

GAO

Report to the Chairman, Legislation  
and National Security Subcommittee,  
Committee on Government Operations,  
House of Representatives

January 1992

# DEFENSE HEALTH CARE

## Efforts to Address Health Effects of the Kuwait Oil Well Fires



**RELEASED**  
**RESTRICTED--Not to be released outside the  
General Accounting Office unless specifically  
approved by the Office of Congressional  
Relations.**

---

---

**Human Resources Division**

B-246677

January 9, 1992

The Honorable John Conyers, Jr.  
Chairman, Legislation and  
National Security Subcommittee  
Committee on Government Operations  
House of Representatives

Dear Mr. Chairman:

This report responds to your request for information on efforts by the Department of Defense (DOD) to safeguard the health and well-being of U.S. troops from the smoke, soot, and other residue of the Kuwait oil well fires set by the Iraqis during the Persian Gulf war. Specifically, it describes DOD's actions to (1) advise the troops and protect them from the smoke; (2) assess both the short- and long-term health threats posed by the fires; and (3) retain information that would be necessary to develop a list of troops exposed to potentially harmful pollutants.

---

**Results in Brief**

DOD took reasonable steps to safeguard the health of U.S. troops stationed in the Persian Gulf who were exposed to potentially dangerous smoke. Soon after the Iraqis set fire to the oil wells, DOD performed some limited air monitoring and consulted with other organizations making early assessments of the oil fire effects. U.S. commanders used such means as Armed Forces Radio and briefings to advise the troops on ways to minimize exposure to oil fire pollutants. Troops were told to avoid exposure to smoke plumes to the extent possible, cover exposed skin, minimize physical activity, and use the gas masks, dust masks, goggles, and scarves provided them. While immediate health effects were not severe (consisting primarily of eye and throat irritations), the potential long-term effects from short-term exposure to oil fire smoke are still unknown.

To assess potential long-term health risks, DOD has undertaken several efforts. The U.S. Army Environmental Hygiene Agency (USAEHA) has two initiatives underway:

- Collection of extensive air and soil samples and other data to determine whether harmful pollutants were present in areas where U.S. troops were located. These data should help the agency identify the type of health effects that exposed personnel may experience in the future.

- A biological surveillance study of about 3,700 soldiers, which includes blood and urine analyses of a smaller sample of troops, to identify changes in the body as a result of exposure to toxins.

Using data from both projects, USAEHA will perform a health risk analysis that attempts to project the incidence of illnesses attributable to oil fire smoke exposure. It expects to complete its analyses in December 1992.

Finally, DOD is archiving information and has a plan for developing a list of troops whom it determines to be at risk from exposure to oil fire pollutants. DOD officials believe these efforts comply with the National Defense Authorization Act for fiscal years 1992 and 1993<sup>1</sup> which calls for the establishment of a separate record containing information on troops exposed to oil fire pollutants. A record or registry could be useful, particularly if it is determined that exposure to the smoke may cause adverse long-term health effects. It could be used for (1) determining future health care eligibility and (2) adjudicating claims for compensation due to disabilities caused by oil well fire exposure.

The information DOD is retaining includes the health risk analysis; a roster of all troops stationed in the Gulf; specific unit rosters, movements, and daily locations; and meteorological data. With this information, DOD can identify the units at risk by determining the specific days and locations where the potentially harmful pollution occurred and comparing these data to unit locations on those days. It is exploring options for developing more complete and accurate lists of people assigned to specific units.

---

## Background

Some U.S. troops were exposed to smoke, soot, and other residue emanating from the 611 oil wells ignited by the Iraqis in late February 1991.<sup>1</sup> Because troops were widely dispersed for differing durations, however, the amount of exposure among the U.S. forces varied substantially. While some were located close to the burning wells and their plumes, others were stationed far enough away to avoid exposure altogether. For the most part, exposures were for relatively short periods.

---

<sup>1</sup>All of the fires were extinguished by November 30, 1991.

