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Management Plan for Chemical
Stockpile Emergency
Preparedness Program
Medical Course (Re)Design

E. D. Copenhaver

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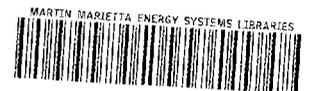
**MANAGEMENT PLAN FOR CHEMICAL STOCKPILE EMERGENCY
PREPAREDNESS PROGRAM MEDICAL COURSE (RE)DESIGN**

by
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1. SCOPE OF WORK

Under the Interagency Agreement between the Federal Emergency Management Agency (FEMA) (FEMA EMW-88-E-2943) and the Department of Energy (DOE) (DOE 1457-B106-A1), Oak Ridge National Laboratory (ORNL) has been tasked with the preparation of a chemical-agent-specific course (and a complementary "train-the-trainer" program) for civilian emergency medical technicians (EMTs) and paramedics in Chemical Stockpile Emergency Preparedness Program (CSEPP)-impacted communities in the 10 CSEPP states. This course is to be based on the Centers for Disease Control course "Medical Management of Chemical Exposures" and the U.S. Army Medical Research Institute of Chemical Defense (MRICD) course entitled "Medical Management of Chemical Casualties."

Though the course materials will be based strongly on the above courses that have already undergone review and approval from the U.S. Department of Health and Human Services (DHHS) and the Army, they will have to be redeveloped to a significant degree. The redevelopment will change the orientation from on-site conditions to potential off-site conditions and will allow the courses or course modules to be used in the variety of instructional conditions outlined, the most difficult condition being the ability to be used by an individual without an instructor present. This necessitates the development of self-study guides for each module as well as instructional materials geared to group interactions and instructor-controlled presentation.

Completion of this task will result in a suite of medical training course materials directed toward the EMTs and other emergency medical personnel such as paramedics. The diversity in the materials prepared will enable them to be adapted to the multiple training environments expected. Some modules would also be useful as general awareness training for others including emergency managers, and other response personnel.

2. REDESIGN STRATEGY

The strategy for redesigning the medical training courses is to optimize the use of the existing materials to the extent possible by making them more amenable to multiple training environments and multiple training audiences. Additional content will be added where deficiencies appear, and the training materials design will be more job-specific and hence more performance-based. ORNL will review the content of the courses and existing materials, examine the multiple training options needed to fulfill the FEMA CSEPP mission, attempt to standardize training via training materials rather than instructors, develop instructor assistance and guidance, and provide a means for testing and documentation. Each of these subjects is examined below.

2.1 REVIEW OF CONTENT AND EXISTING MATERIALS

To review the existing courses and course materials, ORNL staff first screened videotapes of the presentation of the DHHS Chemical Management Course in Lexington, Kentucky, by Sanford Leffingwell (M.D.) and examined the existing course materials from this course and from the U.S. Army MRICD course. In addition, ORNL staff attended and completed Leffingwell's Train the Trainer version of the DHHS course in Tooele, Utah, from February 13 to 15, 1991. During this time, some of the course content and presentation methods were discussed with medical personnel attending the two concurrent course offerings in Tooele (one in the afternoon and one in the evening).

Following completion of this course, ORNL staff discussed further development of the medical training modules with Leffingwell and Walter Ruch of the National Institute for Occupational Health, who served as the second trainer in the DHHS course of February 13-15, 1991, and solicited their ideas, suggestions, and specific opinions about how to develop the curriculum to better include the pre-hospital environment without losing valuable information more related to the emergency room environment. Information from this session has been incorporated into the management plan. The summary of the post-course evaluations from the trainees and Leffingwell's commentary on the evaluations have also been reviewed and elements incorporated into the plan.

While one staff member was attending the course and reviewing training options with Leffingwell, other ORNL staff undertook a detailed review of the materials on hand from the courses and from ORNL's previous work on health-related issues. This review indicated that three levels of information might be included in the medical training modules:

- that which is critical to know,
- that which is necessary to know, and
- that which is nice to know, but not necessary.

