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**AIR FORCE CIVIL ENGINEERING CENTER
FISCAL YEAR 1978
TECHNICAL OBJECTIVE DOCUMENT**

**DIRECTORATE OF PROGRAMS AND RESOURCES
PLANS AND PROGRAMS DIVISION**

15 DECEMBER 1976

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**AIR FORCE CIVIL ENGINEERING CENTER
(AIR FORCE SYSTEMS COMMAND)
TYNDALL AIR FORCE BASE
FLORIDA 32403**

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This document has been reviewed and is approved.


ROBERT E. BRANDON, GS-15
Technical Director

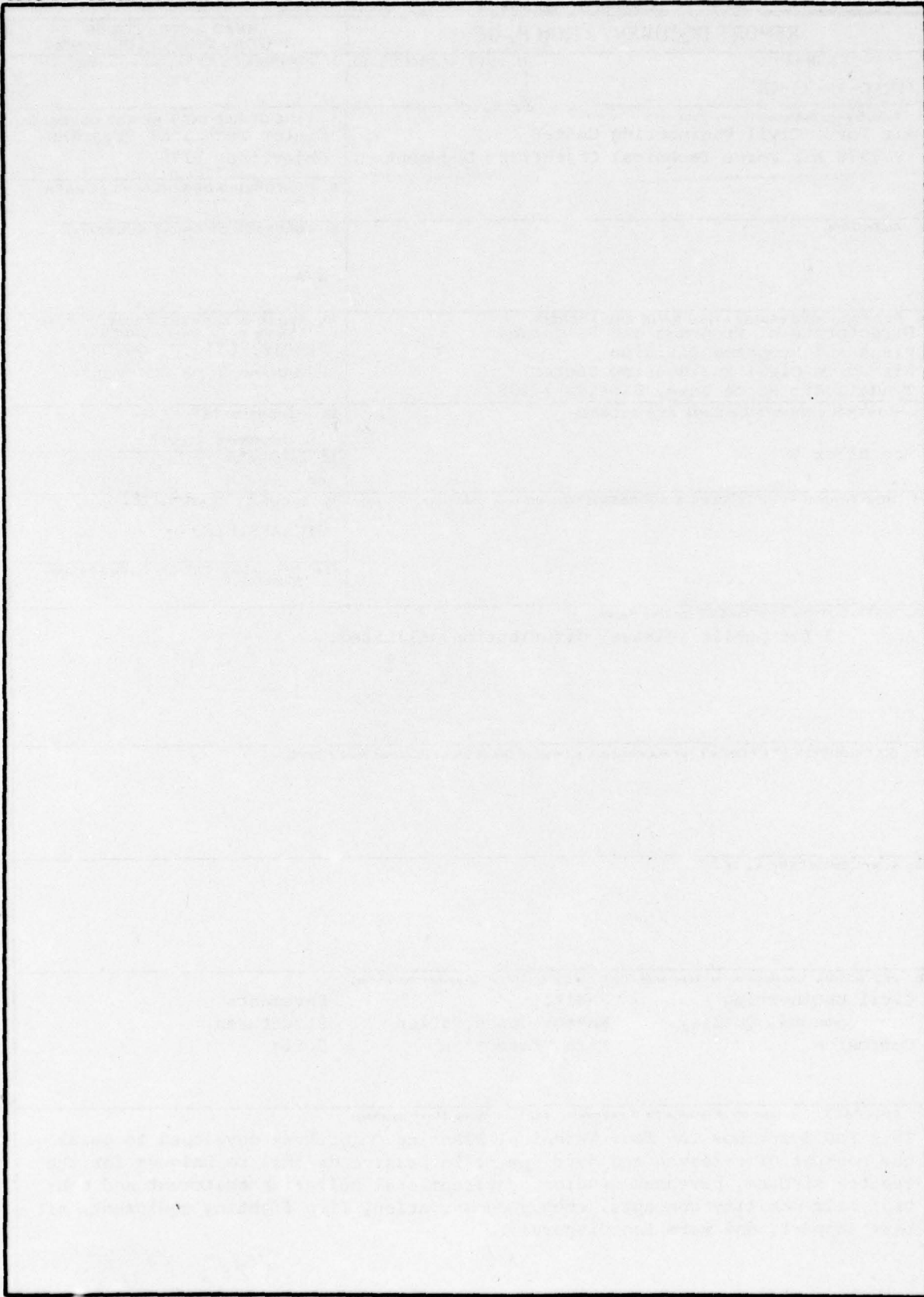
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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER AFCEC-TR-76-40	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Air Force Civil Engineering Center FY 1978 Air Force Technical Objectives Document		5. TYPE OF REPORT & PERIOD COVERED Center Technical Programs Objectives FY78
7. AUTHOR(s)		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Directorate of Programs and Resources Plans and Programs Division Air Force Civil Engineering Center Tyndall Air Force Base, Florida 32403		8. CONTRACT OR GRANT NUMBER(s) N/A
11. CONTROLLING OFFICE NAME AND ADDRESS See Block 9		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62601F, 63723F, 64708F Planning Type Document
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE 15 December 1976
		13. NUMBER OF PAGES 28
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited. 16/2493, 414N 17/41		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
Civil Engineering	Shelters	Pavements
Environmental Quality	Energy Conservation	Structures
Corrosion	Fire Protection	Soils
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)		
This TOD describes the four Technical Planning Objectives developed to guide the conduct of research and development in passive defense techniques for the theater airbase, pavement studies, environmental pollution abatement and control, air mobility concepts, energy conservation, fire fighting equipment, air base support, and warm fog dispersal.		
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INTRODUCTION