---

On March 10, 1991, a U.S. Government team led by the Environmental Protection Agency (EPA)<sup>2</sup> began collecting data on air quality and acute health effects in Kuwait and Saudi Arabia. This was done at the request of the Kuwaiti and Saudi Arabian governments, which were concerned about the potential harmful effects of the smoke on their citizens and environments. In early April, the EPA-led team issued an interim report based on its preliminary assessment.

The team reported that it did not find significant quantities of pollutants of concern that would cause severe immediate health effects except perhaps to people with limited respiratory capacity, such as asthmatics. It could not determine long-term health effects because of insufficient data on the populations exposed, the composition of the smoke plume, the impact of oil pools, and long-term meteorological patterns. The team stressed that considerable follow-up would be needed to evaluate definitively the nature and magnitude of the health and environmental effects of the fires. The EPA-led study and other efforts to assess the impact of the oil fire smoke are being examined in detail in a separate GAO study.

DOD has embarked on its own efforts to obtain and assess information about the fires, particularly the long-term effect on U.S. troops. These efforts are being undertaken by two groups: First, a triservice working group, formed in April 1991, is evaluating the acute, intermediate, and chronic health effects; evaluating clinical and environmental sampling data; developing an appropriate medical surveillance program; and evaluating the need for conducting epidemiologic studies in the future. The working group comprises medical representatives from each service, the offices of the Assistant Secretary of Defense (Health Affairs) and the Assistant Secretary of Defense (Environment), and the Joint Chiefs of Staff. A representative from the Department of Veterans Affairs (VA) also attends the working group's monthly meetings.

A second group, the U.S. Army Environmental Hygiene Agency, was tasked also in April 1991 with identifying whether dangerous levels of pollutants were present where U.S. troops were located and assessing the potential health risks associated with exposures to the pollutants identified. USAEHA employs a wide range of scientific disciplines. It offers a variety of environmental, occupational health, industrial

---

<sup>2</sup>In the Gulf, the interagency team consisted of representatives of EPA, the National Oceanic and Atmospheric Administration, and the U.S. Public Health Service. These were supplemented by representatives from DOD, the U.S. Coast Guard, and the Department of Energy.

---

hygiene, and laboratory services to support worldwide preventive medicine programs.

---

## Scope and Methodology

The information for this report came from discussions with DOD officials who had key roles in addressing the Kuwait oil well fires crisis and from supporting documentation. Among those with whom we talked were representatives stationed in the Persian Gulf from the U.S. Central Command and its subordinate commands, which had responsibility for all troops during the Gulf war; the triservice working group; and USAEHA.

We obtained information on (1) protective equipment provided to troops, (2) instructions and advisories given to troops, (3) health effects observed, (4) studies planned or underway to assess the health threat to troops, (5) what DOD knows about potential long-term health effects, (6) implications of preliminary data collected by USAEHA, and (7) DOD's views on developing a registry.

We performed our work, most of which was done between July and November 1991, in accordance with generally accepted government auditing standards.

---

## DOD Took Prompt Actions to Advise and Protect Troops

Soon after the oil well fires were set in late February 1991, DOD advised troops of protective measures and initiated action to assess the effects of the fires. For example, DOD performed some limited air monitoring (using its own equipment), interacted with the other organizations and countries involved in making the early assessments of the oil fire effects, and provided guidance to U.S. troops to help minimize exposure to the oil fire pollutants. Shortly after the EPA-led interagency team made the results of its investigation available, DOD launched an extensive effort to assess the long-term health implications of the fires.

---

## Guidance Provided Troops

After initial air sampling, medical observations, and consultations with the Kuwait and Saudi Arabian governments, DOD, in early March, advised soldiers to avoid smoke plumes when possible and wash frequently to keep their skin free of soil and soot. Medical personnel and health units also were alerted to the possibility that the smoke could cause lung irritation—coughing and wheezing, and illness among asthmatics. By mid-March, DOD provided more specific guidance to its commands and troops on protective measures that should be taken. These included using goggles and disposable face masks or scarves,

---

rolling down sleeves when encountering areas with large amounts of smoke and soot, restricting physical activity, and staying as far away as possible and upwind from burning wells.

