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GULF WAR ILLNESSES

Similarities and Differences Among Countries in Chemical and Biological Threat Assessment and Veterans' Health Status

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Mr. Chairman and Members of the Subcommittee:

We are pleased to participate in this international hearing by presenting our findings on differences in illnesses, as well as exposure, among the Allied Forces—France, the United Kingdom (U.K.), and the United States (U.S.)—that served in the Persian Gulf War, which began in 1990. My statement is based on our report entitled *Coalition Warfare: Gulf War Allies Differed in Chemical and Biological Threats Identified and in Use of Defensive Measures*, which we issued on April 24, 2001, and subsequent work that we conducted at your request.¹

As you know, shortly after the war, some veterans began reporting illnesses that they believed might be due to exposure to chemicals; to medical countermeasures, such as drugs and vaccines, to guard against chemical and biological warfare agents; and to other potentially hazardous substances used during the war. In the United Kingdom (U.K.) and the United States (U.S.), such exposure has been evaluated as a possible cause of illnesses among veterans. In France, the legislature has recently completed an inquiry into the health of French veterans of the Gulf War. Consequently, the French government has decided to study this issue systematically.

In our testimony today, we will present our findings on differences among the French, U.K., and U.S. forces concerning the assessment of Iraqi chemical and biological threats and the use of various medical countermeasures. We will also report on the extent of illness, as well as exposure, reported by each country's veterans. In particular, we will focus on the results of population-based surveys of Gulf War veterans' exposure to chemicals, as well as drugs and vaccines to guard against warfare agents. For a discussion of our scope and methodology, see appendix I. For a list of the organizations we contacted in France and the United Kingdom, see appendix II.

Background

Following the Iraqi invasion of Kuwait on August 2, 1990, the United Nations (U.N.) set a deadline of January 15, 1991, for Iraqi withdrawal from Kuwait and authorized military action to enforce this deadline. These U.N. resolutions formed the legal canopy for the Persian Gulf War, which

¹*Coalition Warfare: Gulf War Allies Differed in Chemical and Biological Threats Identified and in Use of Defensive Measures* (GAO-01-13, April 24, 2001).

included the largest international military coalition in combat since World War II. The size of the coalition forces varied greatly, as did location in the theater: French ground forces were on the western flank; U.S. forces were spread across the theater; and U.K. forces were concentrated closer to the Saudi-Kuwaiti border. It has been reported that during this deployment, many troops had known or potential exposure to a variety of substances with known or suspected health effects, including chemicals (for example, organophosphate pesticides), drugs (for example, pyridostigmine bromide), and vaccines (for example, the vaccine against anthrax).

Differences in Threat Assessment

The coalition countries drew different conclusions about the threats posed by Iraq. As shown in table 1, during the Gulf War, both the United Kingdom and the United States considered biological warfare a possible threat, but France did not. Specifically, the United Kingdom and the United States jointly concluded that use of anthrax or botulinum toxin was possible. The United Kingdom alone concluded that plague was a threat.

Table 1: Differences in Threat Assessment by Country

Country	Biological warfare	Chemical warfare	Nuclear/radiation
France	No	Yes	No
United Kingdom	Yes	Yes	No
United States	Yes	Yes	Limited

Although the coalition countries agreed that chemical warfare was a threat, they did not agree about the specific types of chemical agents that might be used. Both the U.K. and U.S. assessments found that Iraq had weapons capable of delivering blister and nerve agents. Immediately before the war, the U.K. found Iraq's chemical weapon capability to include nerve agents, blister agents, and, probably, a blood agent, hydrogen cyanide. Similarly, at the time of the war, the U.S. military found that Iraq had weapons capable of delivering nerve agents — including sarin, soman, and VX — and the blister agent, mustard.² In November 1990, the U.K. specifically concluded that the Iraqis had dust impregnated with

²*Final Report*, Presidential Advisory Committee on Gulf War Veterans' Illnesses (Washington, D.C.: Dec. 1996), p. 107.

sulfur mustard, commonly known as “dusty mustard.”³ In contrast to this U.K. assessment, French officials did not believe agents in dust form were present before, during, or after the war.

