FACT sheet
Sulfur Fire at the Mishraq State Sulfur Mine Near Mosul, Iraq

NOTICE TO VA EXAMINERS
VA Considers this Veteran Exposed to Sulfur Dioxide and Hydrogen Sulfide

In June 2003, a fire ignited at the Mishraq State Sulfur Mine in northern Iraq. The sulfur mine is the largest in the world and resulted in the largest manmade sulfur fire in recorded history. It burned for approximately 3 weeks and caused the release of roughly 42 million pounds of sulfur dioxide (SO2) per day; hydrogen sulfide (H2S) was also released.

In early 2007, medical personnel from the U.S. Army Center for Health Promotion and Preventative Medicine visited Ft Campbell, Kentucky, which is the U.S. home base for the 101st Airborne Division. Members of the 101st were firefighters at the Mishraq State Sulfur Mine fire. The medical personnel learned that from late 2004 through February 2007, 41 soldiers, citing exposures to the sulfur fire and reporting unexplained shortness of breath on exertion, had been referred by the Blanchfield Medical Center to a pulmonary specialist at the Vanderbilt Medical Center. As of February 2007, nineteen (19) personnel had an open lung biopsy and were all diagnosed with constrictive bronchiolitis. Constrictive bronchiolitis is an inflammatory and fibrotic lesion of the terminal bronchioles of the lungs. This diagnosis is very uncommon and has been associated with inhalation exposures, organ transplantation, certain drugs, and collagen vascular disorders.Individuals with this finding typically have shortness of breath on exertion, but may have normal chest X-rays and inconclusive findings on pulmonary function testing. Due to some similarities, symptoms of constrictive bronchiolitis may be attributed to asthma or chronic obstructive pulmonary disease (COPD).

Examiners may have a difficult time evaluating this population. In most cases, the affected soldiers are comfortable at rest and are able to perform the activities of daily living. They have normal or near normal pulmonary function tests, but at the same time they become short of breath on slight physical exertion, cannot meet physical training requirements, and are considered unfit for deployment. This unique circumstance challenges those who must determine a disability rating.

While individual exposure levels cannot be accurately determined, DoD considers constrictive bronchiolitis (initially diagnosed as "bronchiolitis obliterans") to be plausibly associated with exposure to the 2003 Mishraq State sulfur fire event. This health effect has been scientifically associated with high exposures to SO2 .

Both sulfur dioxide and hydrogen sulfide are gases that can produce irritation and reddening of the nose and throat, eye irritation/pain, and coughing. At high levels, sulfur dioxide can burn the skin and can cause severe airway obstruction, hypoxemia, pulmonary edema, and even death. The firefighters involved with suppressing this fire experienced irritation, minor burns, and other effects such as blood-tinged nasal mucous. Some have been found to have long-term respiratory conditions such as "constrictive bronchiolitis."

Note: If the claim is for a respiratory condition possibly related to the sulfur fire exposure consider requesting tests for "bronchiolitis" be conducted in addition to other respiratory testing, while noting that many standard test results may be normal.

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potentially related to such exposure, please utilize this information objectively and together with the remaining evidence, including lay evidence, in the Veteran's record.

Adjudication Authority

FACT sheet
Qarmat Ali Water Treatment Plant in Basrah, Iraq

NOTICE TO VA EXAMINERS
VBA Considers this Veteran Exposed to Hexavalent Chromium

From approximately April through September of 2003, Army National Guard (NG) personnel from Indiana, West Virginia, South Carolina, and Oregon operated at the Qarmat Ali Water Treatment Plant in Basrah, Iraq. They were assigned to guard contract workers who were restoring the plant. During that time, sodium dichromate, a source of hexavalent chromium was found on the ground and measured in the air. Hexavalent chromium, or Chromium VI (six), in sodium dichromate is a lung carcinogen through inhalation. Chromium VI is also an acidic compound that can cause immediate irritation of the eyes, nose, sinuses, lungs, and skin.

DoD provided a medical evaluation for certain soldiers there at the time, which took place in October 2003. Accordingly, 137 service members were evaluated. The results at the time showed some abnormalities in individuals, such as complaints of eye, nose, throat and/or lung irritation, or abnormal pulmonary function, kidney, or liver tests. However, the Army stated that it could not specifically trace these symptoms to chromium exposure.

The Veterans Health Administration (VHA) has begun to augment the Gulf War Registry to reflect service at Qarmat Ali. VHA is verifying the numbers of these Veterans who have either enrolled in care or received a Gulf War Registry examination. The involved Guard members who have had an initial examination will be recalled to have a complete exposure assessment as well as a more targeted physical examination and ancillary testing to detect indications of health outcomes that may be related to hexavalent Chromium. The Veteran, whose case you are reviewing, may or may not have completed this type of examination. Therefore, please be sure to review any such records if they exist in the VHA health record system for this Veteran.

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Adjudication Authority

FACT sheet
Burn Pits in Iraq, Afghanistan, and the Horn of Africa

NOTICE TO VA EXAMINERS
VA Considers this Veteran Exposed to Burn Pit Toxins

Large burn pits have been used throughout the operations in Iraq and Afghanistan to dispose of nearly all forms of waste. It is estimated that such pits, some nearly as large as 20 acres, are or have been located at every military forward operating base (FOB). The pit at Joint Base Balad, also known as Logistic Support Area (LSA) Anaconda, has received the most attention. The burned waste products include, but are not limited to: plastics, metal/aluminum cans, rubber, chemicals (such as, paints, solvents), petroleum and lubricant products, munitions and other unexploded ordnance, wood waste, medical and human waste, and incomplete combustion by-products. Jet fuel (JP-8) is used as the accelerant. The pits do not effectively burn the volume of waste generated, and smoke from the burn pit blows over bases and into living areas.

