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May 1991
Survey of TRADOC's Environmental Training Needs

fessional Training for TRADOC vironmental and Natural Resource Professionals, lume I: A Feasibility Study and Concept Plan a "University Without Walls"

. Nemeth
. Fittipaldi
S. Natoli

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The prevention of pollution and environmental degradation is vital to maintain effective and realistic training areas for Training and Doctrine Command (TRADOC) activities. This report analyzes the training needs of environmental professionals in the TRADOC work force, outlines a model training program to fill those needs, and evaluates the feasibility of creating such a program. Volume I of this report specifies: (1) the body of environmental professionals to be trained, by background, experience, and responsibilities, (2) the training needs of the work force, and the categories of training to be accomplished under a broad training program, and (3) the conditions and operational constraints that will bear upon a successful environmental training program. Volume II lists available education sources.

This conceptual outline is the basis for several recommendations:

1. The program presented here should be refined into a final curriculum for individuals and installations.

2. Personnel retention incentives should be explored and developed, including the refinement of an Army environmental professional career path, and a formal system for receiving academic credit while accomplishing training.

3. This model program should be pursued in cooperation with other Army Major Commands and other Department of Defense services to achieve maximum cost effectiveness and economies of scale.

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FOREWORD

This research project was conducted for Headquarters, Training and Doctrine Command (HQTRADOC), Environmental and Natural Resources Branch, under Intra-Army Order (IAO) No. EFC9R127, dated 22 November 1988, "Survey of TRADOC's Environmental Training Needs." Ms. Linda McFarlane was the HQTRADOC Technical Monitor.

The work was performed by the Modeling and Simulation Team of the Environmental Division (EN) of the U.S. Army Construction Engineering Research Laboratory (USACERL). The USACERL principal investigator was Mr. John Fittipaldi. The USACERL associate investigator was Ms. Nancy S. Natoli. Special acknowledgement is given to Mr. Philip Prisco, who initiated the concept for this study. Dr. John C. Nemeth is Director of the Environmental Science and Technology Laboratory of the Georgia Tech Research Institute in Atlanta, GA. Edward W. Novak is Acting Chief, USACERL-EN. The USACERL technical editor was Mr. William J. Wolfe, Information Management Office.

COL Everett R. Thomas is Commander and Director of USACERL, and Dr. L.R. Shaffer is Technical Director.

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EXECUTIVE SUMMARY

The purpose of this research is to determine the feasibility of developing a training program for U.S. Army Training and Doctrine Command (TRADOC) environmental professionals. This program would offer the training necessary to achieve full compliance with environmental laws. Specifically, the goals of this project are to:

1. Define the environmental professional work force its training needs

2. Identify sources of courses, curricula, and materials and tools available for provision of training needs

3. Develop a feasibility framework for a "University Without Walls," a long-term, efficient, flexible training program for the TRADOC environmental professional.

Researchers have determined that the need for training is significant and that an environmental and natural resource management University Without Walls is feasible. The concept is operationally feasible within reasonable bounds of both costs and logistics. Original plans to coordinate a broad combination of academic and commercial sources have been reduced in scope because substantial training resources are already available within the Army, and can be readily supplemented by outside sources. TRADOC environmental professionals comprise a small group of varied technical backgrounds, who are distributed over a wide geographic area. Cost-effectively meeting the continuing education needs of this group calls for a diverse strategy.

The first step is to evaluate installation and individual training needs. The realization of a University Without Walls depends on several related issues:

1. Career Path Planning:

a. Career-path planning and incentive programs for TRADOC environmental employees should be linked directly to the training program. The diversity of the work force is a major challenge that training through the University Without Walls approach should address.

b. More stringent recruitment criteria and an increase in General Schedule (GS) grades is needed to attain better entry-level credentials for new hires. In certain cases, providing remedial training and perhaps formal educational degree programs for existing staff members may prove appropriate and necessary.

c. Training should be documented through a course and course-series certificate program and continuing education units (CEUs). This should become an integral part of performance appraisals.

2. Cost-Effectiveness and Economies of Scale:

a. The size and geographic distribution of the target audience suggest several cost-effective training options:

1) Maximizing usage of satellite and video-teleconferencing technologies to meet the largest audience at the smallest cost.

2) Adapting an existing electronic bulletin-board system as a mechanism to transmit training information.

3) Developing an autotutorial manual approach for Army policy and procedures.

4) Developing a combined "mentor" system and "circuit rider" approach, which can be an important delivery mechanism for environmental training.

b. Using existing expertise within the Army, such as PROSPECT courses through the Corps of Engineers' Huntsville Division, and the Army Logistics Management College environmental courses. Where existing sources are unavailable or insufficient, sufficient training expertise exists among outside sources to procure reliable instruction.

c. Explore cooperation between Army Major Commands (MACOMs) and possibly other Department of Defense (DOD) agencies to achieve maximum benefit relative to cost.

The following recommendations provide an outline for implementing a TRADOC environmental University Without Walls.

1. Inventory Training Needs: The first step toward starting a University Without Walls is an inventory using the suggested matrix approach to evaluate specific individual and installation-level needs for training. On completion of such an inventory, a team of interviewers should visit TRADOC installations to finalize the "curriculum" of courses.

2. Develop and Refine Curriculum: The Model Training Program must be refined into a final curriculum. This should include a careful rewrite and critical evaluation of the Model to decide the most appropriate technical content and best methods of course delivery. That curriculum would serve as a general training plan for individuals and installations, which would then be reviewed at the installation level to determine what training had been done and what training remained across all technical areas in all three course categories: Baseline, Required Update, and Advanced.

3. Explore and Develop Retention Incentives: TRADOC should evaluate all incentive-enhancing factors suggested here and decide the best way to upgrade the professional standing of the environmental work force.

4. Institutionalize Academic Credit: Refine and implement the training documentation program through certificates and CEUs to link documentation of professional improvement to organizational advancement.

5. Use ALMC and PROSPECT: Expand use of the PROSPECT courses, Army Logistics Management College (ALMC) Satellite Education Program (SEP), and existing electronic bulletin board systems at TRADOC installations initially. This should include an analysis of budgeting and funding constraints in these programs, and possible ways to expand the course offerings and availability.

6. Identify Mentors: Inventory TRADOC and other environmental expert sources to staff a "mentor" or "circuit rider" approach to training.

7. Prepare Course Materials: Prepare the autotutorial manual for delivery of the "Army Environmental Policy and Procedures" training.

8. Identify and Rate Outside Sources: Determine those technology-oriented subjects that require outside instruction from universities and/or commercial sources. As needed, these sources could be contracted through normal procurement channels.

9. Investigate Other MACOM and DOD Cooperation: The viability of extending the concept of the University Without Walls training program Army-wide and to the other branches of the armed services is also recommended.

PROFESSIONAL TRAINING FOR TRADOC ENVIRONMENTAL AND NATURAL RESOURCE PROFESSIONALS, VOLUME I: A FEASIBILITY STUDY AND CONCEPT PLAN FOR A "UNIVERSITY WITHOUT WALLS"

1 INTRODUCTION

Background

The prevention of pollution and environmental degradation is vital to maintain effective and realistic training areas for TRADOC activities. Political and operational problems associated with the lack of environmental compliance have become both obvious and acute. In October 1989, the Secretary of Defense confirmed the environmental responsibilities of the DOD:

> This Administration wants the United States to be the world leader in addressing environmental problems, and I want the Department of Defense to be the Federal leader in agency environmental compliance and protection... Effective DOD environmental compliance and stewardship activities are the surest ways to maintain and improve our mission capability.

Headquarters, TRADOC has recognized the responsibilities of its environmental professionals, who bear the task of environmental stewardship. The environmental arena is broad and interdisciplinary, and includes nearly every aspect of the global environment—biogeochemical, economic, social, political, and technical. While no one person *can have* absolute proficiency in all these subject areas, TRADOC should make an investment in continuing education to provide its environmental professionals some exposure to all areas.

This sort of continuing education effort must always keep touch with the realities of the Army system. The backgrounds of TRADOC environmental professionals vary in content, experience, and complexity. An overly broad training program that covers all environment-related disciplines could interfere with job productivity. Thus, this project provides a preliminary, realistic program that assumes some formal scientific, engineering, or environmental policy/legal preparation.

This report describes a prototype training model for a refined training program that meets both general and facility-unique training requirements. Even though a given installation will have differing types of ecological settings, training and tenant activities, infrastructure, and varied environmental staff capability, training must be both general enough to cost-effectively reach a wide target audience, and specific enough to be applied in the contexts of specific installations. This report also provides an initial model training curriculum for the environmental professional staff serving in TRADOC installations. Volume II includes sample course outlines from past and present programs at a major university.

Objectives

The principal objective of this research is to determine the feasibility of providing continuing education training to the environmental professionals at TRADOC installations. This training would supplement a

professional's formal academic training and experience, and would help make the staffer more efficient and effective in managing both existing and emerging environmental programs. Further objectives of this project were to:

1. Define and characterize TRADOC environmental professionals, in terms of academic backgrounds, experiences, and responsibilities

2. Define types and levels of training needed by the professional environmental work force

3. Identify sources of curricula, courses, materials, and tools that could meet the specified training requirements

4. Recommend a framework for a University Without Walls, a long-term, efficient, and flexible professional environmental training program that draws upon many sources.

Approach

1. A telephone survey of the TRADOC professional environmental work force was made to determine the backgrounds, needs, and responsibilities of that group. A review of Army environmental policy and responsibilities was made to determine fundamental training requirements.

