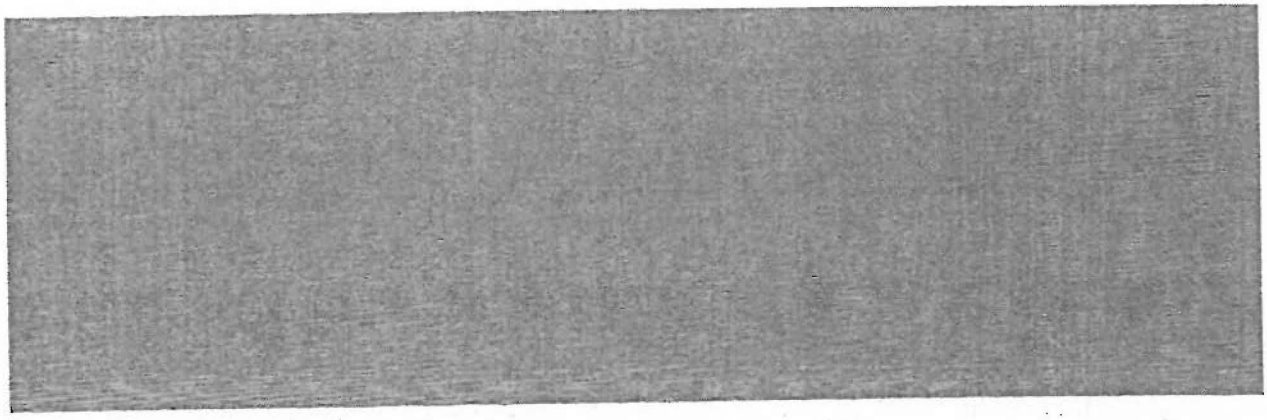
(2) Code Activated Processor (CAP). This new coded switch is a replacement for the [redacted] and will allow recode and verify operations to utilize cipher text rather than plain text Top Secret COMSEC data with its attendant security procedures and restrictions. The first applications of this new switch is scheduled for 1988 on the [redacted] immediately followed by the [redacted]

(3) Automated Code Handling. The European Command (EUCOM) automated PAL code handling system is nearing completion. This system will automate the PAL code management responsibilities in EUCOM and provide new capabilities as well. The final software capability of the T1565 automated PAL controller has been accepted by the DoD and will go into use in the spring of 1987. The T1565 Headquarters code processor was installed at EUCOM Headquarters at Patch Barracks, Stuttgart, West Germany, in January 1986, with limited capability; full capability will be available in the fall of 1987. The system will be fully capable for the next recode cycle.