The initial needs analyses performed by the CSEPP Training Management Team (TMT) in each of the ten states affected were reviewed to become more familiar with the job requirements, training actions, and current level of training for the medical personnel in each state. ORNL staff accompanied Robert Norville and Helen Belletti of the CSEPP TMT on the information-gathering visits in Illinois from January 28 to 31, 1991, to better understand the process. During

this visit the medical training content and methods of presentation were discussed with all levels of medical personnel representing the state and local services of Illinois. The initial needs analyses over the ten states affected identified more than 2,300 emergency medical service (EMS) personnel to be trained; this figure does not include those other personnel based at hospitals, highway patrols, city and county health departments, etc. These other potential trainees could easily result in a doubling of the 2,300 quoted above. The overall tables for all types of personnel are presented state by state in the FEMA CSEPP Training Plan.

ORNL staff will also verify and expand the knowledge, skills, and abilities inventory already initiated by the FEMA staff if deemed necessary (not a detailed job task analysis for each site complete with task lists). The objectives outlined in the Basic Emergency Technician National Standard Curriculum (Hafen and Karren 1989) will be reviewed, and the chemical stockpile special training will be aligned with the types of training identified (e.g., recognition, treatment, and decontamination).

The major tasks in redesigning the courses involve changes in the orientation from on-site operational emergency conditions to potential off-site civilian emergency conditions, requiring determination of differences in (1) exposure forms and conditions, (2) resources immediately available for health protection, (3) symptom identification and treatment, and (4) definition of roles and responsibilities. The significant unknowns at this time are **decisions regarding protective clothing required, personnel decontamination timing and methods, and the extent to which the Army will be expecting off-site resources to come on-site to deal with emergencies.** The information to date indicates that only in Harford County, Maryland, is there any memorandum of understanding or close relationship that suggests county EMTs might be used on-site; in that particular case, the county team leader is also a member of the on-site team, and there may be other members who belong to both organizations.

If an off-site orientation only is chosen as the chief training scenario, there may be several changes in response conditions to take into consideration: which accidents are most credible, exposure concentrations and forms (e.g., vapor hazard is more prevalent than contact hazard because spills off-site would not likely occur, even in the so-called "Fireworks" scenario), individual vs. multiple victims, etc.

After extensive review of course materials, additional information resources, videos, and CSEPP needs analyses, the attached course outline (Table 2.1) has been drafted to identify content requirements.

2.2 MULTIPLE TRAINING OPTIONS

As mentioned earlier, the result of this course redesign effort will be a suite of medical training course materials for use in multiple-training-environments directed at the EMTs and other emergency medical personnel such as paramedics. Some modules are also appropriate for use as general awareness training for others, including emergency managers. This is due to the wide range of training environments to be taken into consideration when redesigning these courses: hospitals, fire halls, emergency operations centers, schools, medical associations, etc. In addition, the pre-training situations vary greatly from group to group and state to state. Because the states have the primary responsibility to train their personnel, the materials developed must meet their varying requirements and still maintain a standard content and consistent delivery across a variety of training implementation strategies. (See Sect. 3, "Identification of Training Materials," for the full range of training options accommodated.)

Table 2.1. Draft course outline

1. Introduction

- Chemical Stockpile: what it is, where it is, why we are talking about it now?
[Early history (very brief), liken to agricultural pesticides (up to 10,000 more potent), stockpile characterization]
[Note site-specifics but do not go into depth (this can be added in site-specific modular units if necessary).]
- Outline the course
- Forms: video, viewgraphs, self-study
- Test: yes, but very little (which kind at specific location, mostly)

2. Agent Characterization

- (Suggest that we move to agent-specific information because that appears to be the simplest cut to site-specifics.)
- Nerve agents and vesicants: the major characteristics
(Would like to use video animation to show the effects of agent on the body and effects of treatment; think this will be explicit without using humans; may make it easier to produce, more accurate, and less scary.)
 - Chemical structure
 - Route of spread (includes forms and actions in environment)
 - Entry into body
 - Effects
 - Immediate treatment
 - Forms: video, viewgraphs (some), self-study, one computer-based lesson as sample; Job Aids needed here (pocket-size for EMTs; must be succinct so EMT can use for quick review—may be long time interval between training and actual use; others for emergency room and training room walls—one very good one for emergency room already available from Leffingwell course)
 - Test: yes, in detail