2. Army Regulations (ARs) 200-1 and 200-2[1] were reviewed to ensure that the model training program met the requirements of the Army environmental program areas.

3. A literature search was conducted to identify and inventory sources of degree and nondegree training provided by universities and colleges, the U.S. Army and federal agencies, states, and commercial agencies. This same literature survey was used to identify appropriate types of instructional tools.

4. A 2-day panel of national environmental professionals from private industry, academia, USATHAMA, the U.S. Army Construction Engineering Research Laboratory (USACERL), and Headquarters, Training and Doctrine Command (HQTRADOC) was convened to discuss job responsibilities, training needs, and optimal modes of delivery for the required training.

[1] Army Regulation (AR) 200-1, *Environmental Protection and Enhancement* (Headquarters, Department of the Army [HQDA], 23 April 1990); AR 200-2, *Environmental Effects of Army Actions* (HQDA, 23 December 1988).

2 THE FEASIBILITY STUDY

Description of the Work Force

TRADOC Environmental Professionals

The "environmental professional work force" in TRADOC is defined as all those in a professional career series in the general service (GS), who work in the installation environmental and/or natural resources management office. Using this definition, a comprehensive telephone survey of all TRADOC installations was conducted May through July 1989. This survey provided a 100 percent response rate, and produced an accurate snapshot of the TRADOC environmental professional work force at that time.

As of July 1989, there were 123 professional environmental positions at 18 TRADOC installations. Figure 1 summarizes this characterization, and includes frequency distributions for: (1) job titles, (2) grade levels, (3) level of education, (4) fields of college degrees, and (5) experience in the job series. These data show a workforce, the majority of which have fewer than 4 years' experience, no more than a baccalaureate degree, and a broad variety of specialization. This suggests that introductory and comprehensive training should be emphasized, with some emphasis on refresher training.

Target Audiences

For the purposes of this study, the 123 positions have been grouped into three target audiences, based on tenure and level of experience, and are based on AR 690-950,[2] Chapter 11:

1. Entry Level: (GS through GS-7) This represents the entry point into a professional career series. Such employees work under direct supervision, and in a variety of technical areas. These people typically have a bachelors degree, either in a general area such as environmental science, engineering, or health, or a specialty area such as geology, biology, forestry, chemistry, engineering, or agronomy. However, there may also be some "uninitiated" entry level persons, with little or no formal training or background in environmental matters.

2. Technical Specialist - (GS-9 and GS-11) Employees at this level are typically midlevel journeyman, with a detailed knowledge of professional specialty, working on independent responsibilities with little supervision. The career program emphasis for employees in this level includes increased technical knowledge and professional growth.

3. Supervisory/Management (GS-12 and GS-13) Employees at this level are responsible for administration and direction of lower organizational segments, with overall management of all program areas. Supervisors and managers typically have some program responsibilities, and focus on continued technical and professional specialization. These employees are also the lead persons to interact with other Directorates and the Command, as well as with environmental regulators (e.g., EPA) and the local community. These employees have a broad technical base and management skills in such areas as policy, administration, personnel, and planning, and have enhanced backgrounds in decisionmaking.

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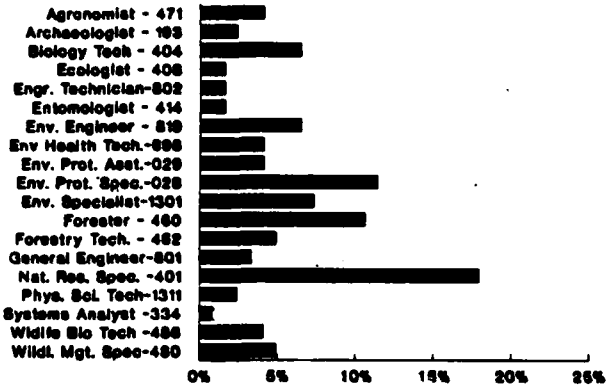
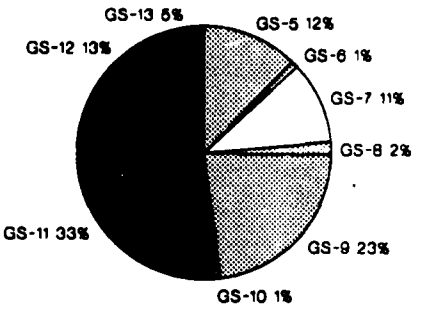
[2] AR 690-950, *Career Management* (HQDA, 31 July 1987).

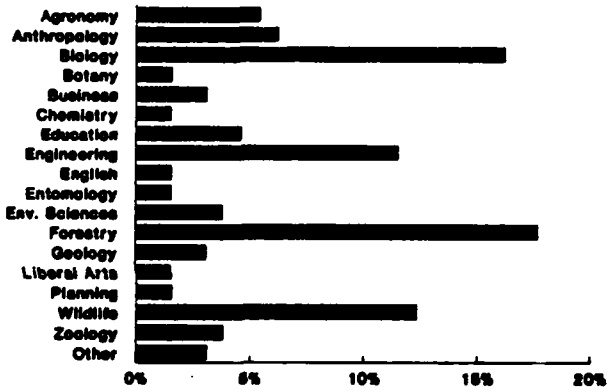
Job Titles and Series



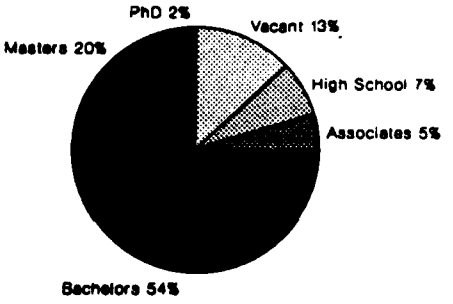
Grade Levels



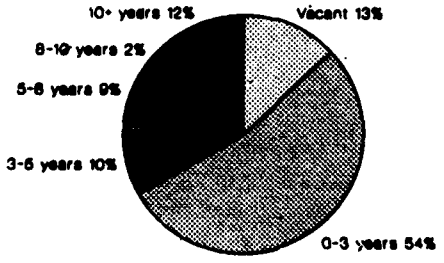
Fields of College Degrees



Highest Level of Education



Experience in Job Series



Based on phone interviews May-July, 1989
(123 total positions)

Figure 1. Description of target audience.

Often, differences between the three target audiences are indistinct. Depending on office size, discrete tasks may or may not be assigned to individual people. In small offices, one or two people with comprehensive backgrounds may carry out all review and quality assurance roles. In larger offices with staffs of seven to 10 persons, individuals may specialize on specific environmental areas.

Framework for Environmental Compliance and Management Training

The broad responsibilities of the environmental professionals include environmental compliance, restoration, preservation, and enhancement. These tasks are governed by many federal, state, and local laws, as well as established Army policy and procedures found in Army Regulations 200-1 and 200-2. Table 1 outlines the Army Environmental program areas.

Army environmental program areas and environmental laws and regulations can be categorized into 12 technical areas to create distinct training units. While the boundaries of Army environmental program areas may change over time, these technical areas will remain distinct:

1. General Army environmental policies and procedures
2. Environmental laws and regulations
3. NEPA Review process and environmental audit/assessment
4. Air emissions
5. Hazardous materials and waste management
    a. Polychlorinated biphenyls (PCBs)
    b. Petroleum, oil, and lubricants
    c. Pesticides/herbicides
6. Solid waste management
7. Wastewater discharge
8. Drinking water
9. Underground storage tanks (USTs)
10. Noise
11. Natural resources
12. Cultural resources and historic preservation.

Training Needs

Within distinct subject areas, individuals at various points in their careers and levels of experience will require training in one of three different levels of technicality:

1. Basic: For persons entering the workforce with little or no experience or advanced technical skills

2. Advanced/In-depth: For persons presently in the work force who need additional technical training in specific areas

3. Required Update/Refresher: For persons who have been in the field or with the organization for some time, but who need some updating or refreshing.

The first component to the training program is a set of two matrices (Tables 2 and 3), which together help evaluate the installation's environmental training needs. This two-matrix approach allows

Table 1

U.S. Army Environmental Program Areas

I. R & D PROGRAMS

II. WATER RESOURCE MANAGEMENT PROGRAM
- Clean Water Act (CWA)
- Safe Drinking Water Act
- Watercraft
- Dredge and Filling Actions

III. AIR POLLUTION ABATEMENT PROGRAM

IV. HAZARDOUS MATERIALS MANAGEMENT PROGRAM
- Management of Hazardous Materials
- Disposal and Storage of Non-Defense Toxic and Hazardous Materials
- Pest Management Program
- PCBs
- Underground Storage Tanks
- Radioactive and Nuclear Accidents and Incidents
- Best Management Practices

V. SOLID WASTE AND HAZARDOUS WASTE MANAGEMENT PROGRAM
- RCRA Compliance
- Hazardous Waste Management and Waste Minimization
- RCRA and NEPA
- Disposal of Munitions and Ordnance
- Explosive Ordnance and PEP Materials and Chemical Warfare Agents
- Pesticides
- Medical, Dental, and Veterinarian Supplies and Health Care Facility Wastes
- Solid Waste Management Procedures
- Site Recording
- Recycling
- Funding Solid Waste and Hazardous Waste Disposal

VI. ENVIRONMENTAL NOISE ABATEMENT PROGRAM
- Installation Compatible Use Zone (ICUZ) Program
- Noise Assessment

VII. OIL AND HAZARDOUS SUBSTANCES SPILL CONTINGENCY PLANNING, CONTROL AND EMERGENCY RESPONSE
- Reporting of Army Oil and Hazardous Substance Discharges