Differences in Medical Countermeasures—Drug and Vaccines—Against Chemical and Biological Threats

France, the United Kingdom, and the United States adopted varied combinations of protective drugs and vaccines for protection against the threat of chemical or biological exposure; each country employed these drugs and vaccines to a different extent. Some of the differences could be attributed to each country’s having identified different threats. For example, as shown in table 2, France, which did not identify a biological threat, did not use vaccines to protect against biological threats and reportedly relied more on protective gear than did either the U.S. or the U.K. Similarly, the U.S. did not identify plague as a threat, although the U.K. did; therefore, the U.S. did not require forces to receive plague immunization.

Table 2: Differences in Medical Countermeasures Used Against Biological Threats by Country

Country	Anthrax	Botulinum toxin	Plague
France	No	No	No
United Kingdom	Yes	No	Yes
United States	Yes	Yes	No

In addition, some differences occurred in the use or selection of medical countermeasures even when the same threat had been identified. For example, botulinum toxin was identified as a threat by both the United States and the United Kingdom. But the United Kingdom addressed it with antitoxin to be given post-exposure; the United States addressed it with investigational botulinum toxoid vaccine, to be administered before exposure. Similarly, the countries took different approaches to managing the mismatch between the standard schedules for immunization and the time available to prepare for war. The U.K. used pertussis vaccine as an adjuvant for anthrax vaccine, in the belief that this would help soldiers

³In addition, U.K. analyses of Gulf War decision making state that it was known that Iraq had been provided information on the nerve agent soman, the choking agent phosgene, the psychochemical BZ, and the vomiting agent adamsite.

achieve adequate immunity by the projected onset of the war.⁴ All three countries employed a drug, pyridostigmine bromide, to enhance the effectiveness of post-attack therapy for exposure to the nerve agents, such as soman, but the extent and duration of its use differed somewhat across the coalition countries.

Finally, the use of medical countermeasures for biological and chemical threats varied within, as well as across, national commands. For example, based on official report and survey data, the U. S. administered botulinum toxoid vaccine to only a small portion of its forces. Similarly, the U.K. reported that it administered the first anthrax injection to over 75 percent of its deployed forces, with some units fully vaccinated.

Differences in Extent of Illness Reported by Veterans

To date, French veterans of the Gulf War have not reported as many illnesses since the conflict as their counterparts from the U.K. and U.S. Since the war, the U.K. and the U.S. veterans have reported illnesses at rates that are significantly higher than veterans who were not deployed or deployed elsewhere.⁵ Across several studies of U.K. and U.S. veterans, the rates of illnesses reported by those deployed to the Gulf War have consistently been between 25 and 30 percent greater than the rate reported by comparison groups of veterans.

In the U.K., researchers surveyed three groups of veterans: U.K. Gulf War veterans, U.K. veterans deployed to Bosnia, and U.K. veterans deployed elsewhere during the Gulf War. Illnesses—including symptoms and disorders—were reported significantly more frequently by the Gulf War veterans than by the other two groups of veterans. Even after adjusting for various factors, reporting of illness was significantly higher among Gulf War veterans than among others. In particular, Gulf War veterans were more likely to report substantial fatigue and symptoms of post-traumatic

⁴An adjuvant is a substance incorporated in a vaccine to accelerate, enhance, or prolong a specific immune response.

