



## Health Problems from Oil Well Fires Not Seen in Gulf War Veterans

*The following is part of a series of articles about various environmental hazards or risks encountered by military personnel deployed to the Gulf War theater of operations. Previous articles have focused on chemical and biological warfare agents, pesticides, depleted uranium, pyridostigmine bromide, infectious diseases, and vaccinations, including anthrax and botulinum. They can be found on-line at [www.va.gov/health/environ/persgulf.htm](http://www.va.gov/health/environ/persgulf.htm).*

Perhaps one of the most vivid and alarming images of the Gulf War is that of the hundreds of burning oil wells. Viewing the fires with the large volume of billowing smoke, many people in the U.S. braced for the worst – large numbers of Gulf War participants with serious breathing and other respiratory problems.

During the past decade, a number of internal government and external committees/boards have looked at the potential health risks of exposure to smoke from oil well fires. None of them found that exposure to be the likely cause of the problems that some Gulf War veterans are experiencing. Dr. Mark A. Brown, Director, VA's Environmental Agents Service noted, "Even before the war ended, VA was worried that returning Gulf War veterans would have health problems from the oil well fires' smoke. We now know that this environmental exposure wasn't really a significant problem, and attention has shifted to other deployment related health issues."

In December 1991, Congress responded to this concern by including in Public Law 102-190 a provision (Section 734) that required the Secretary of Defense to "establish and maintain a special record relating to members of the Armed Forces who ...were exposed to the fumes of the burning oil in the Operation Desert Storm theater of operations during the Persian conflict." (VA was developing its Gulf War Registry at the same time.)

Less than a year later in November 1992, in Public Law 102-585, Congress recognized that other potential hazards and environmental factors may have caused the medical problems of some Gulf War participants. Section

704 of that law directed the Department of Defense(DoD) Persian Gulf Registry to expand the DoD Registry to include "Any other member who served in the Operation Desert Storm theater of operations during the Persian Gulf conflict."

### Background

In February 1991, the first oil well fires were ignited by the Iraqi armed forces during a retreat in the Persian Gulf War. Between February 1991 to November 1991, 605 oil well fires were started. Oil well fires produced dense clouds of soot, liquid, aerosols, and gases. Unknown numbers of troops were likely exposed to high concentration of particulate matter, metals, sulfur, and nitrogen oxides in the air as a result of oil well fires—many of the same components found in smog.

A concentrated effort was made by the DoD, U.S. Environmental Protection Agency, the U.S. Department of Health and Human Services, and the National Oceanic and Atmospheric Administration to evaluate the health effects from these fires. Based on data collected from May through December 1991, the carcinogenic and non-carcinogenic health risks from exposure to oil well fire smoke were determined to be minimal due to the lofting of the smoke above the ground level and the nearly complete combustion of most chemical substances.

The plumes of the billowing smoke occasionally remained low to the ground, in some areas enveloping U.S. military personnel. Exposures to respiratory irritants, carcinogens and neurotoxic compounds were highest during wintertime encampments in Saudi Arabia.

In December 1999, the Final Report of the Presidential Advisory Committee (PAC) on Gulf War Illnesses indicated that known immediate health effects from inhaling large amounts of smoke and particulates are primarily respiratory. Toxic gases were not detected at high levels during the fire. High levels of airborne particulates are associated with increased rates of asthma and can worsen other chronic respiratory conditions. With chronic exposure (months or years) to particulates, there is increased risk of some loss in lung function or chronic bronchitis, especially in cigarette smokers.



Exposures to organic compounds were found to be similar to the levels observed in Houston and Philadelphia, cities with major petrochemical industries. Although substantial increases were noted in particulates, concentrations were still considered normal for the Middle East. Air pollutants expected from the oil fires were classified into four categories:

- Reactants: uncombusted crude oil components
- Combustion products: carbon dioxide and water
- Incomplete Combustion Products: carbon monoxide
- Products of Secondary Reactions: photolysis (chemical decomposition by the action of sun light)

Sampling was designed by the U.S. Army Environmental Hygiene Agency so that results could be used to estimate risks of cancer and subchronic non-cancer diseases. The total cancer risk is determined by adding the individual cancer risks for each pollutant in each means of exposure (i.e. breathing, eating, and through the skin), then adding the risk for all the pathways. Further, on the basis of air and soil pathway analysis, the excess cancer risk resulting from exposure to oil fire smoke both in Kuwait and Saudi Arabia, did not surpass two excess cancers per one million. A soon to be published VA mortality study reports that the risk of death from natural causes, including cancer, is the same among Gulf War veterans compared to non-Gulf veterans.