Spill Prevention Control Countermeasures Plan (SPCCP) and Installation Spill Contingency Plan (ISCP)

VIII. ENVIRONMENTAL RESTORATION PROGRAMS
- CERCLA
- Defense Environmental Restoration Program Coverage (DERP)
- FUDS (Formerly Used Defense Sites)
- Community Relations and Public Participation

IX. ASBESTOS MANAGEMENT PROGRAM
- Installation Asbestos Management Plan

X. ARMY RADON REDUCTION PLAN

XI. OTHER
- Threatened and Endangered Species and Historic Preservation
- Real Properties Transactions
- Environmental Agreements, Environmental Compliance, and Environmental Auditing
- Mobilization
- Supplements and Reports
- Environmental Quality Awards and Environmental Quality Control Committee
- Selection of Military Construction Sites

XII. ENVIRONMENTAL RECORDS AND DOCUMENTATION
- National Environmental Policy Act (NEPA)
- Right-to-Know Rules
  - Hazard Communication (OSHA)
  - Trade Secrets Provisions
  - Consumer Product Safety Act
- Clean Air Act
- Clean Water Act
- Safe Drinking Water Act

individual and installation training needs to be tracked separately. The first matrix is used to evaluate an individual's training needs, and the second assists in evaluating the training needs of the overall office, based on number of staff, types of experiences, job responsibilities, and particular environmental concerns. Each matrix matches either experience level or job responsibilities with the 12 technical areas.

The first matrix is based on level of experience and previous training, and is used to determine the baseline, required update, and advanced training that an individual staff member may need to be qualified for duties in any of the 12 technical areas. The matrix provides a systematic way to evaluate individual preparation for specific tasks at one of the three experience levels within the 12 technical areas. Completing this evaluation and classification helps designate an appropriate training program for individuals and the installation work force.

At the installation level, the second matrix helps to evaluate the overall staff training needs based on job titles, and relative to responsibilities in the 12 technical areas. This matrix allows the environmental compliance needs at a particular installation to be correlated with specific job series. It also helps to identify training needs of particular types of professionals.

Table 2

Installation-Specific Matrix for Determining Training Requirements Based on Staff Experience Level

Name of installation

Name of individual (for career path planning)

Technical Area: / Experience levels:	Entry level	Technical specialist	Program management		
Army environmental policy and procedures					
[illegible]					
Environmental background and assessment					
[illegible]					
Environmental audit and assessment					
[illegible]					
Air emissions					
[illegible]					
Polychlorinated biphenyls (PCBs)					
[illegible]					
Pesticides/herbicides					
[illegible]					
Wastewater discharge					
[illegible]					
Underground storage tanks					
[illegible]					

Table 3

Installation-Specific Matrix for Determining Training Requirements Based on Need for Technical Area Expertise and Available Staff

Name of installation

Name of individual (for career planning)

Technical Area: / Job title & series:	Environmental protection assistant - 029	[illegible]	Systems analyst - 334	[illegible]	Biology technician - 404	[illegible]	Entomologist - 414	[illegible]	Forestry technician - 462	Agronomist - 471	Wildlife management specialist - 480	Wildlife biology technician - 486	General engineer - 801	Engineering technician - 802	Environmental engineer - 819	Environmental health technician - 698	Environmental specialist - 1301	Physical science technician - 1311
Army environmental policy and procedures																		
[illegible]																		
Environmental background and assessment																		
[illegible]																		
Environmental audit and assessment																		
[illegible]																		
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[illegible]																		
Polychlorinated biphenyls (PCBs)																		
[illegible]																		
Pesticides/herbicides																		
[illegible]																		
Wastewater discharge																		
[illegible]																		
Underground storage tanks																		
[illegible]																		

INSTRUCTIONS:

Place letter(s) in appropriate boxes to indicate level needed.

Entry level (GS 5-7) = E

Technical specialist (GS 9-11) = TS

Program management (GS 12-13) = PM

Subject Area Training Needs and Delivery Methods

Model Training Program

This report includes a training program model to evaluate the feasibility of matching in- and out-of-house training capabilities with the target audiences and their technical training requirements. In concept, this approach tests whether those components can be combined into a workable format. This proposed model centers upon providing needed training to the target audience in the 12 technical areas, and should be combined with the individual and installation training needs assessment matrices listed in Tables 2 and 3. Together, these represent the basic component of a comprehensive environmental and natural resource management training program for TRADOC professionals.

This model training program, detailed in Chapter 3, includes a table for each of the twelve technical areas. Each table lists recommended training courses to provide proficiency in that subject matter area. The tables designate courses as basic, in-depth, or required refresher levels of training, and also include recommended lengths of time and modes of delivery for particular subject matter at appropriate levels. For instance, hands-on experience is appropriate for an in-depth course on asbestos abatement, but the basic level course on asbestos abatement may require mostly classroom lecture on physiology and chemistry. Individuals could be credited for experience and previous training that meet the standards of Baseline Courses, excepting prerequisite Army Environmental Policy and Procedures Baseline Courses that should be required of all staff. All individuals, as appropriate and based on supervisor judgment, would be subject to completion of Required Update Courses (refresher courses). Advanced Courses should be completed systematically according to Individual Development Plans and the technical needs of the installation.

An effective environmental training program can begin to establish a professional career path that does not currently exist for environmental professionals in the federal civil service. Turnover rates of environmental professionals at TRADOC installations are high, as in the Army as a whole. This suggests a strong need for an established career path linked to a tangible incentive program. The October 1989 Senior Environmental Leadership Conference (SELC II) in Atlanta, GA (October 1989) recommended that, to improve the quality of staffing: "A career program for environmental professionals must be developed in the Army. A review of the existing work force must be completed and a cohesive program must be developed."

A training program achieves its greatest value when it provides tangible rewards and clearly defined benchmarks for career-path advancement. Since degrees of training are a measure of individual job performance that can be monitored and credited to an individual, it can be made the basis for advancement. A series of certificates could be established to be awarded upon completion of specific training courses and sets of courses within the 12 technical areas. Using the Model Training Program in Chapter 3, technical area certificate achievement could be developed for each set of courses. For example, the Army Environmental Policy and Procedures module (Table 4) could have three certificates associated with it: (1) an overall certificate of completion for each course, (2) one for each series, and (3) one for the entire technical area.

A certification system also rewards the individual, and documents completed training for personnel, installation training, and Schedule X records. This could be done by recording completion dates in the tables in Chapter 3. Thus, both individual and summary training data for the installation would be readily available. Organization-specific certification for completed training is a successful tool that has been used for decades in the private sector and other professional disciplines. It offers employees clear career-path

goals, provides a format for organizational consistency, and assists in monitoring quality assurance and control, and organizational effectiveness.

A systematic program to create TRADOC-certified training could make the environmental professionals attractive to other government agencies or the private sector. This is a risk; however, losses are already significant now, and certification can be implemented along with retention incentives. As an incentive for the professional to progress technically and also to remain with TRADOC, the training achievement record should attach substantively to the annual performance appraisal process. It can be a powerful incentive and positive motivational factor when training plays a central role in advancement.

Another issue in training content is measuring its effectiveness. Obviously, the usefulness of training is best measured by on-the-job performance after the training. But required examinations or projects for some subject matters may also demonstrate proficiency and retention.

Finally, CEUs could be granted for each course. Outside trainers, such as universities or commercial sources, could grant CEUs for their training. Thus, TRADOC could implement its own CEU system, accredited by outside agencies.

Delivery Methods

Environmental training must offer realistic, hands-on experience. If anything, environmental matters are difficult to convey in a typical classroom setting. However, overall cost effectiveness is a critical concern, because the expense of training can be significant considering time away from the job, travel costs, and cost of the delivery systems. The delivery methods recommended in this model training program consist largely of the classroom lecture format, supplemented heavily by training materials, demonstrations, simulations, interactive workshops, and instructional tools that enhance cost effectiveness.

There are several unique methods that promise to be cost-effective and innovative training techniques. First, global satellite or tele-electronic delivery systems can cut travel costs associated with training while preserving instructor-student contact. The infrastructure is already in place for this technology at all Army installations, by up-link through ALMC and by up/down-link capabilities of the video-teleconferencing facilities available at several TRADOC sites. ALMC estimates cost of remote satellite training to be as low as one-fourth the expense of resident student training. While students may prefer resident instruction, test scores for students trained in satellite and traditional classrooms are comparable to those receiving resident training.

A second recommended delivery method is a "mentor" program. This technique would draw on experienced TRADOC professionals to share their knowledge and expertise with newly hired staff. Such "mentors" could be both Army personnel and outside individuals—university professors or consultants. "Mentors" could contact students by site visits, TV satellite, telephone, or electronic bulletin board. It is hard to document this sort of on-the-job-training (OJT), but memos, letters of interaction, and other indicators (professional organization activity, books and journals read, etc.) can enter an individual's training file under an OJT/self improvement category heading.

Much can be gained from staff interaction with concerned, highly motivated, technical and organizational leaders. Army-specific information should be timely and unclouded by outside translation, and can be applied specifically to the installation and its particular conditions and needs. Also, a sense of team participation can be a positive motivational factor. The principal drawback is that there may be frequent interruptions

since training sessions occur at one's installation. However, this can be overcome with creative location selection and supervisor commitment to the training effort.