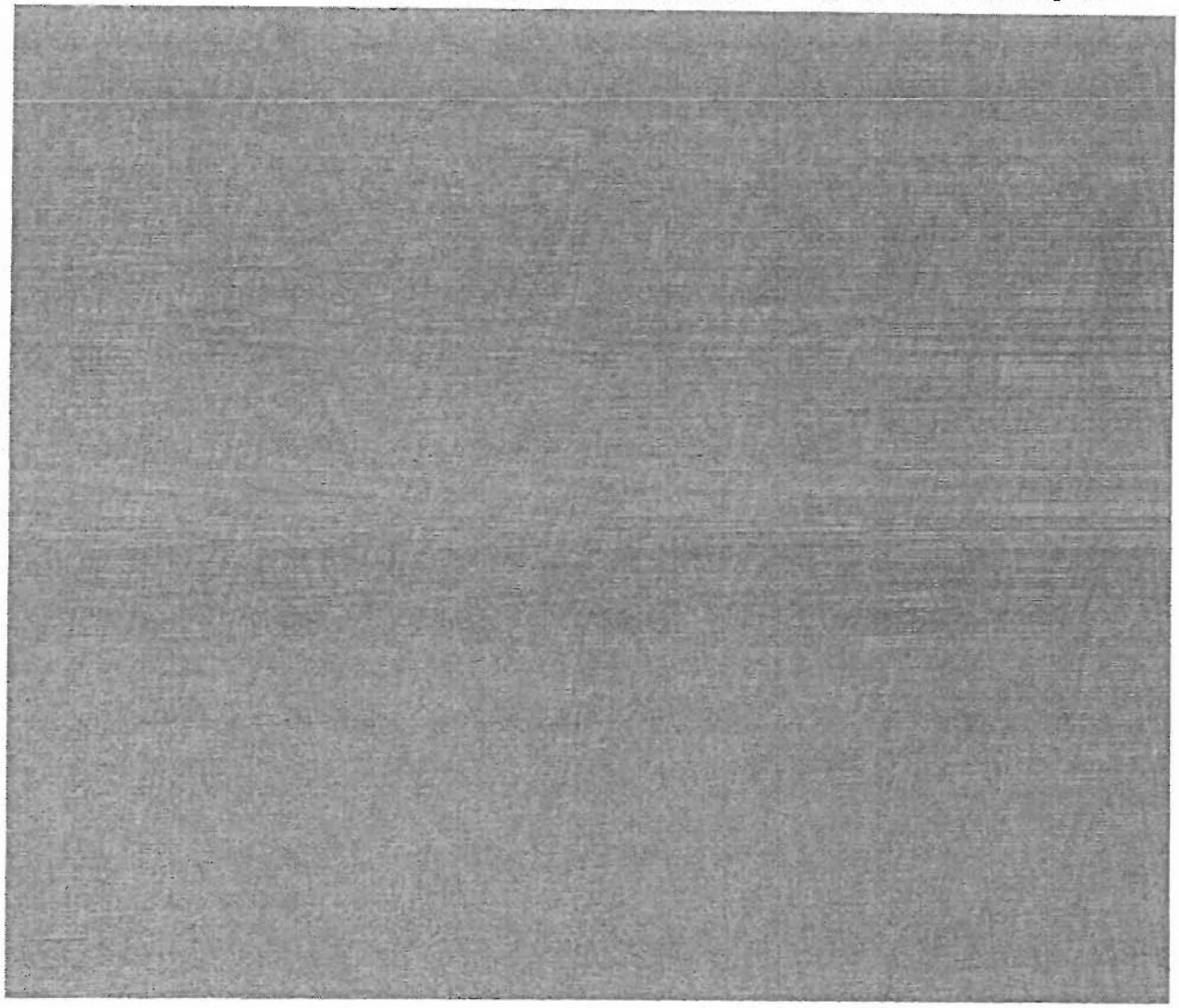
3. Technology Research and Development (R&D). The DOE has a continuing program of technology R&D at Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Sandia National Laboratories. These programs are aimed at improved and assured nuclear detonation safety, HE detonation/Pu scatter safety, and use control.

a. Insertable Nuclear Component. Safety of a nuclear weapon can be enhanced if the nuclear material used in a high-explosive-driven nuclear weapon can be physically separated/removed from the explosive and the weapon system during storage. Besides the obvious safety advantage derived from separating fissile material and high explosive, more effective command-disable techniques could be provided. Several techniques which readily combine the nuclear material and high explosive have been demonstrated to be feasible.

b. One-Point Safety. Nuclear weapons are required to be one-point safe; i.e., if the HE is detonated at any single point, the resulting nuclear yield must be less than four pounds TNT equivalent. This is generally determined by computer calculations which are verified by comparing predictions with past experimental data. In the past, a sufficiently accurate calculational sequence has been available only for two-dimensional geometry. Three-dimensional tools are being developed to address this safety feature for more complicated weapon geometries.



d. Stabilization of Fractured Explosives. The stabilization of the high explosive of a nuclear weapon that might be damaged as a result of an accident is required to ensure safe transportation and disassembly of a damaged weapon. In accident response exercises, NUWAX 81 and 83, available techniques and materials for stabilization were found to be ineffective. Since then, DOE developed a new technique that very effectively consolidates and desensitizes fractured explosives. A process has also been developed by which damaged weapons could be disassembled after having been stabilized by this technique.



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4. Safety Group Activities.

a. Nuclear Weapon System Safety Groups (NWSSGs). During 1986, DOE participated in 20 nuclear weapon system safety studies or operational safety reviews conducted by the Services'

NWSSGs. Problem areas addressed and actions taken on NWSSG recommendations are discussed throughout this report.

b. Nuclear Explosive Safety Study Groups. The DOE Nuclear Explosive Safety Program was very active during 1986. Forty-nine nuclear explosive safety studies and 24 nuclear safety surveys were completed during the year. A series of studies on the response to abnormal environments of all nuclear warheads currently being handled or processed at the Pantex Plant was completed in November 1986. These studies provided recommendations for improving the safety of operations at the plant. A 10-year warhead reevaluation program was instituted whereby each warhead will be restudied for nuclear explosive safety within successive 10-year periods until its retirement.

c. Safety, Security, and Control (S^2C) Committee. The S^2C Committee, composed of senior DOE and design laboratory officials, was convened three times during 1986. A review of the Rogers' Commission report of the Challenger accident was made and possible parallels between NASA and DOE experience were highlighted. A Sandia National Laboratories report, "A Review of the U.S. Weapon Safety Program, 1945 to 1986 (U)", was reviewed and endorsed. The committee continues its review of broad Defense Programs responsibilities for nuclear device or weapons safety and security, and the DOE dual-judgement, check-and-balance role for nuclear weapons and nuclear weapon systems in the custody of the DoD.

