DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 20310

REPORT OF THE INTERAGENCY AD HOC ADVISORY COMMITTEE FOR REVIEW OF TESTING SAFETY AT DUGWAY PROVING GROUND

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I. SUMMARY AND RECOMMENDATIONS

A comprehensive review was made of the procedures, talents, monitoring equipment, facilities, and safety regulations used by the Army to support chemical test activities at Dugway Proving Ground. Problem areas in the subjects of ecology, toxicology, chemistry, fate of chemicals in the environment, meteorology, community relations and public information were discussed in great detail. It is the judgment of the Committee that current procedures and practices are sound and adequate for field testing certain classes of chemical agents and munitions. However, additional steps must be taken to insure the adequacy of these procedures and practices when field testing other specific classes of chemical agents and munitions.

A. Test Limitations

1. Discussion. In terms of desirable safety restraints, chemical test programs can be identified under one of five headings. These headings are riot control agents, incapacitating agents, nonpersistent lethal agents, persistent lethal agents, and new agents. Under the latter heading (new agents) fall those future test programs in which the newness of the agent may require special safety restraints and therefore will not be addressed by this Committee. Current operating practices and restraints are adequate to support all tests currently programmed under the first three headings. The basic principle underlying the safe conduct of any chemical test is the eventual depletion and dilution of the toxic material by natural processes by the downwind travel of the cloud over controlled areas. At Dugway, the largest controlled area is the salt flats area to the northwest of the major test grids. (See Appendix A) Therefore, large scale testing of persistent lethal agents should be designed and executed in a manner which insures the depletion and dilution of the cloud within the controlled salt flats area. This restriction should remain until studies of vegetation, soils, and wildlife and an increased Dugway meteorological capability indicate this restriction can be modified safely.

2. Recommendations. The Committee recommends that:

a. Testing of riot control, incapacitating and nonpersistent lethal agents and munitions be resumed without modification of current practices and safety procedures. The scale of testing must be consistent with available toxicological information so as to reduce to a minimum the probability of harmful effects to man, representative indigenous animals and domestic livestock.

b. Testing of persistent lethal agents and munitions in quantities of agent not to exceed the equivalent of one artillery round, rocket, or mine be resumed without modification of current practices and safety procedures. The scale of testing must be consistent with available toxicological information so as to reduce to a minimum the probability of harmful effects to man and representative indigenous animals and domestic livestock.

c. Plans of test for programs involving persistent lethal agents in quantities greater than those specified in 2b, above, will specify restraints in scope of testing and meteorological restrictions needed to comply with the following criteria: (These restraints should remain in effect until reviewed by a permanent Chemical Safety Committee recommended elsewhere in this report).

(1) The combination of windspeed, release height, and particle size shall be controlled to provide maximum depletion of the cloud within the initial downwind travel period. No release shall be made at heights greater than 300 feet; also no significant fraction of the agent cloud shall be composed of particles smaller than 100 microns in size. Positive control of agent dissemination will be maintained by automatic flow devices, radar and radio control, by establishment of limitations on total quantity of agent dispersed and other available means when high performance aircraft are used for dispensing toxic chemical agents having properties equivalent to those of the nerve agent VX.

(2) The cloud shall remain in a sector between north and northwest of the test area and not cross U. S. Highway 40 for at least three hours.

(3) The windspeed at standard anemometer altitudes (10 to 30 feet) shall be as low as possible but no stronger than 15 miles per hour.

(4) No thunderstorms shall be present within 100 miles of the test site at release time nor predicted to occur within 100 miles of the cloud trajectory for at least 8 hours from actual release time.

(5) Confidence in the weather forecast shall be high; there must be past experience demonstrating the reliability of predictions from similar weather situations.

B. Toxicological Research

1. Discussion. Knowledge of the toxicity of any compound to be released into the environment during tests at Dugway Proving Ground is an important part of the pretest evaluation of the chemical. The safety of the people and animals living not only in the immediate area of the test but also within several tens of miles of the point of release of the compound must be considered along with the aggressive characteristics of the chemical. Much of this information is already known. However, to insure that all essential knowledge gaps are filled, immediate steps should be taken to obtain necessary toxicological information on all chemical agents tested.