A third variation of the mentor approach is the "circuit rider" technique. While the mentor is linked to a specific student, the circuit-rider is one expert instructor, who trains the target audience periodically. An Army-wide electronic bulletin board may offer excellent opportunities to supplement mentor/student interactions, "circuit rider" instruction, other training, or routine information dissemination. Every training opportunity should be used to full advantage. An audit, routine inspection, or any installation visit may be turned into a training opportunity.

Finally, for some areas such as Army-centered training, an autotutorial manual-based training program is appropriate. Such manuals may be revised with inserts and deletions, in looseleaf-style binders. Autotutorials could be traditional hardcopy, or interactive computer-based tutorials.

There is also a need for an intense evaluation of TRADOC training-budget resources, particularly travel expenses. Given the small number of people in the TRADOC work force, a University Without Walls could be more cost effective if all Army environmental professionals were included. An appropriate environmental training program for the entire DOD might be a realistic, long-term goal for this initial TRADOC-centered effort. The cost economics in addressing a large audience should be an early consideration in planning the development and delivery of training. Furthermore, as a video teleconferencing system becomes more refined and better accepted, it could be incorporated with traditionally taught courses.

Training Sources for a University Without Walls

Governmental Sources

Environmental Protection Agency (EPA). In 1985, the EPA Institute was created to provide environmental training to EPA employees and other public sector employees at no charge. The training is conducted at the EPA Institute Headquarters in Washington, DC and at various USEPA facilities throughout the United States. EPA Institute environmental courses cover the following training categories:[3]

1. Science and Technology: Air and Radiation
2. Science and Technology: Cross-Media
3. Science and Technology: Hazardous Materials and Incident Response
4. Science and Technology: Quality Assurance/Quality Control
5. Science and Technology: Risk
6. Science and Technology: Solid and Hazardous Waste
7. Science and Technology: Water and Groundwater
8. Legal, Regulatory, and Enforcement
9. Health and Safety
10. Communications.

The EPA Institute may be contacted by telephone for additional information at (202) 475-6678.

[3] Volume II of this report contains listings of available education sources.

The USEPA also conducts training through the Hazardous Materials Incident Response Training program headquartered in Cincinnati, OH. The courses are held at this location and at various facilities throughout the country. USEPA staff and other public sector employees may take these courses at no charge. The Hazardous Materials Incident Response Training Program may be contacted by telephone for additional information at (513) 569-7537.

Occupational Safety and Health Agency (OSHA). OSHA conducts a variety of occupational safety and health training for its employees and other public sector employees at the OSHA Training Institute in Des Plaines, IL. Although the OSHA Training Institute is primarily concerned with workplace hazards, it is a tremendous resource for occupational cross-training of the TRADOC environmental work force. Currently, the environmental and occupational fields are rapidly merging, a trend likely to accelerate in the future. The OSHA Training Institute may be contacted by telephone for additional information at (312) 297-4810.

U.S. Army Sources. Perhaps, if not already in place, an interagency agreement could share these training resources. Presently, PROSPECT courses are offered through the U.S. Army Corps of Engineers at Huntsville, AL and ALMC at Fort Lee, VA.

Academic and Commercial Sources

Academic and commercial sources of environmental training abound. In general, a major factor indicating the quality of training is the longevity of the program. Should TRADOC pursue a training program using academic or commercial sources, response to specific requests for proposal would be a second evaluation point. Many fliers and brochures were reviewed and this large information base may be built upon in later work. Overall, many training programs already exist on a variety of topics that match TRADOC's needs.

In general, academic continuing education organizations and commercial trainers have several drawbacks. First, many programs tend to specialize; they take on the nature and strengths of the presenters and their organization, emphasize individual interests, and target non-Army audiences. In addition, instructors often come from many places outside the sponsoring training unit, causing an even greater mismatch between teacher and audience. Second, academic and commercial continuing education programs are typically scheduled around institutional and business calendars, which may not match the Government calendar. Third, most environmental courses are not specifically designed for a particular audience. Typically, a brochure lists highly diverse types "who should attend," everyone from interested citizens and managers to corporate personnel and plant engineers. Meeting the specific needs of an organization like TRADOC can be difficult. Finally, many ordinary educational resources cannot accommodate the geographical dispersion of Army personnel. For instance, continuing education training courses for a MACOM may include persons from at least 20 or 30 states with a tremendous variety of backgrounds.

Volume II lists academic and commercial sources for continuing education short-courses, and an article describing a Wayne State University survey of hazardous waste degree programs nationwide, sponsored by the U.S. Department of Health and Human Resources (USDHHR). While the Wayne State survey was intended for those in the hazardous waste field, many courses listed are also appropriate for those in environmental management and protection.

In addition, the Ecological Society of America has done a comprehensive survey of degree programs in ecology and related areas; the U.S. Fish and Wildlife Service, National Ecology Center also provides training. Where career-path planning and TRADOC needs dictate, specific coursework or degree programs

in ecology/environmental science/resource management would be appropriate. There are also many engineering degree programs; the Wayne State University survey includes that information.

Sources of Instructional Aids

A variety of commercial sources of instructional aids available on the market were reviewed for this study. As with the courses and degrees, this is not a complete listing, but a sampling of available items. Volume II also includes a summary article on environmental software.[4] These programs' relevance to TRADOC training needs should be evaluated during curriculum refinement.

Coordination of Sources

A University Without Walls can be organized in one of two ways: (1) by contracting a trainer to provide all training needs, or (2) by contracting individual trainers to give courses on foundations in Army policy and procedures as needed. In the former case, providing a trainer with a specific educational charge for well-defined audiences is feasible. To be completely relevant and satisfy students' expectations, the contract courses must be more than minor fine tuning of an off-the-shelf product. However, shaping a contractor's expertise to one's unique needs can be expensive. In reality, certain Army-specific matters are unique and will demand special treatment, while purely technical aspects will be much more generic.

[4]Gerald A. Rich, "Environmental Software Review: 1990," *Pollution Engineering*, Vol XXII, No. 1, pp 90-97.

3 MODEL TRAINING PROGRAM

Introduction

This feasibility model was developed to test the feasibility of structuring a cost-effective program to meet the needs of TRADOC target audiences. It is assumed that the primary motivation for training is regulatory compliance. The environmental ethic, however, is a consistent and strong theme throughout all U.S. Army environmental training programs.

The following sections detail the model training program for the 12 fundamental technical areas. This preliminary model was developed to help evaluate the scope of needed training. The model attempts to reconcile training needs, training mechanisms, resources, and the realities of the diverse work force into a reasonable and workable solution.

The environmental training topics have been grouped into 12 technical area training modules:

1. General U.S. Army Environmental Policy and Procedures
2. Overview of Environmental Laws and Regulations
3. NEPA Process and Environmental Audit and Assessment
4. Air Emissions
5. Hazardous Materials Management, Hazardous Waste Management, PCBs, Pesticides, and POLs
6. Solid Waste Management
7. Wastewater Discharge
8. Drinking Water
9. Underground Storage Tanks
10. Noise
11. Natural Resources
12. Cultural Resources and Historical Preservation.

Each subject area includes summary training on environmental laws, Army procedures and protocols, and technical topics. Each technical area training module includes a discussion of the subject matter, the nature of basic training, and the regulatory or policy implications for training. A detailed discussion of environmental regulatory trends is included to help structure a comprehensive but realistic program. Each section also includes a table of courses to fulfill the training requirements in that subject area. The tables organize courses by the three target audiences: (1) Entry Level, (2) Technical Specialist, and (3) Program Management; and over the three levels of difficulty: (1) Baseline, (2) Advanced, and (3) Refresher.

General U.S. Army Environmental Policy and Procedures

The Army sets forth its environmental program through Army regulations, pamphlets, and technical manuals. All environmental professionals must understand Army policy with respect to writing and implementing environmental laws and regulations. Environmental professionals must also understand the technical aspects of the Army environmental program, and also the administrative policies and procedures of budgeting, scheduling, programming, resources management, procurement, and reporting.

All three target audiences should understand the Defense Environmental Restoration Program (DERP) (DOD, 12 September 1988), which includes identification, investigation, research and development, and cleanup of hazardous substances, pollutants, and contaminants; correction of other environmental damage; and removal and/or demolition of unsafe buildings and structures.

Environmental compliance has become a matter of personal liability, given the ever increasing number of criminal charges brought against individuals for environmental infractions. The precedent-setting court case at Aberdeen Proving Ground has set the stage for individual criminal prosecution for environmental offenses. Matters of liability should be included in any training that focuses on Army policy, organization, and procedures. The target staff should be encouraged to establish formal communication with the installation commander to heighten senior management's sensitivity to the importance of environmental management.

Frequent changes in the statutes, regulations, and Army environmental program may result in major frustration and additional costs. To avoid costly revisions to a structured curriculum program, an autotutorial manual method, along with a mentor program for new employees, would be an efficient and cost-effective method. Looseleaf manuals, updated on a regular basis section by section, much like subscription services or organizational procedures manuals, are a desirable alternative to textbook centered learning.

Table 4 gives the initial program suggested for this technical area.

Overview of Environmental Laws and Regulations

Environmental professionals must have training on fundamental environmental laws and regulations. As these laws change through reauthorization and technical advances, refresher training is also needed periodically.

The various laws and regulations include:

1. RCRA, SARA, and CERCLA
2. Solid Waste Management
3. Asbestos Abatement
4. TSCA, FIFRA, and OSHA Related Safety and Health Interface
5. Right-to-Know Rules:
   a. Hazard Communication (OSHA)
   b. Trade Secrets Provisions
   c. Consumer Product Safety Act
6. Clean Air Act
7. Clean Water Act
8. Safe Drinking Water Act
9. National Environmental Policy Act (NEPA).