The Air Force Technical Objective Document (TOD) program is an integral part of the process by which the Air Force plans and formulates a detailed technology program to support the development and acquisition of Air Force weapon systems. Each Air Force laboratory annually prepares a Research and Technology (R&T) Plan in response to available guidance based on USAF requirements, the identification of scientific and technological opportunities, and the needs of present and projected systems. These plans include proposed efforts to achieve desired capabilities, to resolve known technical problems, and to capitalize on new technical opportunities. The proposed efforts undergo a lengthy program formulation and review process. Generally, the criteria applied during the formulation and review are: responsiveness to stated objectives and known requirements; scientific content and merit; program balance; developmental and life cycle costs; and consideration of payoff versus risk.

It is fully recognized that the development and accomplishment of the Air Force technical program is a product of the teamwork on the part of the Air Force laboratories and the industrial and academic research and development community. The TOD program is designed to provide to industry and the academic community, necessary information on the Air Force laboratories' planned technology programs. Each laboratory's TOD is extracted from its R&T Plan.

Specific objectives are:

- a. To provide planning information for independent research and development programs.
- b. To improve the quality of the unsolicited proposals and R&D procurements.
- c. To encourage face-to-face discussions between nongovernment scientists and engineers and their Air Force counterparts.

One or more TODs have been prepared by each Air Force laboratory that has responsibility for a portion of the Air Force Technical Programs. Classified TODs are available from the Defense Documentation Center (DDC) and unclassified TODs are available from the National Technical Information Service (NTIS).

While not entitled laboratory, the Air Force Civil Engineering Center, by virtue of its technical program responsibilities, is included in the collective term laboratory as used in this document.

HOW TO USE THIS DOCUMENT

Unsolicited proposals to conduct programs leading to the attainment of any of the objectives presented in this document may be submitted directly to an Air Force laboratory. However, before submitting a formal proposal, we encourage you to discuss your approach with the laboratory point of contact. After your discussion or correspondence with the laboratory personnel, you will be better prepared to write your proposal.

As stated in the "AFSC Guide for Unsolicited Proposals" (copies of this informative guide on unsolicited proposals are available by writing to Air Force Systems Command/PPPR, Andrews Air Force Base, Washington, DC 20334), elaborate brochures or presentations are definitely not desired. The "ABCs" of successful proposals are accuracy, brevity, and clarity. It is extremely important that your letter be prepared to encourage its reading, to facilitate its understanding, and to impart an appreciation of the ideas you desire to convey. Specifically, your letter should include the following:

1. Name and address of your organization.
2. Type of Organization (Profit, Nonprofit).
3. Concise title and abstract of the proposed research and the statement indicating that the submission is an unsolicited proposal.
4. An outline and discussion of the purpose of the research, the method of attack upon the problem, and the nature of the expected results.
5. Name and research experience of the principal investigator.
6. A suggestion as to the proposed starting and completion dates.
7. An outline of the proposed budget, including information on equipment, facility, and personnel requirements.
8. Names of any other Federal agencies receiving the proposal (this is extremely important).
9. Brief description of your facilities, particularly those which would be used in your proposed research effort.

10. Brief outline of your previous work and experience in the field.

11. If available, you should include a description brochure and a financial statement.

As you read through the pages that follow, you may see a field of endeavor where your organization can contribute to the achievement of a specific technical goal. If such is the case, you are invited to discuss the objective further with the scientist or engineer identified with that objective. Further, you may have completely new ideas not considered in this document which, if brought to the attention of the proper organization, can make a significant contribution to our military technology. We will always maintain an open mind in evaluating any new concepts which, when successfully pursued, would improve our future operational capability.