### Health Risk Small

There has also been no indication of unexplained illnesses among U.S. civilian firefighters who worked to put out the oil well fires after the cease-fire, and who were highly exposed to combusted and non-combusted products of damaged oil wells. The professional firefighters were presumably exposed to a much higher level of pollutants from the burning oil wells than the average U.S. service member.

DoD's Geographic Information System (GIS) was used for data integration and risk calculation. The GIS allows for data from the environmental sampling, modeled pollutant concentrations, satellite imagery, exposure factors, chemical toxicity, and the troop unit location databases to be combined and assessed in determining the oil fire exposure and health risks to U.S. service members. This information together with various independent review committees all indicate that the exposures that troop units received from oil fires and other industrial sources in the Gulf are unlikely, by themselves, to have caused long-term health problems.

In considering in how to evaluate health impacts of hazardous wartime experience in the future, the Final Report of the PAC made the following research recommendations:

- Develop more accurate and reliable troop locator systems;
- Monitor Gulf War veterans for increased rates of cancer through long-term mortality studies;
- The Research Working Group should consult more thoroughly with other federal agencies. Members of the Research Working Group include scientists and managers from VA, DoD and HHS. The Research Working Group serves as a common forum for researchers to present ideas and findings and collectively respond to emerging research issues and problems.

Readers with internet access may wish to get additional information about this subject and related topics at <http://www.gulflink.osd.mil/>

*Martha Adell Cruz, a full-time communications/journalism student at the Austin Community College in Austin, Texas, was the principal author of the above article. Adell wrote this article in June 2001 while she was serving as a Summer Intern, through the Hispanic Association of Colleges and Universities (HACU), in VA's Environmental Agents Service. She plans to graduate in Spring 2002 and looks forward to a career in journalism.*

### Past Environmental Risks Articles Available

During the past two years, we have published a series of articles about various environmental health risk factors for Gulf War veterans. For information about the topics listed below, see our web page <http://www.va.gov/health/enviro.n.persgulf.htm>, contact the Gulf War Registry Coordinator at the nearest VA medical center, or contact the Environmental Agents Service (131), VA Central Office, 810 Vermont Avenue, N.W., Washington, DC 20420.

- Chemical and Biological Warfare Agents** – October 2000
- Depleted Uranium** – September 1999
- Infectious Diseases** – January 2001
- Oil Well Fire Smoke and Petroleum** – July 2001 (Current issue)
- Pesticides** – June 2000
- Pyridostigmine Bromide** – March 2000, December 1999
- Vaccinations, Including Anthrax and Botulinum** – May 2001

Comments regarding these articles are welcome and should be sent to Donald J. Rosenblum, Gulf War Review, Environmental Agents Service (131), VA Central Office, 810 Vermont Avenue, N.W., Washington, DC 20420.

## Oops!

The front page of the May 2001 issue of the Gulf War Review included the cover of the Institute of Medicine's *Veterans and Agent Orange: Update 2000*. No, Agent Orange was not used to defoliate the jungles of Iraq, Kuwait and Saudi Arabia. In addition to the Gulf War Review, this office produces the Agent Orange Review. The image of the Agent Orange update should have been included in the Agent Orange Review, not the Gulf War Review. We

## Gulf War Issues in Other Countries – Part 2

*The following article is the second in a three-part series that describes the concerns and reactions of the United Nations Coalition partners that joined the U.S. in the Gulf War. More than thirty countries provided air, sea, or ground forces to the Gulf War. The United Kingdom (U.K.) contributed 53,000 troops, the second largest number from Western countries (after the U.S.).*