Table 5 displays proposed minimum training sessions needed on environmental laws.

Table 4
Army Environmental Policy and Procedures Training

	Baseline Courses		Required Update Courses		Advanced Courses	
Course	Length	Mode of Delivery	Length	Mode of Delivery	Length	Mode of Delivery
Army Environmental Organization, Policy, and Procedures	Varies	Autotutorial manual with mentor continuous update of modifications [b]	1/2 day	Teleconference/video with text and/or electronic bulletin board [b]		
Army Budgeting and Procurement	Varies	Autotutorial manual with mentor continuous update of modifications [b]	1/2 day	Teleconference/video with text and/or electronic bulletin board [b]		

[Experience/Grade Level]
- a = All levels as appropriate
- b = Required by all involved or demonstrated proficiency

E, TS, PM = Entry Level (GS 5-7)
Technical Specialist (GS 9-11)
Program Management (GS 12-13)

Table 5
Overview of Environmental Laws and Regulations Training—U.S. Army Context Training

Course	Baseline Courses: Length	Baseline Courses: Mode of Delivery	Required Update Courses: Length	Required Update Courses: Mode of Delivery	Advanced Courses: Length	Advanced Courses: Mode of Delivery
WASTE MANAGEMENT SERIES						
Resource Conservation and Recovery Act	2 days	Lecture/teleconference	1/2 day	Teleconference/video electronic bulletin board		
Superfund Amendments Reauthorization Act						
CERCLA						
Solid Waste Management Act (Anticipated)		[b]		[b]		
HEALTH MANAGEMENT SERIES						
Asbestos Legislation TSCA and FIFRA	1 1/2 days	Lecture/teleconference	1/2 day	Teleconference/video electronic bulletin board		
Right-to-Know-Rules: Haz Communication Trade Secrets Consumer Product Safety Act		[b]		[b]		
AIR AND WATER SERIES						
Clean Air Act Clean Water Act and Safe Drinking Water Act	1/2 days	Lecture/teleconference	1/2 day	Teleconference/video electronic bulletin board		
		[b]		[b]		

[Experience/Grade Level]

a = All levels as appropriate

b = Required by all involved or demonstrated proficiency

E, TS, PM = Entry Level (GS 5-7) Technical Specialist (GS 9-11) Program Management (GS 12-13)

NEPA Process and Environmental Audit and Assessment

Many actions at TRADOC installations under the jurisdiction of the National Environmental Policy Act (NEPA). From construction projects to Superfund restoration projects, TRADOC is frequently required to perform varying levels of environmental impact evaluation, including all steps in the NEPA impact analysis and documentation process.

A report entitled *Army Environmental Review Process (Implementation of NEPA)*[5] correlates the NEPA process with the needs and policies of the Army. This document can be expanded to develop courses that meet the needs of the three target audiences, and accomplish a successful NEPA action.

The NEPA process demands a consistent procedural approach and implementation of the law. There are three occasionally overlapping roles in the NEPA process. One role is to analyze environmental impacts, another is to supervise the effort, and the final role is to review the process and report the outcome to both installation commanders and the public. A series of training courses is proposed in Table 6 to meet these various functional responsibilities.

SELC II addressed the need to "develop and implement a standard Army environmental audit protocol." The environmental audit concept as a format for administering this aspect of organizational management has been evolving for over a decade. Many private consulting firms, federal and state agencies, and industrial companies have established a standard environmental audit protocol. The recently revised AR 200-1 specifies Environmental Review for Management Action (ERMA) as the Army audit protocol.

Table 6 presents a series of courses that would promote ERMA as the standard Army audit protocol, and provides an expertise to help focus the many technologies and aspects of environmental management. The environmental assessment series includes courses that develop skills to understand, monitor, and evaluate management and remedial activity related to land, air, water, and biotic ecosystem components.

Air Emissions

The technical area of air emissions includes three primary categories: (1) air pollution source management, (2) ambient air quality, and (3) indoor air quality. The latter overlaps "occupational health," but should still be considered, if only because of potential fugitive emissions. Where environmental and occupational health and safety regulations converge, it is prudent to require routine communication and interaction between professionals in these two areas. The industrial hygienist and the environmental coordinator should share expertise and information more often than they presently do. Health risk assessment related to National Priority List sites and all hazardous waste management activities is but one important example of potentially beneficial interaction. Many economies can be achieved by such interactions.

[5]Law Environmental, *Army Environmental Review Process, Implementation of NEPA* (March 1989).

Table 6
NEPA Review Process and Environmental Audit and Assessment Training

Course	Baseline Courses		Required Update Courses		Advanced Courses	
	Length	Mode of Delivery	Length	Mode of Delivery	Length	Mode of Delivery
NEPA REVIEW PROCESS SERIES						
U.S. Army Environmental Impact Review Process and NEPA and CEQ	1/2 days	Lecture/teleconference or video [b]	1/2 day [b]	Teleconference/video occasional	2 days	Lecture [TS, PM]
Impact Assessment Components and Data Gathering Methods					1 day	Lecture/teleconference/video [TS, PM]
Impact Interpretation and Analysis					2 days	Lecture/teleconference/video [TS, PM]
Review of U.S. Army EAs and EISs					2 days	Teleconference/video [TS, PM]
Mitigation and Monitoring					2 days	Teleconference/video [TS, PM]
ENVIRONMENTAL AUDIT SERIES						
Basic Environmental Auditing	3 days	Lecture/video/simulation/ teleconference [b]	1/2 day	Teleconference/video occasional update [b]		
Environmental Audit as a Management Tool: U.S. Army Protocol					2 days	Teleconference/video/ simulation [pM]
Obtaining Environmental Audit Information and Sampling					1 day	Lecture/video/teleconference [TS, PM]

[Experience/Grade Level]

a = All levels as appropriate

b = Required by all involved or demonstrated proficiency

E, TS, PM = Entry Level (GS 5-7)
Technical Specialist (GS 9-11)
Program Management (GS 12-13)

Table 6 (Cont'd)

NEPA Process and Environmental Audit and Assessment Training

Course	Baseline Courses		Required Update Courses		Advanced Courses	
	Length	Mode of Delivery	Length	Mode of Delivery	Length	Mode of Delivery
ENVIRONMENTAL AUDIT SERIES (Cont'd)						
Analyzing and Reducing Environmental Audit Information					1 day	Lecture/demonstration/ teleconference/video [TS, PM]
Close-out Sessions and Reporting					2 days	Lecture/simulation/teleconference
Follow-up and Verification of Environmental Audit					1 day	Lecture/teleconference [TS, PM]
ENVIRONMENTAL ASSESSMENT SERIES						
U.S. Army Environmental Management System	2 days	Lecture/teleconference/video [b]				
Ecological Principles					3 days	Lecture/workshop/ textbook/video [TS, PM]
Jurisdictional Wetlands Determination					4 days	Lecture/field demonstration [TS, PM]
Basic Environmental Toxicology					3 days	Lecture/workshops textbooks [TS, PM]
Basic Environmental Statistics					3 days	Lectures/workshops textbooks [TS, PM]

[Experience/Grade Level]

a = All levels as appropriate
b = Required by all involved or demonstrated proficiency

E, TS, PM = Entry Level (GS 5-7)
Technical Specialist (GS 9-11)
Program Management (GS 12-13)

Table 6 (Cont'd)

NEPA process and Environmental Audit and Assessment Training

Course	Baseline Courses		Required Update Courses		Advanced Courses	
	Length	Mode of Delivery	Length	Mode of Delivery	Length	Mode of Delivery
ENVIRONMENTAL ASSESSMENT SERIES (Cont'd)						
Fundamentals of Epidemiology					3 days	Lectures/workshops textbooks/teleconference/video [TS, PM]
Introduction to Environmental Software and Data Bases					2 days	Lecture/dDemonstration/ tutorial [TS, PM]
Environmental Risk Assessment					4 days	Lecture [TS, PM]

[Experience/Grade Level]

a = All levels as appropriate
b = Required by all involved or demonstrated proficiency

E, TS, PM = Entry Level (GS 5-7)
Technical Specialist (GS 9-11)
Program Management (GS 12-13)

Some central air pollution source management highlights are:

1. Clean Air Act Reauthorization: Current issues facing Congress include acid rain, toxic air pollutants, stratospheric ozone, carbon monoxide, and ozone attainment. These issues translate into Army activities as diverse as boiler-plant emissions of toxic and acid precursors (sulfur dioxide, nitrogen oxides), vehicle emissions, toxic air-pollutant releases from a variety of source types, and VOC emissions.

2. Hazardous Waste Incinerators: USEPA has indicated that hazardous waste incinerators will be permitted based on performance rather than health risk assessment.

3. Medical Waste Incinerators: Medical waste incineration is under review. Several agencies have found virtually all such units to have significant problems with the types of waste and locations of the existing incinerators. In many cases, new incinerator design and location will be required as new environmental standards are researched, developed, and applied.

4. Land Ban: At least for the next few decades, the land ban on certain chemicals (e.g., halogenated solvents) will increase the need for expanded recycling or incineration of these substances.

Principal evolving changes in ambient air quality include:

1. Toxic Air Pollution: Most states have approved or proposed toxic air pollution regulations. Thus, review of air pollution sources to determine emission estimates, possible required testing, ambient air quality modeling, ambient air sampling, or even health risk assessments may be necessary to obtain permits for certain operations.