On behalf of the United States Air Force, you are invited to study the objectives listed in this document and to discuss them with the responsible Air Force personnel. Your ideas and proposals, whether in response to the TODs or not, are most welcome.

MANAGEMENT OVERVIEW

1.0 MISSION

The mission of the Air Force Civil Engineering Center (AFCEC) is two-fold. First, to provide specialized engineering, technical, and planning assistance to Headquarters United States Air Force (HQ USAF) and Major Command (MAJCOM) civil engineering organizations worldwide. Second, to act as lead agency for exploratory, advanced, and engineering development of civil engineering and environmental quality technology; and test and evaluation of facility systems and related civil engineering equipment.

2.0 COMMANDER'S ASSESSMENT

The AFCEC dual mission of Air Force-wide assistance and research and development (R&D) are mutually complementary and make the AFCEC a unique organization. Through the assistance role, the AFCEC maintains contact with the support and operational needs of the Air Force, which in turn provides feedback to the development mission. The assistance role provides both a mechanism by which R&D efforts can be tested under actual operational conditions and an avenue for field implementation of R&D results. We believe that the AFCEC offers an outstanding opportunity for the Air Force Systems Command (AFSC) to economically accomplish civil engineering related programs.

In support of stated requirements by higher headquarters, the AFCEC has developed technology planning objectives (TPOs) to guide the conduct of R&D efforts in passive defense techniques for the theater airbase, pavement studies (including contingency launch and recovery, and skid resistance), environmental pollution abatement and control, improved air mobility concepts, air base support, energy conservation, improved fire fighting equipment, and for a ground-based warm fog dispersal system. Other civil engineering related programs, in part or in total, may also be transferred to the AFCEC.

An analysis of the program forecast indicates that the AFCEC Research Development Test and Evaluation (RDT&E) workload should experience a continued upward trend through

the FY78 - FY82 time period. This increase will be the result of the transition of civil engineering related programs to AFCEC, such as has been experienced during the past four years.

A significant portion of the AFCEC resource requirements for FY78 - FY82 are devoted to specialized civil engineering assistance to HQ USAF and the MAJCOMs. This effort presently accounts for approximately sixty-five percent of the total AFCEC available manyear resource. While the scope and functional areas of assistance may change with evolving requirements, the level of resource committed to this very important assistance role is anticipated to remain relatively steady. In the same time period, the RDT&E efforts are expected to increase gradually with the current 90-10 ratio of contract to in-house dollars slightly decreasing as full laboratory capability is established at the Center.

Major RDT&E thrusts are expected in the following areas:

- a. Increase in those project/programs oriented towards alleviating the expanding energy crisis.
- b. Increase in priority and scope of the environmental pollution abatement and control program.
- c. Increase in priority and scope of the contingency launch and recovery program.
- d. Increase emphasis on base operations and maintenance management programs in such areas as snow removal and fire suppression equipment, corrosion control, energy conservation, and base pavement management system.

These programs provide for the essential development of concepts, facilities and equipment necessary to support future weapon systems and missions. Increased public awareness of environmental and energy problems requires the Air Force to find solutions to problems as they emerge. Control and abatement techniques as required by national policy for air, water, noise and other environmental pollutants created by Air Force operations require immediate research and development efforts. Tactical deployment of forces dictate that new techniques be developed for contingency launch and recovery to enable performance of assigned mission. Declining energy sources and austere budgeting

demand quantum improvements in base operations and maintenance management.

3.0 RELATIONSHIP OF PROGRAMS TO OTHER EFFORTS

The four technology planning objectives established by the Center are: Environmental Quality (TPO-1); Aerospace Structures (TPO-2); Mission Support (TPO-3); and Aircraft Operational Surfaces (TPO-4). Close coordination with R&D programs of Army and Navy laboratories is effected through the Joint Services Civil Engineering Research and Development Coordinating Group (JSCERDCG) on a regular, formal basis. This prevents duplication of effort and makes for maximum utilization of laboratory expertise and capabilities. Air Force civil engineering requirements are further defined and identified through participation in the Requirements Review Panel of the Air Force Civil Engineering Research and Development Board.

a. Environmental Quality: AFCEC has been selected as the Laboratory Designated Area Manager for all AFSC environmental quality efforts. Consequently, formal coordination is being effected with all AFSC laboratories as well as the other DOD components. Informal coordination through regional meetings, seminars, and work shops provides interface with governmental agencies and the private sector.