⁵See Iowa Persian Gulf Study Group, “Self-reported Illness and Health Status Among Gulf War Veterans: A Population-Based Study,” *Journal of the American Medical Association*, 277 (3), (1997), pp. 238-245. K. Fukuda et al., “Chronic Multisymptom Illness Affecting Air Force Veterans of the Gulf War,” *Journal of the American Medical Association*, 280, (Sep. 16, 1998), pp. 981-88; C. Unwin et al., “Health of U.K. Servicemen Who Served in the Persian Gulf War,” *Lancet*, 353, (Jan. 16, 1999), pp. 169-178; and P. Pierce, “Physical and Emotional Health of Gulf War Veteran Women,” *Aviation, Space and Environmental Medicine*, 68, (Apr. 1997), pp. 317-21.

stress and psychological stress. These symptoms were consistent with a working case definition of Gulf War illness developed by the Centers for Disease Control.⁶

According to a survey of U.S. veterans, the Gulf War veterans reported significantly higher rates of illnesses than did veterans who were deployed elsewhere during the same time period. U.S. Gulf War veterans, compared with non-Gulf War veterans, reported a rate of functional impairment twice as high.⁷ In addition, according to a recent study of Kansas veterans, the probability of reporting a specific set of symptoms, among Gulf War veterans, was highest among those who served in Iraq or Kuwait; the probability, among those who served elsewhere in the region, increased with the length of stay in the region after the war.⁸

The French government has not conducted any survey of Gulf War veterans' health status, although plans for an epidemiological study have recently been put in place.⁹ When we visited in 1998, we did not find any reports of Gulf War-related illnesses among French veterans, although we spoke with medical staff at a military hospital, multiple French veterans' organizations, a French military writer, and many French military officials. The leader of a French veterans' organization cited only a few cases of psychological problems and a handful of veterans affected by Gulf War-related traffic accidents, accidental atropine injection, and unexplained hair loss (two cases). Veterans from the U.K. and U.S., however, had long reported a variety of symptoms, including fatigue, weakness, and muscle pain.

The relative absence of reports of illnesses among French veterans could not, even at that time, be attributed to a lack of publicity within France as to the illnesses of U.K. and U.S. veterans. Such illnesses had been

⁶C. Unwin et al., "Health of U.K. Servicemen Who Served in the Persian Gulf War," *The Lancet*, 353 (9148), Jan. 16, 1999.

⁷Han K. Kang et al., "Illnesses Among United States Veterans of the Gulf War: A Population-based Survey of 30,000 Veterans," *Journal of Occupational and Environmental Medicine*, 42 (5), May 2000, 491-501.

⁸L. Steele, "Prevalence and Patterns of Gulf War Illness in Kansas Veterans: Association of Symptoms with Characteristics of Person, Place, and Time of Military Service," *American Journal of Epidemiology*, 152 (10), 992-1002, Dec. 2000.

⁹See "Syndrome de la guerre du Golfe: vers une étude épidémiologique [Gulf War Syndrome: Towards an Epidemiological Study]," *Le Monde*, Sep. 1, 2000, p. 26.

discussed in articles and broadcasts in mainstream French media.¹⁰ The apparently low rates of reported illnesses persisted even in the presence of outreach by French veterans' organizations and the publicized existence of veterans' benefits. More recently, 140 among the 25,000 French veterans of the Gulf War have come forward with illnesses they link to the war; a new group (Avigolfe), specifically representing ill Gulf War veterans, has been formed; and the French legislature has held a series of hearings to review the matter.¹¹ However, as recently as June 2000, no case of Gulf War illness, French military authorities state, has been identified among the 25,000 French veterans of the war.¹² Only 300 requests for compensation have been made, officials reported, of which 120 had been granted based on proof of connection to Gulf War service.

The apparently lower rate of illness reported by French Gulf War veterans does not clearly point to any particular cause for Gulf War veterans' illnesses; there were, in fact, several differences in French veterans' experience. For example, French officials reported, apart from the differences in force location already mentioned, French forces did not, unlike certain U.S. and U.K. forces, make use of vaccines to protect against chemical and biological warfare agents. French forces also made no use of organophosphate pesticides, unlike the U.S. and U.K. forces, and relied on bottled water. In addition, French forces had greater access to forms of collective protection, such as specially ventilated truck cabs and shelters; in addition, they employed protective gear that was less bulky than that of the United States and the United Kingdom and, consequently, were reported to have used the gear more often.