2. Recommendations. The Committee recommends that:

a. Determination or estimation be made of the toxic and lethal activities of single and repeated doses of the chemical by intravenous, intramuscular, sub-cutaneous, oral, inhalation, and cutaneous injection or application, on humans or animals, including laboratory species, economically important species in the vicinity of Dugway Proving Ground (DPG), and representative wild species, living on or near DPG, of both sexes and representative age brackets, and on pregnant females.

b. Toxicity and persistence of residues of the compound on test sites and other areas of Dugway Proving Ground be determined.

c. Determination or estimation be made of the toxic and lethal activities of repeated oral and cutaneous doses during the period of persistence, of the chemical and its residues, on humans or animals of both sexes and of all ages, and on pregnant females.

d. Estimation be made of the additional insult due to the chemical in foraging animals that have partaken already of known poisonous forage plants, halogeton for example, indigenous to the area of the testing facility.

C. Environmental Studies

1. Discussion. Knowledge of the effect of indigenous vegetation, soil and water at the Proving Ground and in adjacent areas on the behavior and fate of chemical agents is an integral part of the safety requirements for current types of testing at Dugway and will be critically important for future testing with high performance weapons systems. Effort should be expanded to obtain necessary information on the fate in the environment of all chemicals tested.

2. Recommendations. The Committee recommends that:

a. Determination be made of the presence and persistence of toxic residues of chemicals upon indigenous vegetation and of their absorption from the soil by indigenous plants; whether the plant decreases or increases the toxicity of the chemical after its absorption into the plant. Absorption, uptake and metabolic transformation by the plant must be studied for each individual chemical agent.

b. Determination be made of the presence and persistence of the compound in soil and in water supplies, including snow, at all seasons of the year in the neighborhood of the testing site.

D. Monitoring for Chemical Agents

1. Discussion. Dugway Proving Ground has supported a sizable ecology and epidemiology program over the past seventeen years covering the Proving Ground and surrounding areas. This program has been designed particularly to relate to the biological testing that has been conducted at the Proving Ground. As a result of the sheep deaths, Dugway should not only continue this ecology and epidemiology effort but should establish an adequate monitoring program designed to detect the entry of chemicals into the natural environment outside the boundary of DPG and the actions of these chemicals on the natural animal populations resident there. The Committee believes that there are two interrelated monitoring systems required: one based on the immediate detection of a substance and the second based on ecological effects.

2. Recommendation. The Committee recommends that:

Deseret Test Center develop monitoring systems both within and outside the boundaries of Dugway Proving Ground for baseline data collection and to detect the presence of or verify the absence of chemical agents by both immediate responsive methods and by ecological monitoring. The system should be developed in coordination with the Utah State Department of Health and other appropriate Utah State and Federal Agencies.

E. Community Relations

1. Discussion.

a. Community relations is an essential part of any safety program of the Deseret Test Center. Even though all precautions are taken during testing of chemical agents, safety planning must account for the remotest possibility of exposure to humans, animals, and

vegetation off-post. The surest way to have solid community relations as an essential part of the safety program is to seek and obtain participation in the development and maintenance of any safety plan involving off-post protection. This should include knowledge by some community leaders, such as State officials, of the safety procedures involved in the tests themselves; the remote possibility of off-post contamination; and the off-post precautions taken, i.e., monitoring to detect contamination. It should also include the development of a plan of action with appropriate community leaders, police, physicians, etc., in the surrounding area if for any reason the safety of human beings, animals or vegetation has been jeopardized.

b. Without community involvement in the plan for off-post safety at the Deseret Test Center, Utah State officials, community leaders, and the public must rely on assurances of the U. S. Army that all precautions have been taken and that the testing is completely safe. Experience has shown in other situations that assurances given by the testing group reinforced by assurances of knowledgeable State officials and community leaders are more readily acceptable by the public at large.

c. There are three essential parts to good community relations in the off-post safety plan of Deseret Test Center. First, there is the need for knowledge, both general and technical, on the part of certain officials of the activities of the Test Center, the safety procedures, and the off-post safety plan that has been developed. Second, there is the need for joint off-post monitoring by both Deseret Test Center and Utah State as part of the safety operation. And finally, there is need for the development of a meaningful plan of action in the State in the unlikely event of off-post contamination with chemical agents.