*(Note: We initially planned to publish this information in two parts but its length resulted in a revision of that plan). The last issue, dated March 2001, of the Gulf War Review, provided an introduction to this subject and reported on early initiatives undertaken by the British, French, Czechs, Canadians, Danes, and Australians.*

*The next issue will include additional information about the Canadian Gulf War Health Research Program, the Danish Gulf War Study, difficulties in making international comparisons, differences in exposures, future collaboration, and a concluding summary.*

### Synopsis of Part 1

About one million military personnel were deployed to the Middle East in 1990-91 as part of the Coalition Forces formed under the authority of the United Nations to counter the Iraqi invasion of Kuwait. Military personnel from the various nations involved in the war had different exposures and have had different health concerns since their military service.

Middle Eastern countries have not reported unusual health problems in their military populations. The French, until recently, did not report a post-conflict syndrome. The Czech Army sent a chemical unit. They had extensive pre- and post-deployment health screenings, but about 25

percent were lost to follow-up after the collapse of Czechoslovakia. The Danish defence medical authorities are investigating health concerns raised by their veterans. Canada, Australia, and Great Britain have established programs to learn more about the medical problems that some veterans have reported.

### The Requirement for Research

The health assessment programs, though excellent clinical tools, were not well suited to investigating subtle patterns of ill-health in large groups of veterans. They were case series without comparative data. The requirement for epidemiological research was identified first in the U.S. and, shortly afterwards, in the United Kingdom (UK) and Canada.

The UK developed a “Working Plan” for research, in collaboration with the US, setting out research objectives. They were similar to the objectives in the US “Working Plan”. Both countries aspired to:

- Determine if there was an excess of ill-health in the Gulf veteran population (including adverse reproductive outcomes),
- Identify associations between ill health and exposures, and
- Develop therapeutic interventions and preventive strategies.

The Canadian Department of National Defence commissioned a respected academic to advise them on their research requirements. He recommended an epidemiological study to describe the health status of Gulf veterans. The rationale in both the UK and Canada was that epidemiological studies should be carried out as a first step to determine if the problems their veterans were experiencing were comparable to those being experienced by American veterans.

### The UK Gulf Health Research Program

The Ministry of Defence asked the Medical Research Council to recommend a program of research. In May 1996, the Medical Research Council issued a “Call for Proposals” and, in December 1996, recommended to the Ministry of Defence in October 1996 that two applications should be funded, one from Professor Cherry in Manchester and a second from Dr. Doyle at the London School of Hygiene and Tropical Medicine. The Medical Research Council also recommended that these

two studies should be developed in collaboration with a study funded by the United States Department of Defense. Professor Wessely and his team from King's College, London were funded in June 1996 to carry out a study on UK Gulf veterans.

### **Manchester Study**

Professor Cherry and her team proposed three linked studies to determine whether there is an excess of ill health in Gulf War veterans and to identify exposures and predisposing factors associated with distinctive patterns of symptoms.

For the first study two groups each of approximately 5,000 were identified to determine whether Gulf veterans report more symptoms than military personnel with active service elsewhere, whether the pattern of symptoms is different in the two groups and whether symptoms are associated with self-reported exposures. This phase of the work has been completed and publication of findings is awaited.

In the proposed second study, exposures associated with such clusters will be investigated using a nested case referent design. Cases, defined from study 1 will be matched to individuals who were not deployed to the Gulf. Home interviews will be carried out to assess impairment, collect detailed exposure information and to document predisposing events.

A study was also carried out of all Gulf War veterans and a similar number of military with active service elsewhere in order to investigate whether service in the Gulf War is associated with increased mortality or cancer risk. This work is complete and was published recently.

### **Reproductive Outcomes**

In the "Working Plan for Research on Gulf Veterans' Illnesses" reproductive outcomes had been identified as an area of particular concern. Dr. Doyle, and her team from the London School of Hygiene and Tropical Medicine, proposed a study of the reproductive health of all Gulf War veterans and the health of their children. The comparison cohort is a demographically similar group of armed forces' personnel who were in service at the time of the Gulf War but who were not deployed. Potential study participants who left the Armed Forces since the Gulf War are being traced using the National Health Service Central Register, as well as Ministry of Defence pensions and personnel databases.