DOD used several methods to communicate information about the precautions troops were to take to protect themselves from oil fire smoke. One method commands used was fax or teletype messages to the field. An Army Central Command surgeon said that other methods of informing troops included briefings and frequent announcements over Armed Forces Radio, a popular and major source of news for those in the Gulf. Medical personnel, including those who served in the Gulf, told us that the extent to which troops adhered to the guidance varied.

---

## Data Supported the Precautions Taken

Health advisories were based on health data the services collected and monitored. For example, the Navy and Air Force centrally collected weekly information on such illnesses as respiratory, gastroenteritis, and dermatological conditions. The Army also collected medical surveillance data, but not centrally and not as frequently as the Navy and Air Force. None of the services' data showed significant changes in illness rates after the fires, including rates of respiratory illness, a possible indicator of a potential health effect from exposure to oil fire smoke. The Army reported no increase in medical facility visits for acute respiratory complaints, while both the Air Force and Navy reported a drop in respiratory illness rates,<sup>3</sup> after January 1991.

Other information corroborates DOD's initial assessment of conditions and the appropriateness of the advisories it issued. For example, in March 1991, as part of the EPA-led interagency effort, Public Health Service officials interviewed 30 to 50 American soldiers at various locations, reviewed infirmary records of troops stationed in Kuwait City, and met with U.S. Central Command medical personnel. Although the soldiers interviewed reported no significant health problems, they did experience mild to moderate instances of burning eyes, increased postnasal discharge, increased coughing and throat irritation, and an acrid smell to the air. There were also anecdotal accounts of asthmatic symptoms being experienced. Public Health Service officials' review of infirmary records also indicated no report of significant health problems.

---

<sup>3</sup>Respiratory illness rates would include problems resulting from colds and asthma.

---

## Weather Predictions Prompted Plans for Future Safeguards

DOD took additional safeguards in August 1991 to protect its remaining troops. This was after the National Oceanic and Atmospheric Administration and others predicted weather changes between October 1991 and January 1992 that could cause severe pollution and result in acute health effects. After analyzing the models used to predict these weather changes, DOD made plans to employ certain precautions. These included (1) obtaining real-time monitoring and forecasting capability; (2) providing troops with protective equipment (that is, gas masks); (3) warning military medical treatment facilities of the potential threat; (4) implementing a medical alert system; and (5) developing recommendations for tactical commanders to institute early warning networks, protective procedures, and evacuation alternatives. In late October, however, DOD placed these actions on hold because the threat of the severe pollution diminished substantially after most of the fires were extinguished.

---

## DOD Is Assessing the Potential Long-Term Health Effects

DOD is undertaking a study of the long-term health risks associated with exposure to the oil well fires. Results are expected in the fall of 1992. DOD will use them to project the incidence of illnesses and diseases contracted by troops as a result of the fires. No previous assessments have been made of long-term health risks associated with short-term exposure to oil well fires of the type that U.S. troops experienced. Past epidemiological studies, such as on the health effects of hazardous waste sites, and associated health standards have focused primarily on long-term, often lifelong exposures.

---

## Air and Soil Samples Are Being Studied

On April 11, 1991, about a week after the EPA team issued its interim report, DOD asked USAEHA to assess the potential long-term health risks. USAEHA is collecting environmental data—air and soil samples from all major (permanent) U.S. troop locations in the Persian Gulf. Its health risk assessment protocol is patterned after the EPA's protocol for risk assessments of hazardous waste cleanup (Superfund) sites. This methodology is the prevailing approach in the federal scientific community.

Through its ambient air-monitoring effort, USAEHA will identify the pollutants to which troops were exposed and assess the magnitude and risks posed by those exposures. Its protocol provides specific instructions for collecting, preserving, and shipping ambient air samples to help assure they meet quality assurance and quality control standards. This effort also includes "industrial hygiene sampling," in which troops wear



---

personal monitors that collect air samples during the course of a workday to determine the quality of the air they are inhaling.