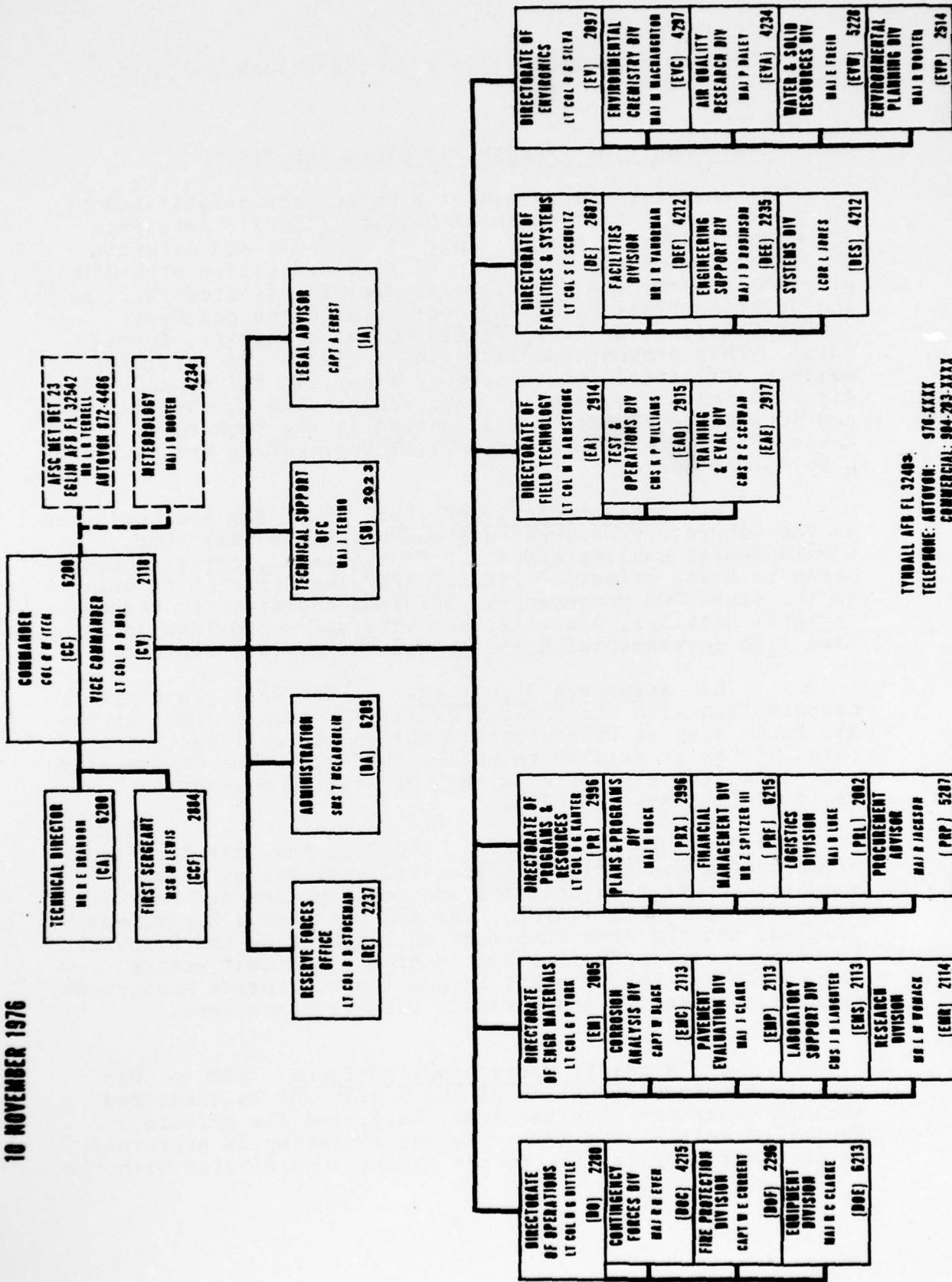
b. Aerospace Structures: AFCEC works in close coordination with the Nuclear Facilities Branch (DEV) at the Air Force Weapons Laboratory (AFWL) on all aerospace structures R&D as it relates to nuclear effects. The Center also represents the Air Force on the DOD Joint Committee on Tactical Shelters (JOCOTAS).

c. Mission Support: AFCEC is the only Air Force organization conducting R&D in civil engineering mission support. Under this Center's sponsorship, the Air Force Materials Laboratory (AFML), the Army Waterways Experiment Station, and the Army Construction Engineering and Research Laboratory are conducting R&D towards a non-destructive inspection system for panel inspection, corrosion management systems, and energy conservation for Air Force bases.

d. Aircraft Operational Surfaces: R&D in this area is a primary function of the Center and is conducted through contracts with the Army, Navy, and the private sector as well as the AFML. In-house testing is performed on pavement surface effects and closely coordinated with the

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Aeronautical Systems Division (ASD), the Federal Aviation Administration (FAA), and the National Aeronautics and Space Administration (NASA). Contingency launch and recovery research is a prime effort in this program and has been closely coordinated with our foreign allies in the North Atlantic Treaty Organization (NATO).