2. Open Burning/Open Detonation: Open burning and open detonation of hazardous materials will require a Part B permit under RCRA.

3. Land Disposal Operations: Regulatory agencies are concerned over air pollution releases from land disposal operations, and new monitoring requirements are being written.

4. Waste Oil Burning: "On specification" waste oil may be burned in a nonindustrial boiler if records are kept. "Non-spec" waste oil may be burned in an industrial or utility boiler; however, if the waste oil is hazardous (i.e., contain metals, etc.) records must be kept. New standards are under development.

5. Audits: The concept and approach of environmental auditing can play a key role to start or continue programs to protect human health and the environment.

Table 7 displays the proposed courses for the air emissions module.

Hazardous Materials Management, Hazardous Waste Management, PCBs, Pesticides, and POLs

Hazardous materials management spans many disciplines. The training of personnel to work with or manage hazardous materials must address the many disciplines that provide a safe and effective management

Table 7
Air Emissions Training

Course	Baseline Courses: Length	Baseline Courses: Mode of Delivery	Required Update Courses: Length	Required Update Courses: Mode of Delivery	Advanced Courses: Length	Advanced Courses: Mode of Delivery
AIR QUALITY SERIES						
Fundamentals of Air Management (Including Applicable Regulations)	3 days	Lectures/workshops equipment demonstrations field exercises textbooks [b]	1/2 day	Teleconference with text and/or electronic bulletin board [a]		
Fundamentals of Air Pollution Control			1/2 day	Teleconference with text and/or electronic bulletin board [a]	3 days	Lectures/workshops field exercises textbooks [TS, PM]
Air Pollution Meteorology					3 days	Lectures/workshops field exercises textbooks [TS, PM]
Air Toxic Source Monitoring					3 days	Lectures evaluation equipment demonstrations field exercises textbooks [TS, PM]
AIR EMISSIONS SERIES						
Ambient Air Monitoring & Evaluation					3 days	Lectures/workshops equipment demonstrations field exercises textbooks [TS, PM]
Volatile Organic Air Pollutants: Sources & Control					2 days	Lectures/workshops textbooks [TS, PM]

[Experience/Grade Level]

a = All levels as appropriate
b = Required by all involved or demonstrated proficiency

E, TS, PM = Entry Level (GS 5-7)
Technical Specialist (GS 9-11)
Program Management (GS 12-13)

Table 7 (Cont'd)

Air Emissions Training

Course	Baseline Courses: Length	Baseline Courses: Mode of Delivery	Required Update Courses: Length	Required Update Courses: Mode of Delivery	Advanced Courses: Length	Advanced Courses: Mode of Delivery
AIR EMISSIONS SERIES (Cont'd)						
Environmental Radon: Detection & Control			1 Day	Teleconference occasional [a]	1 day	Lectures/workshops equipment demonstration field exercise textbooks [a]
Motor Vehicle Emissions: Evaluation & Control					3 days	Lectures/workshops equipment demonstrations textbooks [TS, PM]
Introduction to Air Pollution Dispersion Models: Concepts & Application					4 days	Lectures/workshops textbooks [TS, PM]
Emissions Inventory Calculations					3 days	Lectures/workshops textbooks [TS, PM]

[Experience/Grade Level]

a = All levels as appropriate
b = Required by all involved or demonstrated proficiency

E, TS, PM = Entry Level (GS 5-7)
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Program Management (GS 12-13)

program. While on-the-job training is common in educating new personnel, it is not a comprehensive education. Training must be an ongoing process as new technologies and regulations evolve.

Courses in hazardous materials cover such diverse topics as basic chemistry, toxicology, industrial hygiene, emergency planning, groundwater protection, monitoring and safety equipment, engineering controls, and legal/liability and regulatory ramifications (see Volume II, ch. 2). Hazardous waste management cuts across nearly every aspect of environmental management. Subject matter content must minimumally include: (1) handling of generators, (2) transporter, (3) treatment, storage, and disposal (TSD) facility permitting, (4) safety and health, and (5) waste/source reduction and minimization coverage. Many economies can be achieved by combining hazardous materials training in these topic areas; therefore, the course offerings proposed here center upon regulation-related aspects of hazardous waste management.

Some important emerging areas of concern in hazardous waste management are:

1. Open Burning/Open Detonation (OB/OD): USEPA has offered assistance with preparation of Part B permits for OB/OD. Applications for assistance were submitted November 1988.

2. Medical Waste: Medical wastes are under review, particularly from state regulators.

3. RCRA Part B Permits and Closure of Hazardous Waste Facilities: Impending closure of TSD facilities will be expensive and difficult.

4. Source Reduction and Minimization: Easy "hazmin" approaches should already be in place. The more technically difficult approaches and the identification of the more apparent expensive alternatives should be in progress. In the long run, overall "hazmin" activity (i.e., recycle, reuse, purchasing protocols, product substitution, housekeeping, process modification) can have a positive effect on operational budgets.

5. Land Disposal Ban: Land disposal bans will cause more on-site treatment and incineration, but the source reduction/minimization alternatives should be most useful.

Because of the relation between hazardous materials and waste, polychlorinated biphenyls (PCB); pesticides; and petroleum, oil, and lubricants (POL) management are included here as well. The POL management represents a major opportunity to achieve recycling and reuse of materials. In addition to the shared training associated with both hazardous material and hazardous waste management, training of professionals in this area should center upon conservation opportunities.

Table 8 lists the recommended courses for the hazardous materials module.

Solid Waste Management

Solid waste management incorporates supervision and administration of operations designed to collect, separate, store, transport, treat, and process solid waste. As population increases, the resulting advances in technology, manufacturing, and food production, among others, have increased the amount

Table 8

Hazardous Materials Management, Hazardous Waste Management, PCBs, POLs, and Pesticides Training

Course	Baseline Courses		Required Update Courses		Advanced Courses	
	Length	Mode of Delivery	Length	Mode of Delivery	Length	Mode of Delivery
HAZARDOUS MATERIALS SERIES						
Army Hazardous Materials Symposium*	1 day	Presentations occasional [b]				
Hazardous Material Control and Emergency Response (HMCER)					5 days	Lecture/field exercise [a]
Hazardous Materials Eight Hour** Refresher			1 day	Lecture Note: required annually [b]		
Hazardous Mat. Management: Considerations	3 days	Lecture/demonstration or teleconference/videotape [b]	4 hour	Lecture/demonstration video presentation [b]		
Occupational Respiratory Protection						
Introduction to Chemical Properties and Toxicology						
Understanding and Managing MSDSs						
Sampling for Hazardous Materials***					2 days	Lecture/demonstration [a]
Managing the Transportation of Hazardous Materials			1 day	Lecture [a]	1 day	Lecture or teleconference/videotape [a]
Introduction to Groundwater: Contamination, Investigation, and Remediation Assessment					2 days	Lecture [a]
Hazardous Materials Storage Practices					1 day	Lecture or teleconference/videotape [a]

*This symposium could be structured as a part of some other annual conference. It would offer an opportunity for all Army personnel to interact and receive input from a wide variety of internal sources regarding other programs, problems, and solutions.
**This is an annual refresher for the HMCER course.
***To be updated as appropriate and reviewed annually.

[Experience/Grade Level]
a = All levels as appropriate
b = Required by all involved or demonstrated proficiency

E, TS, PM = Entry Level (GS 5-7)
Technical Specialist (GS 9-11)
Program Management (GS 12-13)

Table 8 (Cont'd)

Hazardous Materials Management, Hazardous Waste Management, PCBs, POLs, and Pesticides Training

Course	Baseline Courses		Required Update Courses		Advanced Courses	
	Length	Mode of Delivery	Length	Mode of Delivery	Length	Mode of Delivery
HAZARDOUS MATERIALS SERIES (Cont'd)						
SARA Title III			1/2 day	Video/teleconference with text	2 days	Lectures/workshops
				[a]		[a]
Advanced Supervision of Asbestos Abatement					4 days	Lecture/video/ workshops/text
						[a]
Supervision of Asbestos Abatement Projects	4 days	Lecture/video workshops/text				
		[b]				
Respiratory Protection					2 days	Lecture/video/ workshops/text
						[a]
Asbestos Abatement: Roofing					1 day	Lecture/video/ workshops/text
						[a]
AHERA Management					2 days	Lecture/video/ workshops/text
						[a]
HAZARDOUS WASTE SERIES						
RCRA Generators, Transporters, and TSD Facilities Course Note: Each category should have a 1-day annual update			1 day	Lecture [a]	3 days	Lecture [a]
Hazardous Waste Site Cleanup Operation			1 day	Lecture/demonstration Note: OSHA required annually	3 days	Lecture/demonstration Note: required annually
				[a]		[a]
Hazardous & Medical Waste Incineration Note: The nonsupervisor/manager categories should have 1-day update					3 days	Lectures/Workshops Textbooks [a]

[Experience/Grade Level]

a = All levels as appropriate
b = Required by all involved or demonstrated proficiency

E, TS, PM = Entry Level (GS 5-7)
Technical Specialist (GS 9-11)
Program Management (GS 12-13)

Table 8 (Cont'd)

Hazardous Materials Management, Hazardous Waste Management, PCBs, POLs, and Pesticides Training

Course	Baseline Courses: Length	Baseline Courses: Mode of Delivery	Required Update Courses: Length	Required Update Courses: Mode of Delivery	Advanced Courses: Length	Advanced Courses: Mode of Delivery
HAZARDOUS WASTE SERIES (Cont'd)						
RCRA Part B Permitting Storage and Treatment Facilities Landfills Incinerators			1 day	Overview and refresher of all three areas Teleconference with text [a]	5 days 5 days	Lecture/demonstrational workshops/video/textbooks [TS, PM]
Source and Waste Reduction and Minimization Strategies	2 days	Teleconference with text [b]	1 day	Teleconference [a]		
PCB SERIES						
Fundamentals of PCB Management (Including Fed., State, Local Regulations)					1 day	Lectures textbooks teleconference [a]
Storage & Disposal of PCBs or PCB Items					1 day	Lectures textbooks teleconference/video [a]
PESTICIDE SERIES						
Fundamentals of Pesticide Management					1 day	Lectures textbooks [b]
Safe Pesticide Use, Storage, & Disposal					3 days	Lectures workshops/field exercises textbooks [a]
Formulating a Pest Management Program					1-2 days	Lectures [a]

*This is specialized training for responsibilities that might be centralized within the Army. Installation staff may need less intensive training that enables monitoring of the permit process.
**A 1/2-day refresher format for all target audiences. Designed to cover recent changes in industry practice, Army practice, and regulatory changes. As in many other instances, use of satellite networking may be most cost effective.