3. Differential Diagnosis and Treatment—Application in First Response Mode

- Self Protection: respirators, clothing, etc.
- Recognition of signs and symptoms of exposure and time available for treatment
- Treatment decisions for multiple exposures
- Treatment protocol
[Practice decision making in group activity (can be also done individually via self-study unit) by two types of activity: (1) case studies on signs and symptoms and (2) situational decision making on how to enter the contaminated environment, who gets treated first, etc., in multiple exposures (e.g., triage at the EMT level?).]
- Forms: group activity (need activity boards, perhaps viewgraphs from earlier video on effects, etc.), self-study
- Test: Group or individual response should be reinforced by iterative discussion or role play (key concepts can also be on written exam)

4. Decontamination—Role in Immediate Response and Necessity For

- Effect of time in immediate response
 - Necessity for decontamination when treating and transporting victims
 - Disposal of materials
[Video or viewgraphs for review (including self-protection)]
(Dress-out and decontamination exercise appropriate.)
 - Forms: video or viewgraphs, exercise, self-study (although self-study should be reinforced by actual exercise); Job Aids also useful here to hit the high points, in case retention is low
 - Test: performance based (checklist for use in exercise)
-

Phyllis Thompson of the TMT has reviewed each affected state's continuing education requirements for EMTs and paramedics; the results of this review are given in Table 2.2. In addition, the development of these materials has been coordinated with the Department of Transportation (DOT) to ensure that the training is in compliance with DOT guidelines.

2.3 STANDARDIZATION OF TRAINING VIA MATERIALS

In the previous courses, much reliance is placed upon the instructors to maintain the high level of information transfer and consistency from course to course. This is possible when the courses are maintained by highly qualified instructors such as Sanford Leffingwell for the DHHS course and Fred Sidell (M.D.) for the Army course, who are among the nation's expert technical specialists in chemical warfare agents. When it is necessary to develop a much larger cadre of trainers capable of presenting the medical training to a broad spectrum of trainees, it is necessary to build into the training materials themselves some assurance that the courses will maintain a high level of effective information transfer and consistency in content over time. This remains a serious objective in redesign of the training materials.

2.4 INSTRUCTOR ASSISTANCE

Because the instructor pool being developed to offer these medical training packages will be more varied in background and less familiar with the detailed medical content of the courses, it is important to assist the instructors in presentation skills, in understanding the technical content, and in providing the trainees with an effective learning experience. The instructor guides to each training tool and the additional instructor resources are discussed in more detail in Sect. 3.

2.5 TESTING AND DOCUMENTATION

Additional testing and review components are to be added to each module so the states can more effectively judge if the trainees are gaining the skills and knowledge required by the job functions as identified in the state training agreements. Also, this documentation can serve as audit verification materials for the local, state, and national training programs. In addition to tests or review sheets, there will be performance-based checklists for some activities and worksheets for others as appropriate to the type of teaching activity undertaken.

Table 2.2. State continuing education requirements for emergency medical technicians (EMTs) and paramedics

State	EMT	EMT-1st responder	EMT-intermediate	EMT-advanced	EMT-ambulance	EMT-paramedic
Alabama						
Arkansas	48 ^a Yes ^b	§	48 ^a Yes ^b	§	48 ^a Yes ^b	48 ^a Yes ^b
Colorado	•	•	•	§	•	•
Illinois	§	§	48 ^a Yes ^b Yes ^c	§	40 ^a Yes ^b Yes ^c	40 ^a Yes ^b Yes ^c
Indiana	i	§	§	10 ^a i	24 ^a j	60 ^a Yes ^b i
Kentucky	24 ^a Yes ^b No ^c Yes ^d	12 ^a Yes ^b No ^c Yes ^d	§	§	24 ^a Yes ^b No ^c Yes ^d	§
Maryland	§	12 ^a Yes ^b	§	§	24 ^a Yes ^b	Yes ^b
Oregon	f	f	f	§	f	f
Utah	•	•	•	§	•	•
Washington	30 ^a	15 ^a	§	§	§	h

^aTotal minimum number of hours of training required for recertification (CSEPP training could count toward total hours).

^bNeed to submit application for course approval prior to offering the course.

^cNeed for continuing education course content to reflect U.S. Department of Transportation training guidelines.

^dState can authorize instruction not reflecting U.S. Department of Transportation training guidelines.

^eNo state requirements.

^fConsidered to be enhanced training and, therefore, not subject to state requirements.

^gNot referenced in state statutes or regulations.

^hReferences in state statutes and regulations are not relevant to CSEPP efforts.