In contrast, population-based studies have consistently shown that Gulf War veterans from the U.K. and U.S. have unexpected levels of illnesses,

¹⁰See, for example, Nathalie Mattheiem, "Dix mille soldats américains de la "Tempête du désert" atteints Enquêtes en chaîne sur le "syndrome du Golfe [Ten thousand American soldiers from Desert Storm wait for investigations in process on 'Gulf War Syndrome']," *Le Soir* (May 27, 1994), p. 6; and Naima Lefkir-Laffitte and Roland Laffitte, "Armes radioactives contre l'ennemi irakien" [Radioactive arms against the "Iraqi Enemy"] *Le Monde Diplomatique* (April 1995), p. 2.

¹¹See B. Cazeneuve, M. Rivasi, and C. Lanfranca, *Guerre du Golfe: Vérité sur un conflit*, vols. 1 (report) and 2 (hearing transcripts), Paris: Assemblée Nationale, 2001 (number 3055).

¹²"La polémique sur le 'syndrome du Golfe' atteint l'armée française: Aucun cas, selon les autorités militaires" ["The debate on Gulf War syndrome reaches the French Army: Not one case, according to military authorities.], *Le Monde*, June 7, 2000, p. 12.

as characterized by self-reported symptoms and diagnosed medical and psychiatric conditions. Overall, the types of symptoms reported by different veterans' groups in the U.S. and U.K. are strikingly similar, even though veterans in these studies come from different countries and served in different locations in the Gulf War theater.

Among Gulf War veterans, the prevalence of symptoms is frequently associated with specific self-reported wartime exposures.¹³ For example, veterans in both the U.K. and U.S. who reported receiving biological warfare vaccine or exposure to specific types of chemical agents were found to have higher rates of illnesses. According to studies in both the U.K. and the U.S., veterans of the Gulf War who reported receiving biological warfare inoculations—for anthrax or other threats—were more likely to report a number of symptoms than non-Gulf War veterans who did not report receiving such inoculations. This pattern was observed in data collected in the United Kingdom and in unpublished data collected by the U.S. Department of Veterans Affairs. In one U.K. study, three exposures—the number of inoculations, the number of days handling pesticides, and the number of days exposed to smoke from oil well fires—were consistently and independently related to the severity of reported symptoms. The number of days handling pesticides was specifically related to neurological complaints and the number of inoculations was related to skin and musculoskeletal complaints. A second U.K. study also noted a relationship between health complaints and receiving multiple vaccines or inoculations against biological warfare agents.

¹³See L. Steele, "Prevalence and Patterns of Gulf War Illness in Kansas Veterans: Association of Symptoms with Characteristics of Person, Place, and Time of Military Service," *American Journal of Epidemiology*, 152 (10), 992-1002, Dec. 2000; C. Unwin et al., "Health of U.K. Servicemen Who Served in the Persian Gulf War," *The Lancet*, 353 (9148), Jan. 16, 1999; N. Cherry et al., "Health and Exposures of United Kingdom Gulf War Veterans. Part II: The Relation of Health to Exposure," *Occupational and Environmental Medicine*, 58: 299-306, 2001.

Mr. Chairman, this ends my prepared statement. I would be happy to answer any questions you have at this time.

Contacts and Acknowledgments

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Appendix I: Scope and Methodology

We conducted structured interviews with officials of the French, U.K., and U.S. governments and with members of their military and veterans' organizations to (1) compare threat assessments and the extent to which they were shared by the three countries and (2) assess use of various countermeasures across the three forces. A list of the organizations contacted in France and the U.K. is provided in appendix II. These interviews addressed both the threats assessed before or during the war and the medical countermeasures adopted in response. We supplemented these interviews with reviews of published information, including U.S. and North Atlantic Treaty Organization (NATO) nuclear, biological, and chemical doctrines, as well as reviews of the Gulf War campaign produced by the Department of Defense (DOD), the U.K. Ministry of Defence, and campaign participants.