4.0 ORGANIZATION

Although the Air Force Civil Engineering Center has two distinct missions, the organization intentionally does not reflect this breakout. Both assistance and R&D efforts are carried out simultaneously, and in many instances by the same people. The Center's philosophy is that this combination of assistance and R&D gives engineers, scientists, and technicians opportunities which are mutually enhancing, and which provide opportunities to demonstrate R&D results in field application roles.

5.0 Facilities

The Air Force Civil Engineering Center facilities are composed of five buildings centrally located on Tyndall AFB, Florida plus a field technology complex located ten miles southeast of the main base complex. The major facilities are:

a. Passive Defensive Test Site: This site is the location of weapons effects testing on aircraft shelters, shelter components, and other facilities protection structures.

b. Pavement Test Section Site: This site supports the evaluation and improvement of techniques to rapidly repair combat damaged runways and the development of improved pavement designs and materials.

c. Corrosion Laboratory: This facility provides the analytical capability to investigate corrosion problems associated with base utility systems as well as evaluation of protective coatings and cathodic protection systems.

d. Soils and Pavements Laboratory: This facility evaluates the capability of airfield pavements to support both currently assigned and planned aircraft and also provides data to support recommendations for repair, maintenance, and new construction. This laboratory has certification by the National Bureau of Standards as meeting the

American Association of State Highway and Transportation Officials (AASHTO) and the American Society for Testing and Materials (ASTM) standards.

e. Environics Laboratories: These facilities are used to conduct bench level and pilot-plant evaluations of methods to reduce and control pollution from Air Force unique activities plus determinations of the fate and effects of Air Force unique pollutants.

f. Computation Facility: A remote access terminal plus peripheral equipment provides access to the Eglin AFB scientific computer facility for execution of analytical and simulation codes such as the Air Quality and Water Quality Assessment Models.

TECHNOLOGY PLANNING OBJECTIVE (TPO) 1
ENVIRONMENTAL QUALITY

GENERAL OBJECTIVE

The objective of this technology is to provide AF managers with a process for making rational choices among alternative futures to insure conservation of resources and the development of facilities and services required to support AF activities. It addresses the unified social, economic, and physical development of AF communities and their environs, including their relationships with state, regional, and national objectives, and incorporates the scope of "comprehensive planning". It includes all areas/activities affecting or affected by air base development and operations.

Without a long-range view and an associated integrated environmental RDT&E program, the military services will be forced into a long series of reactions to crisis situations which could stop or detract from their basic mission of national defense and result in inefficiency of performance. So that environmental considerations can be evaluated realistically and promptly so as not to impede the overall decision making process, research and development in environmental quality is critical and requirements cannot be met without it.

SPECIFIC GOALS AND TECHNICAL APPROACHES

The principal goal is to provide technology that will overcome the effects of physical, chemical, and biological pollutants that adversely affect human health or welfare; unfavorably alter ecological balances important to human life; adversely affect animal or plant life; cause damage to and deterioration of man-made materials or property; or degrade the utility of the environment for aesthetic and recreational purposes.

The technical approach is to investigate, understand, and enable modeling of the basic phenomena underlying the generation, transport, and control of the pollution process. This includes identifying the source and character of significant emissions; evaluating pollutant life cycle interactions; defining environmental transport and chemical mechanisms; developing control, detection, and monitoring capabilities; developing control, disposal, recovery, recycle, and abatement technology; establishing environmental impact of AF decisions; and finally, addressing environmental

assessment and impact evaluation techniques using a systematic interdisciplinary approach for decision making.

Four major thrust areas have been established under which technology will be developed. Each thrust area has major supporting tasks.

a. ENVIRONMENTAL MONITORING AND MECHANISMS

Ambient Pollutant Measurement System

Source Emission Measurement Systems

Ecological Indicator Systems

Pollutant Transport Mechanisms for Chemical, Biological, and Physical Agents

b. CONTROL AND ABATEMENT TECHNOLOGY

Compliance Driven

Conservation Driven

c. ENVIRONMENTAL ASSESSMENT TECHNOLOGY

Environmental Data Baselines

Environmental Quality Assessment Methodologies

Natural Resources Management

d. ENVIRONMENTAL PLANNING AND MANAGEMENT

The general criteria to be followed in carrying out the R&D efforts are: (1) develop the technology and hardware necessary to control or abate the pollution emanating from operations, facilities, or equipment unique to the Air Force and thus meet applicable environmental standards in situations where operations or equipment may be adversely restricted or impacted because of lack of commercial solutions; (2) develop data pertinent to AF operations to serve as the basis for standards or criteria where none exists or to modify existing standards or criteria that appear to be based upon inadequate data; (3) develop R&D programs to make present pollution abatement technology more timely and cost-effective; (4) engage in R&D efforts necessary to evaluate

and extend the technology base in a specific pollution-abatement area where AF has unique expertise or equipment that is not available in the civilian community.