[Experience/Grade Level]

a = All levels as appropriate
b = Required by all involved or demonstrated proficiency

E, TS, PM = Entry Level (GS 5-7)
Technical Specialist (GS 9-11)
Program Management (GS 12-13)

Table 8 (Cont'd)

Hazardous Materials Management, Hazardous Waste Management, PCBs, POLs, and Pesticides Training

Course	Baseline Courses		Required Update Courses		Advanced Courses	
	Length	Mode of Delivery	Length	Mode of Delivery	Length	Mode of Delivery
POL SERIES						
Management of Recoverable and Waste Liquid Petroleum Products Plan					1 day	Lecture/teleconference [a]

[Experience/Grade Level]

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of solid waste generated. Increases in waste generation rates have been accompanied by increased efforts to manage such wastes.

Federal, state, and local government agencies have enacted regulations to help manage solid wastes in a controlled and standardized way. Waste minimization and recycling play greater roles in facility or organization solid waste planning. The burden placed on limited and expensive land resources by the disposal of solid waste has also caused much concern over landfill management and land use. The shortage of land for waste sites has sparked an interest in developing alternate forms of waste disposal. Knowledge of the provisions of RCRA and other regulations is essential to solid waste management.

Environmental concern over solid waste management does not end when the material is delivered to a landfill. Open dumping itself is seen as a threat to health and the environment. Officials are beginning to include air pollution, water pollution, and groundwater contamination in the overall picture of solid waste management.

Key issues to be covered in solid waste management training include:

1. Solid Waste Regulations: Currently, solid waste regulations are pending action in Congress, but when enacted may result in regulations that require sanitary landfills to become the functional equivalent of hazardous waste landfills. This has implications for offsite disposal and onsite landfill design and operation. Sanitary landfill space nationwide is decreasing rapidly, and the NIMBY (Not In My Back Yard) and NIMTO (not in my term of office) syndromes are working against new landfills.

2. Possible Closure of Abandoned Drinking Water and Ground Water Monitoring Wells: Many states are considering formal closure of old drinking water wells that are judged to be a threat to groundwater resources.

3. New (Proposed) USEPA Regulations Regarding Landfills: USEPA proposed landfill regulations (40 CFR 258), if unchanged, will be very expensive, requiring groundwater and methane monitoring, liners, leachate collection, location restrictions, and corrective actions measures for releases. This latter area will require identification, description, and evaluation of solid waste management units (SWMUs). Where releases have occurred, the USEPA will require detailed field investigations and remedial measures.

4. USEPA Regulations (Pending) Regarding Corrective Action Provisions of RCRA.

Table 9 is a summary of the recommended training in solid waste management.

Wastewater Discharge

The training of wastewater discharge centers on biological, physical/chemical, and land treatment of wastewaters and sludges. Generally the course will consist of classroom lectures and textbooks for all three target audiences. However, those tasked specifically with wastewater discharge programs should attend longer, more detailed sessions that include equipment demonstrations.

Table 9

Solid Waste Protocol Training

Course	Baseline Courses		Required Update Courses		Advanced Courses	
	Length	Mode of Delivery	Length	Mode of Delivery	Length	Mode of Delivery
SOLID WASTE SERIES						
Land Disposal Restrictions Program Implementation					2 days	Lecture teleconference [a]
Landfill Management					2 days	Lecture/textbook teleconference [a]
Solid Waste Incineration Monitoring			1/2 day	Teleconference [a]	1 day	Lecture [a]
Waste Reduction and Minimization Strategies	1 day	Teleconference [a]				

[Experience/Grade Level]

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An Operations Management program will consist of a 3-day classroom lecture format, including workbooks, computer operations, and equipment demos for technical specialists. The supervisor and program management staff course would be less detailed and shorter.

This area concentrates on the Clean Water Act. Emerging areas of importance in wastewater discharge overlap with other technical areas. Some areas affected by the Clean Water Act include:

1. Clean Water Act Amendment of 1987: CWA emphasis will center on (1) nonpoint discharges, e.g., building and construction, pesticide/herbicide use, OB/OD areas, surface runoff-leachate from landfills and waste piles, (2) risk assessment of wastewater toxicity (Toxicity Reduction Evaluation [TRE]), (3) storm water discharges, solutions to noncompliance, and sludge management in light of regulations about to move to final rule status.

2. Underground Storage Tank Regulations: Installations will receive increasing attention regarding UST management programs, spill control, and leak detection.

3. Field Waste Water: Field operations (nonfacility based activities, such as construction) wastewater generation needs some innovative treatment technology.

4. Mobilization: Predicting environmental effects during Army mobilization and seeking waivers from federal, state, and local agencies is important. This involves writing an environmental impact statement (EIS).

5. Hazardous Waste Source Reduction and Minimization: Source reduction and minimization is a key element for any facility environmental planning program. The next reauthorization of RCRA may be called the Hazardous Waste Reduction Act.

Table 10 displays the proposed training courses for this area.

Drinking Water

As the world's supply of drinking water comes under increasing demand, it is important to ensure that available water is safe to drink. One possible approach is to recycle waste water into acceptable drinking water. Federal, state, and local legislation, such as the Safe Drinking Water Act, address these issues.

To better understand the processes of supplying safe drinking water, a basic knowledge of the principles of ground and surface water hydrology, along with water-quality monitoring, is important. These fundamentals can help to understand the movements of surface and underground water, and to predict or determine possible sources of contamination. Additionally, the knowledge of groundwater movement may affect land-use planning. Particular emphasis items within the drinking-water topic include:

1. Lead in Drinking Water: USEPA regulations are being written to address lead at points of consumption, including water coolers.

Table 10

Wastewater Discharge Training

Course	Baseline Courses: Length	Baseline Courses: Mode of Delivery	Required Update Courses: Length	Required Update Courses: Mode of Delivery	Advanced Courses: Length	Advanced Courses: Mode of Delivery
WASTEWATER SERIES						
Treatment Process Biological Physical/Chem Sludge			1 day	Lectures textbooks teleconference/video [a]	2 days	Lectures textbooks equipment demonstrations [a]
Operations Management			1 day	Lectures workbook computer operations teleconference/video [a]	3 days	Lectures workbook computer operation equipment demonstrations [a]
NPDES			1 day	Lecture/workshop teleconference/video [a]	2 days	Lecture/workshop teleconference [a]
Stormwater Management			1 day	Lecture/workshop video [a]	2 days	Lecture/workshop teleconference [a]

[Experience/Grade Level]

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2. Corrosivity Reduction and Volatile Organic Constituents (VOCs) Program: The corrosivity issue, previously one of aesthetics, is being driven by the health-based lead/copper rule and by concern over unregulated VOCs.

3. Groundwater Sources and Drinking Water Surveillance Program: Both the groundwater and drinking water surveillance programs should command critical attention. Under SWDA, states must have groundwater protection plans in place by 1990 and implemented programs by 1992. Water sampling may be needed.

4. Increased Complexity/Score of Drinking Water Regulations: The USEPA has proposed regulations that will require filtration of all surface water supplies.

5. Stricter Enforcement of Drinking Water Requirements: The USEPA is expected to increase emphasis on noncompliance with drinking water regulations and will begin to employ stiffer fines.

Table 11 summarizes a proposed course of study for those involved with issues of drinking water.

Underground Storage Tanks

There are three general areas of required underground storage tank (UST) training. The first area of instruction is corrective action requirements. Although Federal requirements for corrective action programs are relatively few, several states have enacted their own regulations in this area. Many UST owners minimize future liability by including extensive monitoring equipment at installation. Nevertheless, TRADOC will undoubtedly need to monitor and correct its aging USTs. The proposed training program will use classroom lecture, equipment demonstrations, and videotapes.

The second is UST installation and design. In this course, several days of instruction will inform TRADOC environmental professionals of correct procedures to install USTs in compliance with the USEPA requirements of September, 1988. This training includes a combination of classroom lectures and hands-on field exercises to ensure that personnel understand the equipment and materials needed to adequately design and install new UST facilities at TRADOC installations.

Finally, RCRA requirements and ongoing state requirements must be monitored by TRADOC personnel. Under contract, USEPA developed a program called "Reg-in-A-Box." This program outlined RCRA requirements for USTs.

Additional textbooks and regulatory update services are also available and should be used by TRADOC personnel on an ongoing basis.