USAEHA is also obtaining surface soil samples to provide information on the probability that troops were exposed to pollutants through skin absorption or by incidental ingestion, such as could occur from handling food with hands contaminated by the soil.

Before completing its final report on the risk assessment, DOD plans to seek outside peer review of its methodology and interpretation of results. DOD anticipates that it will consult with the National Academy of Sciences, the National Institutes of Health, and EPA. Results are expected by December 1992.

---

## Biological Changes in Troops Are Being Studied

To supplement the risk assessment, DOD has undertaken what is referred to as a "biological surveillance study" of a specific group of U.S. troops stationed in the Gulf. By comparing certain health indicators and exposures of troops before and after their time in the Persian Gulf environment, DOD hopes to detect any biological changes not outwardly noticeable that may be attributable to the deployment.

Data are being collected on the health status, before, during, and upon return from their deployment in the Gulf, of about 3,700 troops from the 11th Armored Cavalry Regiment. The regiment was deployed to the Gulf in June 1991 and returned in late September 1991. Troops completed detailed health status questionnaires and provided health histories for use as baseline health data. For a smaller sample of troops, blood and urine tests were being conducted; daily diaries of diet, health, activities, weather, and exposure to smoke were completed; and lung function was measured. The diaries provide information on health and environmental conditions as perceived by the troops. Sensitive blood and urine as well as lung function measurements may reveal changes that might otherwise go unnoticed.

In coordinating the biological surveillance efforts, USAEHA has enlisted assistance from several organizations inside and outside DOD. For example, the Walter Reed Institute of Research and consultants at The Johns Hopkins University assisted in designing the health status questionnaires. Laboratory and data analysis, as well as interpretation of the analysis, are being done in cooperation with the National Cancer Institute, the Armed Forces Institute of Pathology, and the Centers for Disease Control (Public Health Service), The Johns Hopkins University, and

the Walter Reed Institute of Research. USAEHA officials will ask the National Academy of Sciences and the National Institute of Health to review the surveillance study's methodology and results. DOD also expects to complete this analysis in December 1992.

### Information Needed to Identify Exposed Troop Units Will Be Retained

If exposure to the oil well fires is determined to have long-term adverse health consequences, some troops (as eventual veterans) potentially could be entitled to receive priority health care in veterans' hospitals and disability compensation as a result of their exposure to the fires. Even without conclusive scientific evidence of adverse health effects, DOD officials said they expect some Gulf War veterans to claim disabilities or other adverse health effects. One tool potentially available to assist in adjudicating future claims, notifying potential claimants of their benefits, or conducting future epidemiological studies is a data base detailing troop exposures during the Gulf deployment. The National Defense Authorization Act for Fiscal Years 1992 and 1993 (P.L. 102-190) directs the Secretary of Defense to establish such a data base. DOD has initiatives underway and plans that officials believe meet the act's intent.

### New Law Requires Several Actions

Public Law 102-190 directs the Secretary of Defense to undertake several actions relating to oil well fire exposure. First, the Secretary must "... establish and maintain a special record relating to members of the Armed Forces who, as determined by the Secretary, were exposed to the fumes of burning oil ...." The act stipulates that this record, or registry, be established within 180 days after the act's enactment and include

- a list containing the names of each service member exposed to the fumes and
- a description of the circumstances of each member's exposure, including the length of the exposure.

The act also requires the Secretary to provide the Congress with a report annually on (1) the results of all ongoing health studies on the members relating to the fires and (2) the need for additional studies. Lastly, the act requires that, "upon the request of any member listed in the Registry, the Secretary of the military department concerned shall, if medically appropriate, furnish a pulmonary function examination and chest x-ray to such person."