To supplement this work and to assess the extent of illnesses reported by the three groups of veterans, we reviewed the following: official documents, scientific literature, and reports of various veterans' organizations, publications of the Office of the Special Assistant for Gulf War Illnesses, the Gulf War Veteran's Illnesses Unit of the U.K. Ministry of Defence, reports of the U.K. Defence Committee, the French National Assembly, DOD, RAND Corporation, the Institute of Medicine, and various U.S. congressional and executive advisory committees. We also reviewed key findings with the U.K. Gulf War Liaison officer and with staff of the French Embassy. Finally, we collected and reviewed media and legislative reports on (1) the extent and nature of illness reported in the three countries and (2) the progress of official investigations into these complaints.

Our work was limited primarily to describing the assessment and sharing of information on chemical, biological, and nuclear/radiological threats and the use of medical countermeasures against them. Thus, we did not systematically examine the extent of exposure to many of the other potential challenges that could have been encountered by the three groups of veterans, such as oil fire smoke, depleted uranium, or any hazards that may have emerged from air strikes on military targets. In addition, many of the broad-based surveys of illness across coalition countries rely on health information reported by veterans. While such self-reporting can be biased by media influence, a large national survey of Gulf War-era veterans found that their reports of doctor and hospital visits agreed with medical records.

We conducted initial data collection and site visits between August 1997 and January 1998. At your request, we suspended this work to carry out a

higher priority engagement for you. In April 1999, we resumed our work and conducted additional data collection and updated our findings. We completed our work in January 2001 and issued a report to you. Subsequent to its issuance, again at your request, we have continued to monitor developments in the three countries and have updated our findings as appropriate.

Appendix II: Organizations Contacted in France and the United Kingdom

France

Bureau Recherche, Sous-Direction Action Scientifique et Technique, Direction Centrale, Service de Santé des Armées (Office of Research, Scientific and Technical Division, Headquarters, Army Health Service)

Business Development Directorate, GIAT Industries

Centre d'Études du Bouchet, Ministère de la Défense, Direction Générale des Armées

Conseiller Pour la Santé et les Actions Humanitaires, Cabinet du Ministre, Ministère de la Défense (Counselor for Health and Humanitarian Missions, Office of the Minister of Defense)

Direction centrale, Service de Santé des Armées (Headquarters, Army Health Service)

Division Maîtrise des Armements, État-Major des Armées (Arms Control Division, Dept. of the Army)

Fédération Mondiale des Anciens Combattants (World Veterans Federation)

Groupement Défense Nucléaire Biologique et Chimique, Facteurs Humains – Ergonomie, Section Technique de L'Armée de Terre (Human Factors, NBC Defense Group, Army Technical Section)

Hôpital Henri Mondor de Cretéil

Hôpital Val de Grace (Military Hospital)

La Commission de la Défense Nationale et des Forces Armées, Assemblée Nationale (National Assembly Committee on National Defense and Armed Forces)

La Fédération des Anciens des Missions Extérieures (Federation of Veterans of Foreign Wars)

l'Union Française des Associations de Combattants et de Victimes de Guerre (Coalition of French Associations of Soldiers, Veterans, and Victims of War)

Université Bordeaux, Institut de Santé Publique d'Epidémiologie et de Développement

United Kingdom

British Medical Association

Defence Committee, House of Commons

Gulf Veterans Association

Gulf Veterans' Illnesses Unit, Ministry of Defence

Institute of Neurological Sciences, Southern General Hospital

Institute of Occupational Medicine

London School of Hygiene and Tropical Medicine

National Gulf Veterans and Families Association

Royal British Legion

Royal Society of Medicine

University of Manchester, School of Epidemiology and Health Sciences