D. Personnel Assurance/Human Reliability Programs

1. Personnel Assurance Program (PAP). The DOE PAP continues to provide a high level of confidence that individuals performing nuclear explosive operations are very reliable and stable. Evaluations of the program during 1986 for all participating organizations -- production facilities, laboratories, and DOE -- confirmed that all programs were being well managed and were complying with DOE orders. The major change in the program during this past year was the addition of certain Pantex Plant personnel to the DOE PAP. These personnel were granted access to nuclear explosives, but were not authorized to perform hands-on operations. For many years, individuals with this type of access have been included in a seperate contractor-operated PAP.

2. Human Reliability Program (HRP). The proposed DOE HRP is a security-oriented effort to assist in dealing with what has become known as the "Insider Threat." The program is based on a two-level approach: (1) a specific position is identified as an HRP position, and (2) the position can only be held by an individual with a special Q(R) security clearance. In order to obtain an initial Q(R) clearance or annual clearance renewal, both management and medical staff must determine that the individual is suitable for the position, and the individual must undergo an appropriate security review. A draft directive has

been released for informal review by the operations offices and program offices; formal DOE review is anticipated in mid-1987.

E. Inspection and Evaluation

1. Description

a. The Office of Security Evaluations (OSE), reporting directly to the Assistant Secretary for Defense Programs, has the safeguards and security audit oversight mission for the DOE. The OSE conducts periodic performance-oriented inspections and evaluations of field operations offices, protection programs, and systems under their administration.

b. The objective of the OSE inspection program is to provide independent assessments of the effectiveness of safeguards and security (S&S) policy and protection programs through the conduct of management-level, performance-oriented analyses of the S&S systems at the DOE offices and facilities, as measured against the current DOE threat policy statement.

c. During 1986, the OSE conducted 13 inspections, including one reinspection; 22 sites were visited. Areas reviewed included: physical security systems, protection forces, systems performance tests, material control and accountability, safeguards and security survey program, protection program planning, computer security, personnel security, and information security.

2. Results

a. The OSE's net assessment is that the safeguards and security program is continuing to improve. Significant physical security enhancements are in place and the Department's protective forces' experience and capabilities are generally at a high level. The Department's ability to protect against overt theft or sabotage by outsiders is in most cases adequate. However, protection against knowledgeable insiders who might commit acts of theft, sabotage, or compromise of classified information requires continued attention and improvement.

b. Details of operations offices (and facilities) inspected and inspection ratings can be found in the DOE's quarterly reports on Domestic Safeguards and Security.

IV. Emergency Preparedness and Response

A. Preparedness for Weapon Accidents

1. General Assessment

a. In the event that a U.S. nuclear weapon is involved in an accident, DoD or DOE (depending upon custody at the time) will lead a joint response team. DoD and DOE are responsible for rendering nuclear weapons safe and for recovering classified material from the accident scene.

b. In accordance with the provisions of the Federal Radiological Emergency Response Plan, DOE is also responsible for directing the activities of the Federal Radiological Monitoring and Assessment Center, which coordinates the monitoring and assessment of radioactive contamination outside the area of the accident site and furnishes this information and guidance to state and local agencies. The Federal Emergency Management Agency (FEMA) is responsible for coordinating Federal support to state and local agencies. Significant progress in improving a coordinated Federal response to nuclear weapon accidents was made in 1986 through exercises and formal training.

2. Exercises and Training. Nuclear weapon accident exercises are conducted to evaluate the coordination between all participating Federal agencies, as well as to develop improved procedures for the interaction between those agencies and state and local government organizations. In 1986, exercises were conducted to test notification procedures, as well as the ability of a multiagency command and control structure to function effectively in an accident environment.

a. Exercises

(1) PREMIER TASK-86 (PT-86). This was a U.S.-only command post exercise (CPX) conducted in the state of Hawaii. It was the first joint DOE/DoD CPX to involve a nuclear weapon accident in the U.S. Pacific Command area of responsibilities. The exercise was coordinated by the Joint Chiefs of Staff and was sponsored by the Defense Nuclear Agency. PT-86 significantly improved accident response preparedness, planning, and coordination for both DoD and DOE teams.