Information on fertility, pregnancy outcomes and child health as well as information about specific occupational and environmental exposures will be collected by postal form. Questions relating to service in the Gulf will include chemical and biological weapons, nerve agent prophylaxis, vaccinations, infectious diseases, pesticides, depleted uranium, microwaves, and other chemical and physical agents. Where possible, all reports of serious adverse reproductive and health outcomes will be validated from medical notes and reported exposures will be validated against information supplied by the Ministry of Defence. Appropriate analyses will be performed to compare risks of adverse reproductive outcome in the exposed cohort with risks in the comparison cohort. This study will take three years and is still in the data-collection phase.

### **US-Funded Research on UK Gulf Veterans**

Professor Wessely's team at King's College School of Medicine and Dentistry is carrying out an epidemiological study of the prevalence of unexplained illness in the population at risk, using a two-stage design. Stage 1 was a postal questionnaire survey of approximately 5,000 Gulf veterans selected at random and, for comparison, an equivalent sample who served in the Bosnia conflict and an additional reference group of service personnel who had not been deployed to either the Gulf or Bosnia. This study surveyed three groups each of 5,000 service and ex-service personnel. This phase is complete and the findings have been published in two papers.

The first paper, by Unwin and the Gulf research team, provided a thorough assessment of the health status of British Gulf veterans. They found that Gulf veterans were twice as likely as controls to report a wide range of symptoms, similar to those reported by troops after previous conflicts. Gulf veterans were also found to have increased levels of psychological distress. When adjustments were made for this, the differences between the cohorts remained. They also reported that vaccination against biological weapons correlated highly with ill health. They speculated on the biological mechanism which might explain such an association. They speculated further that the anxiety surrounding the administration of these vaccines might have been a factor in the development of subsequent ill health. They also considered if the immune challenge posed by these vaccines might have contributed to subsequent health effects in veterans who were already suffering a number of other challenges.

In the second paper, Khalida and her colleagues describe the factor structure of the symptoms reported. They then used confirmatory factor analysis to test the fit of the factor analysis in the control groups. They concluded that their findings did not support a unique Gulf War syndrome and recommended that the increased self-reporting of symptoms need further investigation.

The second stage will involve interview, examining and testing all those (approximately 10%) in each of the Stage I study groups who fall below a threshold defining subjective ill health. Information gathered at Stage II will enable them to estimate the prevalence of undiagnosed morbidity including chronic fatigue syndrome in UK service personnel, and to calculate whether there is an excess associated with Gulf war service. If there is, they will be able to examine pre-illness and psychosocial factors implicated in such an increase, as well as directing avenues for further biomedical and psychosocial research. This phase of the study is well under way.

The Wessely team published a further paper analyzing of patterns of ill health in veterans receiving multiple immunizations. They reported that veterans immunized during deployment were more likely to report ill-health than those immunized before deployment. They have since published a retraction following as they found that the results were not robust when interpreted using different statistical methods.

The Ministry of Defence has also funded Professor Wessely's team to conduct neuromuscular and neurological studies. Fifty Gulf Servicemen with prominent neuromuscular symptoms, identified during the epidemiological survey, together with 25 appropriate sick Bosnia veterans and 50 well Gulf/Era controls, are completing a rigorous neuromuscular evaluation assessing the function of peripheral nerves, neuromuscular junction, muscle and autonomic nerves.

During Stage 2 the team are collecting and preserving lymphocytes, serum and plasma from all those attending the unit for clinical assessments. They are carrying out a study of immunological function, with particular emphasis on Th1/Th2 cytokine balance, to explore the hypothesis put forward by Rook and Zumla that multiple vaccination delivered under stress has skewed the distribution of these lymphocyte subsets.

The Wessely team is also conducting several studies of other possible post conflict syndromes that have affected UK Armed Forces during this century, as well as analysing the origins of veteran movements, and the social and political recognition of, and response to, veterans' issues.