Table 12 summarizes the proposed underground storage tank training program.

Noise

Environmental noise abatement is an important responsibility of TRADOC installations. It includes not only mitigation of adverse noise impacts, but also minimization, through noise reduction engineering,

Table 11

Drinking Water Training

Course	Baseline Courses: Length	Baseline Courses: Mode of Delivery	Required Update Courses: Length	Required Update Courses: Mode of Delivery	Advanced Courses: Length	Advanced Courses: Mode of Delivery
WATER QUALITY SERIES						
Groundwater and Surface Water Monitoring and Compliance			1 day	Teleconference	2 days	Lecture
				[a]		[a]
Assessment and Management of Drinking Water Contamination			1/2 day	Lecture	2 days	Lecture
				[a]		[b]
Construction of Groundwater Monitoring Wells			Varies	Videotape	2 days	Lecture/videotape field exercises
				[a]		[a]
WATER TREATMENT SERIES						
Water System Operation and Maintenance			1/2 day	Lecture occasional	2 days	Lecture/textbook
				[a]		[a]
Water Treatment Plant Operations			1/2 day	Lecture occasional	2 days	Lecture/textbook teleconference
				[a]		[a]

[Experience/Grade Level]

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Program Management (GS 12-13)

Table 12

Leaking Underground Storage Tanks Training

Course	Baseline Courses: Length	Baseline Courses: Mode of Delivery	Required Update Courses: Length	Required Update Courses: Mode of Delivery	Advanced Courses: Length	Advanced Courses: Mode of Delivery
Underground Storage Tank Installation & Design Workshop			1/2 day	Lectures/ teleconference	3 days	Lectures hands-on
				[a]		[a]
Corrective Action Alternatives and Plans			1 day	Videotapes lecture teleconferences videotapes	2 days	Lectures equipment demonstration textbooks teleconference videotapes
				[a]		[a]

[Experience/Grade Level]

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administrative and operational controls, land use planning and control, and siting and design of facilities and ranges. Proficiency in environmental noise abatement includes the ability to assess and predict environmental noise, and to create accurate noise simulation. Important federal laws governing noise abatement include the Noise Control Act of 1972 and the Quiet Community Act of 1978. A major Department of Defense regulation is the DOD Air Installation Compatible Use Zone (AICUZ) Instruction 4165.57, and AR 200-1, Chapter Six, which describe the Army Installation Compatible Use Zone (ICUZ) program.

Training in this area must provide background on noise mitigation and management. Principal aspects include mitigation, source control, assessment prediction, and management. The latter area encompasses sound propagation, instrumentation for acoustic measurement, and human response. These courses are designed to familiarize TRADOC environmental staff with areas such as sound absorbing technology, noise monitoring and mitigation, weapons firing, aircraft and vehicular noise, all within the concept of the ICUZ program.

Table 13 lists proposed courses for this area.

Natural Resources

The natural resources subject area encompasses conservation, management, and restoration of lands and their renewable resources, such as forests and wildlife. This includes conservation, management, and use of soils, water areas, croplands, rangelands, forests, and fish and wildlife species.

Training in this area centers on basic natural resource management, including identification of plants, animals, and their habitats. Land management training includes coordinating outdoor recreation needs with resource production, such as food, fiber, and timber products. Natural resource management also involves protection and enhancement of environmentally sensitive areas, such as flood plains, wetlands, steep slopes, aquifer recharge zones, and natural areas. Land use planning is another significant effort of natural resource and land management. Training in wildlife management includes application of scientific and technical principles related to maintaining and preserving the ecological balance in wildlife populations and habitats, especially identification and monitoring of threatened or endangered species, as identified by the U.S. Department of the Interior.

Table 14 includes specialized courses on a variety of topics in natural resource management that represent additional skills broadly needed by most TRADOC environmental professionals.

Cultural Resources and Historical Preservation

The subject area of cultural and historical resource preservation includes standards for the treatment of historic properties, including buildings, structures, objects, districts, sites, archeological materials, and landmarks. Specific training centers on the requirements of the National Historic Preservation Act (NHPA) of 1966 with respect to locating, identifying, evaluating, and treating historic properties.

Table 13

Noise Training

Course	Baseline Courses		Required Update Courses		Advanced Courses	
	Length	Mode of Delivery	Length	Mode of Delivery	Length	Mode of Delivery
Environmental Noise Management			1-2 hour	Videotape [b]	1-2 hour	Videotape [b]
Environmental Noise Evaluation and Control			1-2 hour	Videotape [b]	5 days	Lecture/workshop fieldexercise textbook [a]

[Experience/Grade Level]

a = All levels as appropriate

b = Required by all involved or demonstrated proficiency

E, TS, PM = Entry Level (GS 5-7)
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Program Management (GS 12-13)

Table 14

Natural Resources Training

Course	Baseline Courses Length	Baseline Courses Mode of Delivery	Required Update Courses Length	Required Update Courses Mode of Delivery	Advanced Courses Length	Advanced Courses Mode of Delivery
NATURAL RESOURCES MANAGEMENT SERIES						
Overview of Natural Resource Management	2 days	Lecture/teleconference [b]				
Land-use Planning					1 day	Lecture/workshop/ textbook/video [TS, PM]
Land, Forest and Wildlife Management and Remediation					5 days	Lecture/workshop/ textbook/video [TS, PM]

[Experience/Grade Level]

a = All levels as appropriate
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Technical training in the area of archeological and historic properties is based on the Archeological Resources Protection Act (ARPA) of 1979. This training includes appropriate research designs, sampling methods, inventorying and analytical techniques, and protection strategies for archeological properties.

Historic preservation training focuses on appropriate data collection and documentation to substantiate records of historic properties, and procedures for evaluating historic properties. These skills include methodology for conducting inventories, field studies, surveys, testing, and data recovery. Preservation of historical and cultural resources also includes appropriate storing techniques for specimens and records.

Table 15 lists the initial recommended training program for this technical subject area module.

Table 15

Cultural Resources and Historic Preservation Training

Course	Baseline Courses		Required Update Courses		Advanced Courses	
	Length	Mode of Delivery	Length	Mode of Delivery	Length	Mode of Delivery
CULTURAL AND HISTORIC PRESERVATION SERIES						
Overview of Cultural and Historic Preservation Compliance	2 days	Lecture/teleconference [b]				
Preservation of Historic Sites and Cultural Resources					5 days	Lecture/workshop textbook/video [TS, PM]

[Experience/Grade Level]

a = All levels as appropriate
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4 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This report has defined the work force that comprises TRADOC environmental professionals, in terms of academic backgrounds, experience, and responsibilities. It was found that, within the professional environmental staff, there was much need for continued education and training in the field. Types and levels of required training were defined, and specific sources of curricula, courses, materials, approaches, and tools that could meet the specified training requirements were delineated. It was found that the training concept of a University Without Walls is sound and operationally feasible within reasonable bounds of cost and logistics.

Recommendations

The following recommendations are provided as an outline for implementing a TRADOC environmental University Without Walls:

1. Inventory Training Needs: The first step toward starting a University Without Walls is to evaluate the specific individual and installation-level needs for training. Upon completion of this evaluation, a team of interviewers should visit the installations to finalize the curriculum of courses.

2. Develop and Refine Curriculum: A Model Training Program must be refined into a final curriculum. This should include a careful rewrite and critical evaluation of the model to decide the most appropriate technical content and best methods of course delivery. *That curriculum* would serve as a general training plan for individuals and installations. It would then be filled out at the installation level to determine what training had been done and what training is needed in all three course categories—Baseline, Required Update, and Advanced—across all technical areas.

3. Explore and Develop Retention Incentives: TRADOC should evaluate the suggested incentive-enhancing factors to decide how to use incentives to upgrade the professional standing of the environmental work force.

4. Identify Mentors: Locate TRADOC experts, and other environmental expert sources to staff a "mentor" or "circuit rider" approach to training.

5. Identify and Rate Outside Sources: Determine those technology-oriented subjects that require outside instruction from universities and/or commercial sources. As needed, these sources could be contracted through normal procurement channels.

It is recommended that, following a complete evaluation of installation and individual training needs, the following steps be taken to implement a continuing professional education and training program within the concept of the University Without Walls:

1. Career Path Planning:

a. Career-path planning and incentive programs for TRADOC environmental employees should be linked directly to the training program. The diversity of the work force is a major challenge that the University Without Walls approach is suited to address.

b. More stringent recruitment criteria and an increase in GS grades is needed to attract new hires with better entry-level credentials. In certain cases, providing remedial training and formal educational degree programs for existing staff members may prove appropriate and necessary.

c. Documentation of training should proceed through a course and course-series certificate program and CEUs. This should be established as an integral part of the performance appraisals.

2. Cost-Effectiveness and Economies of Scale: The size and geographic distribution of the target audience suggest several cost-effective training options:

a. Maximizing use of satellite and video-teleconferencing technologies to meet the largest audience at the smallest cost

b. Adapting an existing electronic bulletin-board system as a mechanism for transmitting training information

c. Developing an autotutorial manual approach for Army policy and procedures

d. Developing a combined "mentor" system and "circuit rider" approach, which can be important delivery mechanisms for environmental training

e. Using existing Army expertise, available from such sources as the PROSPECT courses through the Corps of Engineers, Huntsville Division, and the Army Logistics Management College environmental courses. Where existing sources are unavailable or insufficient, sufficient training expertise exists among outside sources to procure reliable instruction.

f. Exploring cooperation between Army MACOMs and other DOD agencies to achieve maximum benefit relative to cost.

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