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TECHNOLOGY PLANNING OBJECTIVE (TPO) 2
AEROSPACE STRUCTURES

GENERAL OBJECTIVE

Research, development, and resources investment in this technology area will provide the technology base and hardware development for hardened aerospace structures to resist the effects of chemical, biological, nuclear, and conventional weapons; reduce air base vulnerability through improved passive defense measures; and advance lightweight air transportable facilities. The objective of these collective efforts is to provide options for levels of protection which will render Air Force facilities, in support of tactical and strategic operations worldwide, less vulnerable to attack and more survivable for retaliation.

SPECIFIC GOALS AND TECHNICAL APPROACHES

Major areas of thrust in which research and development efforts will be conducted include:

- a. PROTECTIVE CONSTRUCTION
- b. AIR MOBILITY SYSTEMS
- c. AIR BASE VULNERABILITY

Specific goals and avenues of approach to achieve upgraded capabilities consistent with current/projected threats and operational needs within the major areas of thrust are as follows:

- a. PROTECTIVE CONSTRUCTION.

Goal: Improve configuration and hardness of air base facilities to survive current and projected effects from high explosive, chemical, biological, and nuclear weapons.

Approach: Analyze, study, and test enemy weapons and their effects against air base target elements and develop means to defeat them. Utilizing the results of threat and vulnerability studies, the most vulnerable target elements will be upgraded first. Aircraft shelter development and weapons effects testing to prove survivability against the NATO threat was completed in FY76 and R&D emphasis shifted, beginning in FY77, to studies and testing of weapon effects and protective construction for other vulnerable air base target elements. Weapon effects studies and

testing against airfield pavements, aircraft maintenance shelters, and command/control/communications facilities will be accomplished during FY78 through FY79. Specific key support facilities for United States Air Forces Europe (USAFE) will be upgraded by protective construction modifications developed and tested during FY78-82. Upgrade analysis for aircraft shelters will commence again in FY80. Passive defense techniques to conceal, decoy, harden, and obscure air base targets will be studied and developed during FY78 through FY80. In FY78, AFCEC will develop chemical/biological (CB) warfare collective protection for tactical shelters and personnel in Bare Base deployments. Foreign technology assessments will be performed on a continuing basis to identify cost and performance effective materials and construction techniques applicable to AF facilities.

b. AIR MOBILITY SYSTEMS.

Goal: Develop new technology and materials for use in and in support of air transportable systems. The primary objectives are to standardize shelters, reduce life cycle costs, and improve transportability and utility of the shelters.

Approach: Beginning in FY78, this program will be directed by the Joint Committee on Tactical Shelters (JOCOTAS), and funded through the Department of the Army. USAF tactical shelter RDT&E requirements will be forwarded by the Center (designated as USAF representative to JOCOTAS) for inclusion in the DOD program. The Center will continue to perform R&D functions as directed and funded by JOCOTAS.

c. AIR BASE VULNERABILITY.

Goal: Maintain cognizance of air base vulnerability to enemy threats and assess the requirements for protective construction to counter the threats.

Approach: Threat assessment of air base vulnerability will be a continuing effort with a periodic in-depth study. Air base vulnerability and passive defense studies will be accomplished during FY81.

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TECHNOLOGY PLANNING OBJECTIVE (TPO) 3
MISSION SUPPORT

GENERAL OBJECTIVE

Research, development, and resource investment in this technology area will provide the technology base and hardware development for the enhancement of civil engineering support of Air Force real property facilities and combat weapon systems. The ultimate goal is more effective mission support at reduced operation and maintenance costs consistent with national environmental and energy conservation programs.

SPECIFIC GOALS AND TECHNICAL APPROACHES

Major areas of thrust in which research and development efforts will be conducted include:

- a. ENERGY
- b. FACILITY IMPROVEMENTS
- c. EQUIPMENT SYSTEMS
- d. FACILITY CORROSION
- e. FIRE PROTECTION
- f. WARM FOG DISPERSAL SYSTEM

Specific goals and avenues of approach to achieve the objectives within the major thrust areas are as follows:

- a. ENERGY

Goal: Reduce the total energy consumption and augment or substitute alternate or more efficient energy sources for petroleum derived fuels.