DoD has performed air sampling at Joint Base Balad, Iraq and Camp Lemonier, Djibouti. Subsequently, DoD has indicated that most of the air samples have not shown individual chemicals that exceed military exposure guidelines (MEG). Nonetheless, DoD further concluded that the confidence level in their risk estimates is low to medium due to lack of specific exposure information, other routes/sources of environmental hazards not identified; and uncertainty regarding the synergistic impact of multiple chemicals present, particularly those affecting the same body organs/systems.

The air sampling performed at Balad and discussed in an unclassified 2008 assessment tested and detected all of the following: (1) Particulate matter (PM-10) (and PM 2.5); (2) Polycyclic Aromatic Hydrocarbons (PAHs); (3) Volatile Organic Compounds (VOCs); and (4) Toxic Organic Halogenated Dioxins and Furans (dioxins). Each of the foregoing is discussed below.

Some of the PAHs that were tested for and detected are listed below. These results are from DoD testing from January through April 2007.

Acenaphthene	Acenaphthylene
Anthracene	Benzo(a)anthracene
Benzo(a)pyrene	Benzo(b)fluoroanthene
Benzo(b)fluoroanthene	Benzo(g,h,i)perylene
Benzo(k)fluoroanthene	Chrysene
Dibenz(a,h)anthracene	Fluoranthene
Fluorene	Indeno(1,2,3-cd)pyrene
Naphthalene	Phenanthrene
Pyrene	

The following list reveals some of the VOCs that were tested for and detected at Balad. These results are from DoD testing from January through April 2007.

Acetone	Acrolein*
Benzene	Carbon Disulfide
Chlorodifluoromethane	Chloromethane
Ethylbenzene	Hexane
Hexachlorobutadiene*	m/p-Xylene
Methylene Chloride	Pentane
Propylene	Styrene
Toluene	

* Acrolein and Hexachlorobutadiene were, although seldomly, detected far above the MEG ratio-once over 1800 percent above the MEG for Acrolein and over 500 percent above the MEG for Hexachlorobutadiene.

Below is a list of the dioxins and furans detected, all reportedly at low doses.

1,2,3,4,6,7,8 HPCDD	1,2,3,4,6,7,8 HPCDF
1,2,3,4,7,8,9 HPCDF	1,2,3,4,7,8 HXCDD
1,2,3,4,7,8 HXCDF	1,2,3,6,7,8 HXCDD
1,2,3,6,7,8 HXCDF	1,2,3,7,8,9 HXCDD
1,2,3,7,8,9 HXCDF	1,2,3,7,8 PECDD
1,2,3,7,8 PECDF	2,3,4,6,7,8 HXCDF
2,3,4,7,8 PECDF	2,3,7,8 TCDD
2,3,7,8 TCDF	octachlorodibenzodioxin
octachlorodibenzofuran	

For examination purposes, 22 of the VORs and PAHs, affect the respiratory system; 20 affect the skin; at least 12 affect the eyes; and others affect the liver, kidneys, central nervous system, cardiovascular system, reproductive system, peripheral nervous system, and GI tract. In at least seven, dermal exposure can greatly contribute to overall dosage. Therefore, when considering total potential exposure, please consider the synergistic affect of all combined toxins, primarily through inhalation and dermal exposure, but also through ingestion.

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Adjudication Authority

FACT sheet
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Adjudication Authority

FACT sheet
Particulate Matter throughout Iraq, Afghanistan, and Djibouti

NOTICE TO VA EXAMINERS
VA Considers this Veteran Exposed to High Levels of Particulate Matter

"Particulate matter" (PM), is a complex mixture of extremely small particles and liquid droplets made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. The PM levels in Southwest Asia are naturally higher than most of the world and may present a health risk to service members. There are two sizes of particles in the air that are a health concern—particles with a 10-micron (PM10) diameter or smaller, and those 2.5 microns (PM2.5) and smaller. The size is directly linked to potential for causing health problems. Once inhaled, 10-micron sized particles or smaller can affect the heart and lungs and cause serious health effects.

Primary sources of PM in Southwest Asia and Djibouti on the Horn of Africa include dust storms and emissions from local industries. The DoD conducted a year-long sampling survey to characterize the chemistry and mineralogy of the PM at 15 sites in OIF and OEF. These results were published by the Desert Research Institute in 2008 and are being reviewed by the National Academy of Sciences Committee on Toxicology. DoD stated in their 2008 Balad assessment, that emission from burns pits, among other things, "may increase localized concentration of 2.5 micrometer PM and other potentially toxic air pollutants."

Most studies relate PM exposure data to respiratory and cardiopulmonary health effects in specific susceptible general population subgroups to include young children, the elderly, and especially those with existing asthma or cardiopulmonary disease. Many variables influence the probability of health outcomes. The key variables are the size-fraction and chemical makeup of the PM, the concentration levels, the duration of exposures, and various human factors to include age, health status, existing medical conditions, and genetics. These variables combined with scientific data gaps limit the medical community's ability to estimate health impacts to relatively healthy troops. Another key factor is that most studies have been on older or less healthy groups. Several studies to determine potential health effects/outcomes are currently underway.

DoD collected approximately 60 air samples at Balad from January to April 2007 and assessed for PM. The samples were taken from five different locations around Balad. The heaviest measured concentration of PM was taken in April 2007—the concentration level was 299 ug/ m3 of PM10 sized particles. In total, 50 of the 60 samples registered above the military exposure guidelines.

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Adjudication Authority