ⁱReferences to but no definition of what is meant by requirement that training must address "procedures that are within the scope and responsibility" of the individual.

^jSpecific course content is required to be included in continuing education/in-service training taken for recertification.

3. IDENTIFICATION OF TRAINING MATERIALS

Considering the content outlined above, the redesign appears to include one small introductory module and three major modules, with a variety of training techniques built in to meet specific objectives. At the same time, self-study material will be developed, even though some activities such as protective clothing and decontamination drills will be recommended to be carried out in a group setting as performance-based training. Case studies and decision making practice activities as suggested for Differential Diagnosis and Treatment-Application in First Response Mode are also best done as a group but could be implemented in another format. Job Aids will be very useful in any of the anticipated training environments. The self-study guides for each major training area can also be used as student manuals, making review of the materials much simpler than in any other format.

Anticipated products for the full range of training environments include a wide variety of training materials aimed at specific job requirements. For example, though the materials are being aimed specifically at the EMT, some elements can be used by more than one audience. The following list of anticipated products (though not finalized) has been coded, using 1= EMTs, 2 = doctors and nurses, and 3 = emergency management general:

- Video segments
 - ~2 to 5 minutes on Chemical Stockpile and sites (1, 2, 3)
 - ~10 to 12 minutes on agent characterization and treatment (with a lot of animation to illustrate effects on body) (1, 2, 3)
 - ~3 minutes on decontamination (1, 2, 3)
 - ~2 to 3 minute closing segment (1, 2, 3)
(Organization in this manner would allow for video with built-in stops for use in specific modules and a version with no stops built in for more general use.)
- Lesson plans for all modules (1, 2, 3)
- Instructor's guide for all modules (1, 2, 3)
- Viewgraphs and slides where appropriate (1, 2, 3)
- Case study packages for group activity (1, 2)
- Situational decision making packages for group activity (1, 3)
- Tests or checklists for each major training area (1, 2)
- Student and self-study guides for each major training area (1, 2, 3 in some cases)
- Computer-based training module (for IBM machines or DOS systems) for one module as a sample (1, 2, 3)
- Job Aid(s): Pocket-card-size job aids seem appropriate for quick referral and review. Also posters that review the steps may be appropriate for training environments and to some extent in the emergency care environment. Others may be included as course development occurs (1, 2, 3 in some cases)
- Short general training pamphlet set up self-study style for general populations (3)

The "Train The Trainer" Course should include how to use the wide range of materials to be developed. The instructor guide will contain mini-tutorials on the training techniques in use as well as explanations of the technical materials. A major addition would be a compact set of

references that can be used by the instructor to increase his or her own knowledge base and to field questions.

4. ASSIGNMENT OF RESOURCES

This task will be accomplished primarily by Emily Copenhaver, with some assistance from others of the ORNL CSEPP team and some subcontractors. The subcontractors are limited to personnel already under subcontract to ORNL or Martin Marietta Energy Systems, thus avoiding additional loss of time and revenues to the bidding process.

Emily Copenhaver is a research staff member in the Hazards Management Group, Integrated Analysis and Assessment Section, Energy Division, ORNL. She reports directly to John H. Sorensen, the ORNL CSEPP Program Manager for ORNL. Copenhaver has 28 years of experience at ORNL, including 6 years in establishing and implementing environmental safety and health training at all levels at ORNL (over 30 courses, 2 of which have won national awards) and 20 years in environmental safety and health research, including health risk assessment, environmental impact, emergency response, public perception, and waste management. She also worked on the programmatic environmental impact assessment for the Army's Chemical Disposal Stockpile Program (CSDP) and prepared many of the public affairs informational packages and posters for the initial scoping and public hearings. She has produced over 70 technical publications and books and edited a national *Toxic Substances Abstracts Bulletin* for the National Science Foundation some years ago.

Other CSEPP staff assisting in this task include Annetta P. Watson (Ph.D.), Task Leader of the Health Studies and Reentry Technical Support tasks for the ORNL CSDP and CSEPP teams. Watson will review the training content plans, suggest other additional information resources, and serve as a subject matter expert in the design, development, and review stages of this task. She serves on the CSEPP Reentry/Restoration Subcommittee and several panels and working groups related to the health impacts of CSEPP. Watson has been involved in the CSDP and CSEPP programs at ORNL since their inception and has published extensively on these programs and other health and environmental impact issues as a research staff member of the Health and Safety Research Division of ORNL. Other technical specialists will be consulted as needed, drawing upon the large-scale technical resources already involved in the CSDP and CSEPP at ORNL.