Approach: Concentrated and coordinated efforts are under way and will continue in the areas of energy conservation, alternate energy sources, and energy management/control systems. Conservation techniques will continue to be identified and studied during FY78 and FY79 with testing of materials and methods during FY78 through FY80 for retrofit or new construction of Air Force facilities.

Government and industry developed energy conservation measures will be monitored and, where applicable, adapted for Air Force applications on a continuing basis. Continuing efforts will be devoted to developing prototype solar and wind energy supplemental systems for reducing the requirement for diesel generation of power at remote AF sites. In FY78 alternate energy studies which commenced in FY76 will continue for the purpose of identifying remote site energy requirements and investigating alternate sources of energy to augment finite fossil fuels. Prototype wind energy, solar assisted heat pump, and other systems will be evaluated and optimized at a remote installation beginning in FY78 and continuing through FY82. The evaluation of solar energy applications will be continued at the United States Air Force Academy (USAFA) Solar Test Laboratory. In addition, the use of solar energy in trickling filters and solar cell applications will be investigated with prototype development during FY78 and FY79. The evaluation of total energy systems will be carried out in FY79. Ways will be sought to recover presently wasted forms of energy such as heat, refuse, used oils, etc., during FY78 and FY79. Design and prototype development of total energy systems will be accomplished during FY80, FY81, and FY82. Continuing through FY79, the application of microprocessor technology will be applied to remote sensor and control systems for monitoring and controlling energy utilization with the objective of automatic facility heating, cooling, lighting, operation of equipment, and the reduction of overall energy consumption. Follow on efforts during FY79 thru FY82 will be primarily concerned with the management aspects of energy optimization and the development of new energy control design criteria.

b. FACILITY IMPROVEMENTS

Goal: Reduce operation and maintenance costs of Air Force buildings.

Approach: During FY78, efforts will be directed toward identification of need for computer design capability followed by program development for support of structural, mechanical, electrical, environmental, and industrial engineering tasks at MAJCOMs and base civil engineering level. Data on the AF reliability/maintainability requirements will be compiled and studied in FY78. Follow-on efforts will develop engineering instrumentation, equipment, and facility design to enhance AF resource investment.

c. EQUIPMENT SYSTEMS

Goal: Provide cost effective equipment systems to support mission requirements.

Approach: In the next five to seven years, the entire Air Force snow removal fleet will be replaced. Available replacement vehicles are the same as now in use. In FY78 an effort will start to develop advanced concept snow removal equipment capable of keeping runways, taxiways, and areas around aircraft arresting barriers and airfield lighting systems clear of snow and ice, regardless of snow-fall. Also, an effective equipment package and snow removal plan for missile sites will be developed. Phase I of this effort is a study to determine optimum missile site snow removal equipment and manpower requirements, and snow removal procedures. In FY79 a system will be procured for in-house evaluation at a northern tier base to permit testing in snow removal operations.

d. FACILITY CORROSION

Goal: To provide the technology base for the Air Force corrosion prevention program.

Approach: In FY78 corrosion investigations will include the continuation of development of a corrosion management system, and the continued development of new corrosion protective coatings. Work will also continue on investigations into the reasons for the premature failure of deep well anodes.

e. FIRE PROTECTION

Goal: To provide cost effective fire fighting equipment to Air Force fire protection agencies worldwide.

Approach: During FY78 several efforts will be directed toward improving fire fighting equipment. A rapid agent transfer system for reservicing fire trucks; fire fighter training simulator; low cost smoke abated training facility; improved protective clothing; and a fire fighter head protection, breathing apparatus, and communication system will be developed. The physiological limits of fire fighters will be examined. The development of a medium capacity (2500-4000 gallons of agent) fire truck for use in the 1980s and 1990s will be started. Concepts for a multi-purpose fire truck for use as a rescue vehicle, auxiliary airfield protection, mini-pumper, and an initial

attack fire fighting vehicle will be evaluated. During FY79 follow-on efforts from FY78 will occur in the fire fighter training simulator, multi-purpose fire truck, and medium capacity fire truck development. Follow-on testing will be initiated on the A/S32P-15 high capacity fire truck to include testing of a 2500 gallon per minute discharge rate from a single turret.

f. WARM FOG DISPERSAL SYSTEM

Goal: To develop equipment necessary to assure Category I landing conditions at selected major air bases during the occurrence of warm fog.