## Interactions Research

Following the General Election, the British Government initiated a research programme into the possible adverse health effects of the combination of vaccines and tablets given to protect them against biological and chemical agents. Proposals were prepared by the Defence Evaluation and Research Agency and by the Defence Evaluation and Research Agency and considered by an Independent Panel. The Panel is content for initial work, involving tests on rodents, to proceed.

### About the "Review"

The "Gulf War Review" is written by VA's Environmental Agents Service (EAS). The "Review" is published to provide information about the concerns of Gulf War veterans, their families, and others interested in possible long-term health consequences of military service in the Gulf War. The "Review" describes actions by VA and others to respond to these concerns. For past and current issues of the "Review" and additional information, see our web site at [www.va.gov/health/ environ/persgulf.htm](http://www.va.gov/health/environ/persgulf.htm).

The most recent, prior to this, issues of the newsletter are dated January 2001 and May 2001. Additional issues will be prepared when warranted by significant developments. EAS anticipates publication of the "Review" three or four times annually. Three were issued in Calendar Year 2000. This issue was completed in late June 2001 and does not include developments that occurred after that time.

Comments or questions concerning the content of the "Review" are encouraged. Suggestions and ideas for future issues of the newsletter should be sent to Donald J. Rosenblum, Deputy Director, Environmental Agents Service (131), VA Central Office, 810 Vermont Avenue, N.W., Washington, DC 20420.

Requests for additional copies of this and/or future issues should also be sent to Mr. Rosenblum. A limited supply of the prior issues is available. Please specify the quantity and issue date requested.

Questions about the Registry examination should be directed to the Registry Coordinator or Registry Physician at the nearest VA medical facility. The telephone number can be found in the local telephone directory under the "U.S. Government" listings. Assistance is also available from the toll-free VA Gulf War Helpline: **1-800-749-8387**.

## Q's and A's

The "Review" occasionally includes a questions-and-answers section in which Department of Veterans Affairs (VA) officials respond to inquiries from readers regarding the Gulf War experience, problems experienced by Gulf War veterans and their families, and programs initiated by the VA and other federal departments and agencies to help these veterans and their families.

Questions should be sent to Mr. Donald J. Rosenblum, Deputy Director, Environmental Agents Service (131), Attn: GW Review – Q's & A's, 810 Vermont Avenue, N.W., Washington, DC 20420.

### Address Changed? Receiving Multiple Copies?

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## Hymans Appointed to VA Chief Consultant Position

Captain Kenneth Craig Hyams has been appointed Chief Consultant for the Occupational and Environmental Strategic Health Group within the Department of Veterans Affairs' Veterans Health Administration (VHA). Following his retirement from the Navy, Dr. Hyams reports to VA duty on August 1, 2001. He replaces Dr. Frances M. Murphy, who was selected to serve as Deputy Under Secretary for Health. "As a new veteran, I am eager to continue my efforts to learn more about the problems that Gulf War and other veterans are experiencing and doing all I can to help them," Dr. Hyams said.

As Chief Consultant, Capt. Hyams will plan, coordinate, control, and evaluate all of VHA's occupational medicine and environmental programs, and as well as lead educational efforts in these areas for staff, patients, employees, and the public.

In 1978, Capt. Hyams received his M.D. from the University of Texas. He later received a Masters of Public Health at the Johns Hopkins University in Baltimore, Maryland. He is board certified in Internal Medicine and in Infectious Diseases. For the past 14 years, he has been Director, Epidemiology Department, U.S. Naval Medical Research Center in Silver Spring, Maryland.

"We had a rich pool of candidates. I think Dr. Hyams' strengths were really that he had worked within VA, even though he was in the Navy. He knew many of the issues and responses to Gulf War problems. He has great familiarity with the veterans and the environmental issues that people in the military face. He will set his stamp on the job," said Dr. Susan M. Mather, Chief Public Health and Environmental Hazards Officer.

*The above article by prepared by Martha Adell Cruz, Summer Intern.*

## Where to Get Help

**Active duty military** personnel with questions or concerns about their service in the Persian Gulf region - contact your commanding officer or call the Department of Defense (DoD) Gulf War Veterans' Hotline (1-800-796-9699) for an examination.