## Steps Are Being Taken by DOD to Develop and Archive Data Needed for a Registry

Even before the act's passage, DOD had developed an approach and initiated several actions intended to determine, document, and permanently retain information on exposure to the fumes. For example, it is:

- developing a data base of all service members who served in the Gulf, along with the dates they served;
- preserving all data related to its health risk assessment, including monitoring data, field notes, protocol, and analysis; and
- retaining daily weather and troop movement data.

DOD officials said that if the risk assessment shows measurable risks of disease resulting from exposure to the oil fire smoke, this information will permit them to identify the units and most of the people who are at risk and should be "registered" in a separate data base. As a means to verify and ensure an accurate list of individuals assigned to the specific units included in any data base, DOD officials are considering several options, such as publicly requesting that individuals who served in certain units notify DOD.

DOD's plan generally comports with recommendations made by others: the Public Health Service, in a report on dealing with the environmental and health impact of the fires; a Department of Veterans Affairs expert who made suggestions on the Agent Orange registry;<sup>4</sup> and a panel of DOD and VA officials with experience dealing with Agent Orange issues.

A data base, or registry, of troops who were exposed to the oil well fires could take many forms, with varying detail, effort, and cost. Developing it and getting the data into the appropriate format would likely require a substantial effort, DOD officials said. For example, daily troop movements are available only in hand-written diaries maintained by each unit. Unit rosters contain only the names of those service members permanently assigned to the unit and not those who supplemented units during the war. Accounting for all individuals and their daily whereabouts during the war would be a massive and perhaps impossible undertaking. Therefore, DOD's plan focuses on identifying those areas and units where the risk assessment indicates a measurable risk of contracting a disease or illness from the fumes, rather than attempting to record the amount of exposure for each individual who served in the Gulf.

<sup>4</sup>Because of the potential adverse health effects of exposure to the herbicide Agent Orange used during the Vietnam conflict, VA established a registry of veterans who have sought and received medical examinations and care as a result of their concerns over the possibility of being exposed to Agent Orange.

---

## Conclusions

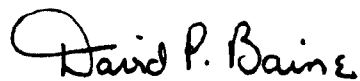
DOD took reasonable actions to safeguard the health of U.S. troops who were exposed to the oil well fires. In addition to advising troops on how to protect themselves, it provided them with the equipment to do so. DOD also has initiated a major effort to assess the long-term health implications of exposure to the oil well fires. Whether troops will incur long-term health effects as a result of serving in the Gulf is uncertain. Predicting long-term health effects as a result of short-term exposure to oil well fires of the type that U.S. troops experienced is a new undertaking, and how well the studies now underway will be able to perform this task is not known. DOD's plan to retain information and develop a list of troops whom it determines to be at risk from exposure to oil fire smoke seems appropriate. It should provide the necessary information in the event that additional studies are needed or veterans' benefits are authorized in the future.

---

As requested by your office, we did not obtain written agency comments on this report. We did however, discuss its contents with DOD representatives and incorporated their comments where appropriate. As agreed with your office, we plan no further distribution of this report until 30 days from its issue date. At that time, we will send copies to the Secretary of Defense and other congressional committees, and make it available to others on request.

If you have any questions about matters contained in this report or would like to discuss it further, please call me on (202) 275-6207. The major contributors to the report are listed in appendix I.

Sincerely yours,



David P. Baine  
Director, Federal Health  
Care Delivery Issues



# Major Contributors to This Report

---

Human Resources  
Division, Washington,  
D.C.

Stephen P. Backhus, Assistant Director, (202) 708-4228  
Shelia Drake, Evaluator-in-Charge

---

### **Ordering Information**

**The first copy of each GAO report is free. Additional copies are \$2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary. Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.**

**U.S. General Accounting Office  
P.O. Box 6015  
Gaithersburg, MD 20877**

**Orders may also be placed by calling (202) 275-6241.**

United States  
General Accounting Office  
Washington, D.C. 20548  
Official Business  
Penalty for Private Use \$300

First-Class Mail  
Postage & Fees Paid  
GAO  
Permit No. G100