Approach: A ground based warm fog dispersal system will be developed for use at major air terminals subject to warm fog to assure Category I landing conditions. The system will be developed in two phases. Phase I (FY 77-78) will include the development of combustors and the control system features, including development testing. Phase II (FY 78-81) will include installation and operational testing of a complete, full-scale prototype system.

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TECHNOLOGY PLANNING OBJECTIVE (TPO) 4
AIRCRAFT OPERATIONAL SURFACES

GENERAL OBJECTIVE

The objective is the advancement of aircraft operational surface technology so that it can more effectively support the Air Force mission. The most important single element in this objective is the development of means and methods to enable the immediate launch of aircraft following an attack by hostile forces and recovery capability within one hour of mission launch. Also included at a lower priority are the development of better materials, better maintenance techniques, improved analysis techniques, and better systems of management as applied to aerospace pavements. The ultimate goal of this development program is the assurance that the United States Air Force has available the most economical and scientifically advanced techniques to provide operational surface support for all aerospace systems.

SPECIFIC GOALS AND TECHNICAL APPROACHES

Major thrusts in which research and development efforts will be conducted include:

- a. STRUCTURAL ANALYSIS
- b. CONTINGENCY LAUNCH AND RECOVERY
- c. PAVEMENT SYSTEMS MANAGEMENT
- d. SURFACE EFFECTS

Each thrust represents a broad-based continuing effort, and the technical approach planned for each is as follows:

a. Structural Analysis

Goal: To provide a fast, portable, nondestructive method for evaluating airfield pavements.

Approach: Develop improved methods for analyzing aircraft operational surfaces to enable optimum use of technology for rapidly responding to operational planning and requirements by predicting the effect of aircraft loading changes on existing pavements and to more fully understand the effects of aircraft traffic on pavement systems.

b. Contingency Launch and Recovery

Goal: Develop systems which will permit immediate launch of aircraft following an attack and recovery capability within one hour of mission launch.

Approach: Develop various contingency surfaces which could be built in advance and used to provide an alternative launch capability, plus the development of improved methods and procedures for repair of damaged surfaces. New repair methodology must be developed for both large and small pavement craters, plus optimum methods for selection of repair strips and clearing out unexploded ordnance.

c. Pavement System Management

Goal: To optimize maintenance and repair of aerospace pavements to provide the safest and most economical pavement available.

Approach: Develop a maintenance system which will enable the Air Force to use limited dollars most effectively. This includes development of a computer-based storage and retrieval system which will contain up-to-date information on all Air Force airfield pavements, thereby permitting more effective management of the total pavement resources. This task also includes the development of improved methods for analyzing and treating pavement roughness.

d. Surface Effects

Goal: To develop an aircraft/runway pavement performance prediction system.

Approach: Retain as a long term goal the development of an evaluation system which correlates with actual aircraft stopping performance. If technically feasible, develop this system so that it has a real-time evaluation capability in order to predict the actual stopping performance of a given aircraft, on a given pavement, at a given time.

TPO FOCAL POINT

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SUMMARY

TECHNOLOGY PLANNING OBJECTIVES AND PROJECT LISTING

The AFCEC Technology Areas and Technology Planning Objectives are synonymous.

<u>PROGRAM ELEMENT</u>	<u>PROJECT</u>	<u>TITLE</u>	<u>TPO</u>
62601F	1900	Environmental Quality Technology	1
63723F	2101	Aerospace Structures	2
	2102	Mission Support	3
	2103	Environmental Quality	1
	2104	Aircraft Operational Surfaces	4
64708F	2054	Aerospace Facilities Engineering Development	ALL
	2093-01	Warm Fog Dispersion System	3
	414N	Aircraft Crash Fire/Rescue Program	3

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OPPORTUNITIES

This section identifies several areas of technology, related to the AFCEC R&D efforts, which appear especially appropriate for the Independent Research and Development (IR&D) Program. The respective TPO focal points can provide additional information.

TPO-1 ENVIRONMENTAL QUALITY

- Advanced Environmental Monitoring Techniques

TPO-2 AEROSPACE STRUCTURES

- Mobility Shelter Concepts - Electronic RFI/EMI shielding using other than honey-comb panels
- New materials application to shelters.

TPO-3 MISSION SUPPORT

- Advanced snow removal and ice control techniques and equipment.
- Solar energy application to light industrial complexes
- Conservation/reduction of facility energy consumption
- Environmentally compatible aqueous film forming foam for fire suppression

TPO-4 AEROSPACE PAVEMENTS

- Rapid Clearance of Unexploded Ordnance from Bomb-Damaged Runway
- Methods for Selecting Optimum Repair Strip of Damaged Runway
- Innovative Techniques for Rapid Repair of Damaged Runways/Taxiways