2. Recommendations. The Committee recommends that:

a. Deseret Test Center shall take the initiative to inform certain key Utah State officials of the general nature of the activities of the Test Center and the relationship of testing to the community.

b. Deseret Test Center shall establish a mechanism with the Utah State Department of Health, Utah Department of Agriculture and other appropriate Utah State Agencies for the exchange of technical information on chemical test planning as it relates to off-post monitoring and safety.

c. Deseret Test Center in collaboration with Utah State officials shall work with the communities surrounding the test site to develop and maintain a stand-by emergency plan of action. This will

include an alerting system, a command point, and levels of action to be taken.

d. Deseret Test Center shall establish a procedure providing for liaison and coordination with designated civilian entities and agencies during test planning and testing of chemical agents which have any possibility of off-site dissemination.

F. Meteorology

1. Discussion. In the conduct of chemical tests, the prediction of transport, dilution, and deposition has always been a critical element. The characterization of cloud behavior in the initial one or two miles of downwind travel has become a routine procedure. Because of the additional complexity of the problem, progress has been slow despite the existence of a continuing program to extend predictive capability to greater downwind distances.

2. Recommendations. The Committee recommends that:

a. The prediction capability for the transport, dilution, settling, and deposition (including thunderstorm scavenging) of chemical agents to distances of several tens of miles be determined and improved.

b. Post-test estimates of cloud transport, dilution and deposition for all significant tests be routinely reconstructed.

c. Experiments to evaluate the resuspension due to wind action of deposited chemical agents be conducted.

d. A climatology of favorable testing period based on various weather restrictions be prepared.

G. Medical

1. Discussion.

a. Review of available test planning directives and facilities demonstrate their exceptional adequacy for on-site safety and medical responsibilities and procedures. There is only very general direction for "effecting necessary coordination with all agencies involved" which would, presumably, include state and federal health and agricultural agencies vitally interested in measures to protect off-post civilians, livestock, and grazing areas should an accident occur. These general directions should be specific as to when and with whom coordination should be made. Coordination, liaison and planning should be

accomplished with specified outside organizational entities such as State Public Health Director, county health officers, regional U. S. Department of Agriculture representatives and U. S. Department of the Interior, Bureau of Land Management, regional representatives.

b. Safety consciousness of medical, professional and auxiliary personnel involved in the planning or execution of test missions is evaluated as very good based on knowledge of training, equipment and test procedures. In the area of coordination, knowledge and planning for mass casualty disasters involving military or civilian populations not directly or indirectly concerned with chemical testing, there is either a lack of complete orientation of medical personnel or incomplete planning for the rare, unexpected accidental exposure of groups of personnel not involved with testing who live on Dugway Proving Ground or in areas surrounding the test installations.

2. Recommendations. The Committee recommends that:

a. Deseret Test Center and U. S. Army Hospital, Dugway Proving Ground shall develop a mass casualty plan to include specific care and evacuation procedures for patients exposed to chemical agents.

b. Deseret Test Center shall develop liaison and coordination procedures with outside medical resources to insure a feasible medical evacuation.

c. Deseret Test Center shall extend medical professional liaison to provide information and medical assistance to the civilian medical community.

d. Deseret Test Center shall conduct at least annual exercises to test mass casualty and medical evacuation procedures.

H. Public Information

1. Discussion. An aggressive public information program designed to provide maximum information, within security restraints, to local state inhabitants concerning the mission, facilities and testing activities of the Deseret Test Center is considered vital to the molding of good community relations.

2. Recommendation. The Committee recommends that: Deseret Test Center expand its public information programs for appropriate Utah State and federal officials and for the public.