In addition, ORNL will employ four subcontractors with experience and special capabilities in video and instructional technology. The CSEPP general information and the basic health effects and treatment information are best suited for video, since this information is needed by all and is not likely to change. Using video for this portion of the training will ensure that the same message is given out uniformly across multiple courses given by multiple trainers with varying amounts of medical information to draw from. The video subcontractor has high-quality animation and visual scripting capabilities. Through Michael Shepard and Martin Marietta Energy Systems' Video and Motion Pictures Department, we will subcontract with Cinetel in Knoxville, Tennessee, to prepare the final storyboard and produce the video, including animation. Cinetel, because of its leading cable television shows, has recently purchased an outstanding computer-generated color graphics and animation system and provides this type of video services. Thus, high-quality graphics and animation will be used to convey the routes of entry, effects on the human system, and other basics that would be difficult to communicate for any instructor not well versed in the medical aspects of nerve agents and sulfur mustard. The video footage produced will be inserted into the training modules where appropriate. However, many of the small segments could be used together also, particularly the introduction to the

chemical stockpile and CSEPP, agent composition, and agent effects; other segments would be more specific to the medical personnel audience as is called for by the task plan.

Instructional technologists with experience in development and delivery of several levels of training based on highly technical subject matter will be used to develop the self-study guides, related tests, and instructional guides for this redesign: Oak Ridge Associated Universities (ORAU), in Oak Ridge, and Moreland, Inc., in Knoxville. Eileen Sample of the Emergency Response Training Laboratory of the Training and Management Systems Division, ORAU, will be responsible for the self-study guides and related testing materials. Edith C. Jones, compliance training manager for Moreland, Inc., will be responsible for development of the instructor guides and delivery of the instructional techniques portions of the draft Train-the-Trainer course.

Another part of Martin Marietta Energy Systems, its Data Systems Research and Development (DSRD) organization, has special expertise in combining computing capabilities with learning systems and in development of expert systems. Lynn Duncan and staff in the Applied Information Technologies and Methods Department of DSRD will be responsible for the development of one sample computer-based module on Module 2. DSRD has much experience in providing computer-based training and other computer-based data systems for military audiences.

5. MILESTONES AND DELIVERABLES

Job and task analysis draft	March 15
Management plan for courses	March 30
Draft course materials (includes videos, viewgraphs, slides, Job Aids, lesson plans, and student guides)	June 30
Train-the-Trainer course materials and pilot course	July 31
Final course materials and documentation	October 30
Computer-based module	October 30

6. PEER REVIEW AND ORGANIZATIONAL APPROVAL

Since the course content is largely derived from the U.S. Army MRICD course and the DHHS Management of Chemical Exposures course, a specific Curriculum Advisory Committee was not convened to develop the enclosed Program of Instruction (POI). Instead, the steps outlined in Sect. 2.1 are designed to fulfill this function, and this management plan is submitted as a surrogate POI for this suite of course materials.

It is anticipated that review of the draft training materials will be provided by one to three doctors who have served as instructors in one of the previously identified courses, by Annetta Watson who leads the health-related tasks in CSEPP at ORNL, and others chosen by FEMA and the U.S. Army for this review process.

State and local personnel will have an opportunity to comment on the draft materials during the pilot of the Train-the-Trainer version of the courses. These comments, along with those from the July review, will be considered in the finalization of all the products.

The computer-based training will be reviewed by selected medical personnel, including one or more of the instructors of the previously mentioned courses for form and utility. For the most part, content will not vary greatly from the materials presented in other formats.

7. FINALIZATION AND DELIVERY OF ALL PRODUCTS

Once peer reviews, pilot presentations, and agency reviews have been completed and changes have been negotiated between ORNL and FEMA TMT, all needed corrections will be made to the training materials and a final copy of each item will be prepared. The agreed upon form of delivery is camera-ready copy for most materials. For some special materials, it may be necessary to negotiate further on the delivery of a proposed number of video copies, posters, color viewgraphs, computer disks, etc. Master record copies will also be maintained by ORNL and its subcontractors for a period of three years; however, any updating of the materials will require additional commitment of funds.

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