(2) Service Response Force Exercise-86 (SRFX-86). SRFX-86 was conducted at the Savanna Army Depot Activity, Illinois. This was the second in a series of training exercises designed to improve the U.S. Army's capability to respond to a CONUS weapon accident. The exercise was a modified command post exercise that included recovery of damaged components. A major result of this exercise was a restructuring of the DOE Accident Response Group (ARG) command organization.

SRFX-86 also provided an opportunity for the ARG to work with the Army's Explosive Ordinance Disposal organization in field decontamination and packaging of large weapon parts.

(3) SAGEBRUSH IV. This nuclear weapon accident exercise was conducted at a remote site in northeastern Washington State. Exercise participants (in addition to DoD and DOE) included FEMA, Washington State, USAF/SAC, and local emergency response organizations. This field exercise provided an opportunity for the joint DOE/DoD crisis management and technical organization to interact with local, state, and regional civilian organizations in accordance with the Federal Radiological Emergency Response Plan.

(4) HUMBLE SERVANT. This was a DOE-sponsored operational effectiveness exercise designed to evaluate the response preparedness of the DOE to an attack on a Safe Secure Trailer. Joint DOE/DoD exercise participants planned and carried out an armed attack, using MILES gear, on a DOE convoy to evaluate DOE courier response and subsequent integration of Federal resources (Nuclear Emergency Search Team, ARG, Federal Bureau of Investigation (FBI), and FEMA) with local law enforcement agencies.

[redacted]

b. Training. The capabilities of the DoD and DOE for responding to a nuclear weapon or component accident are maintained through effective training programs conducted individually and jointly. The training activity in 1986 consisted of classroom and field training for the response elements. DoD, DOE, and the Department of State continued a program to provide information and guidance for embassies worldwide on their contingency plans regarding response to an accident involving nuclear weapons. The DoD is providing assistance to institutionalize a training program for U.S. Ambassadors, Deputy Chiefs of Mission, and Foreign Service personnel in each country involved.

3. Response Capabilities

a. Accident Response Group. The ARG consists of a group of DOE nuclear weapon specialists who maintain a positive, continuing capability to provide immediate response to peacetime accidents and significant incidents involving nuclear weapons. The ARG program has successfully incorporated nationwide DOE emergency preparedness and response resources into plans and operations. In particular, Nevada and Albuquerque Operations Offices have entered into cooperative management agreements to identify and make available unique DOE assets to support the ARG

mission. DOE regional Radiological Assistance Program personnel and equipment have also supported ARG exercises in the continental United States.

b. Atmospheric Release Advisory Capability (ARAC)

ARAC is a DOE- and DoD-supported real-time emergency response system designed to estimate the environmental and public health consequences of an accidental release of radioactive material. Seven DOE and 42 DoD facilities are presently connected directly to the system through a computer network. ARAC supports the DOE NEST and ARG organizations and would also be used to help estimate consequences from accidents at U.S. civilian facilities and foreign nuclear accidents (e.g., Chernobyl) that have potential effects on the health of U.S. citizens.

c. Nuclear Emergency Search Capability

(1) The Nuclear Emergency Search Team (NEST) is a joint DOE/DoD organization. [redacted]

(a) In 1986, the NEST conducted small exercises and training programs to improve command and control of its field organization and to evaluate technical advancements in equipment and command and control. A tabletop multiagency exercise called HUSHED BRASS was held at the Joint Analysis Directorate at the Pentagon in September 1986, to integrate field operations with Washington-level management.

(b) In December 1986, the NEST exercise, MIGHTY DERRINGER, was held simultaneously in Washington, D.C., at the Nevada Test Site [redacted], and in Indianapolis, Indiana. This 12-day exercise included participation by the DOE, DoD, Department of State, FBI, Central Intelligence Agency, FEMA, and the National Security Council. [redacted] provided an opportunity to exercise and evaluate interagency coordination of field resources and Headquarters operations on a national level. This exercise involved approximately 1,000 participants from all agencies.

[redacted]

4. Significant Initiatives with Allies

[redacted]

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DoE

B. Accidents and Significant Events.

[redacted]

DoE
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C. Threats. The DOE Communicated Threat Credibility Assessment program averages about 40 inquiries per year ranging from data base searches to credibility assessments of nuclear threats and attempted "black market" nuclear material sales. There were seven nuclear extortion threats against U.S. cities or facilities reported in 1986. All seven were analyzed and deemed not credible.

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