**Gulf War veterans** with concerns about their health - contact the nearest VA medical center. The telephone number can be found in the local telephone directory under Department of Veterans Affairs in the "U.S. Government" listings. A Gulf War Registry examination will be offered. Treatment will be provided to eligible veterans. The VA Gulf War Information Helpline can also provide the latest information and assistance. The toll-free telephone number is 1-800-PGW-VETS (1-800-749-8387).

Gulf War veterans in need of **marital/family counseling** - contact the nearest VA medical center or VA vet center. For additional information, call the Gulf War Information Helpline at 1-800-PGW-VETS (1-800-749-8387).

Gulf War veterans seeking **disability compensation** for illnesses incurred in or aggravated by military service - contact a Veterans Benefits Counselor at the nearest VA regional office or health care facility at 1-800-827-1000, or call the VA Gulf War Information Helpline at 1-800-PGW-VETS (1-800-749-8387).

Gulf War veterans seeking participation for their **spouses or children** in the VA-funded health examination program for spouses and children - call the VA Gulf War Information Helpline at 1-800-PGW-VETS (1-800-749-8387). Veterans interested in the alternative self-funded examination for spouses or children - contact the Gulf War Registry Coordinator at the nearest VA medical

**Gulf War veterans interested in learning about the wide range of benefit programs** administered by VA - contact a Veterans Benefits Counselor at the nearest VA regional office or health care facility at 1-800-827-1000, or call the VA Gulf War Information Helpline at 1-800-PGW-VETS (1-800-749-8387).

Anyone with first-hand information about "**incidents**" that occurred in the Southwest Asia theater of operations during the Gulf War that may be related to health problems experienced by military personnel who served in the War - call the DoD "Incidents" Hotline at 1-800-472-6719.

Veterans who have been diagnosed with a motor neuron disease (including **amyotrophic lateral sclerosis** or **Lou Gehrig's disease**) and who were on active duty between August 2, 1990, and July 31, 1991, regardless of whether they actually served in the Gulf War theater of operations (or family/friends of veterans who are deceased or otherwise unable to contact VA) - call 1-877-DIAL-ALS (1-877-342-5257) to participate in a national survey.

For additional information about VA's program initiatives, see VA's Gulf War **veterans' illnesses** home page at <http://www.va.gov/health/envIRON.persgulf.htm>.

Gulf War veterans who **encounter difficulties** at a VA medical facility can contact the "**patient advocate**" at that facility for assistance in resolving the problem. The medical center telephone operator should have the telephone number.

Representatives of **veterans service organizations**, including the American Legion (1-800-433-3318), Veterans of Foreign Wars of the United States (1-800-VFW-1899), Disabled American Veterans (1-877-426-2838), etc., may also be very helpful to Gulf War veterans, especially veterans who are seeking disability compensation.

## Annual Report on Gulf War-Related Research on Web

The Annual Report to Congress on Federally Sponsored Research on Gulf War Veterans' Illnesses for 1999 is now available on the web at: <http://www.va.gov/resdev/pgrpt99.htm>

An index of previous reports has been updated: <http://www.va.gov/resdev/pgrpt98.htm>

The 1999 Report is also linked from a "What's New" page: <http://www.va.gov/resdev/wn.cfm>

## Disability Compensation Policy Reaffirmed

On July 6, 2001, final notice was published in the *Federal Register* reaffirming the decision announced January 17, 2001 by then Acting Hershel Gober that the recent findings of the National Academy of Sciences' Institute of Medicine (IOM) does not justify a change in VA policy regarding disability compensation for ill Gulf War veterans.

For information regarding the decision to make no changes in the disability compensation policy, see the January 2001 issue of the Gulf War Review. For information about the IOM released on September 7, 2000, see the October 2000 issue. The newsletters are on the web at [www.va.gov/health/envIRON/persgulf.htm](http://www.va.gov/health/envIRON/persgulf.htm).

**Gulf War Review**  
Information for Veterans Who  
Served in Desert Shield/Storm  
August 2001

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