



Just the Facts...

Dust and Sand - Medical

GENERAL INFORMATION	<p>Before the Persian Gulf War (PGW) of 1991, air sampling data indicated that the levels for particulate matter in the Kuwait Theater of Operations were among the highest in the world. This particulate matter is composed primarily of fine clay dust and sand from natural sources and it is "normal" for the region. This dust and sand contains a significant amount of particles in the respirable size range, that is, smaller than 10 microns in aerodynamic equivalent diameter (AED). This size is commonly referred to as "PM₁₀". When present in very high airborne concentrations, prolonged exposures to this size of particles have been associated with changes in lung function, damage to lung tissue, and altered respiratory clearance of particulate matter. However, these high levels and long time periods were usually associated with uncontrolled occupational exposures.</p> <p>Sand and dust storms are common in the Persian Gulf region, but they are worse during the summer when the northwesterly <i>shamal</i> winds occur with greater frequency and intensity. Visibility can be reduced to less than 30 meters for extended periods (24 hours or more).</p> <p>The deposition of silica-containing dust in the lungs has been studied in the inhabitants of the Saharan, Libyan, Negev, and Arabian Deserts. After years of exposure, individuals in these populations may develop a benign, non-progressive fibrosis of the lungs (Desert Lung Syndrome). This condition is different from "occupational" silicosis in that it is asymptomatic and does not progress over time. It has been suggested that there is a difference between silica particles that are "freshly fractured and formed" and "old particles" where the particle surface has weathered over time. Newly formed particles have sharp and previously unexposed edges and surfaces.</p>
ROUTINE EXPOSURES IN THE DEPLOYED SETTING	<p>Dust and sand may be naturally blown by the wind, or created by vehicular traffic, aircraft, or other human activities.</p>
PERSONAL PROTECTIVE EQUIPMENT (PPE) and COUNTERMEASURES AVAILABLE FOR DEPLOYED PERSONNEL	<p>Personal precautions to avoid exposure and breathing of blowing dust and sand should be taken if possible. The use of glasses, goggles, and cravats (large kerchief-type cloths) provide general protection from the large abrasive particles.</p> <p>Individuals were encouraged to use these measures. Some units may have obtained dust masks that may have been used with the cravats. Dust masks used alone usually "leak" and don't make a complete seal, but use of this protection is largely to prevent irritation and other acute effects.</p>
QUESTIONS TO ASK REGARDING EXPOSURE	<ul style="list-style-type: none">• Was there anything about the exposure that made the individual think that it was unusual (composition, color, taste, duration)?• How long did the exposure last?• Did you become ill? Did you go to sick call? What treatment was provided?
EXPOSURE LEVELS HISTORICALLY ENCOUNTERED	<p>High levels of particulate matter were observed in Kuwait during a USAEHA (now USACHPPM) analysis in 1991. These levels were consistent with average background Kuwaiti PM₁₀ values of nearly 600 mcg/m³--the highest in the world. Average PM₁₀ concentrations measured by the USAEHA during a nine-month period in 1991 ranged from 265 to over 670 mcg/m³. This range is about 2 to 5 times greater than the US 24-hour national ambient air quality standard (NAAQS) of 150 mcg/m³. The chemical composition of the particulates was approximately 75% clays from regional natural sources, 10-23% carbon (soot) from oil fires and other industrial sources, and less than 10% from other miscellaneous sources. These other sources may be industrial or military.</p>

<p>AVAILABLE EXPOSURE DATA</p>	<p>DATA IF AVAILABLE. A review of the data developed as a result of sampling conducted immediately after the 1991 PGW indicates that particulate matter levels in the air were significantly high and that concentrations often exceeded the levels considered safe for the protection of human health. The data also indicate that there was a significant mass of particles in the PM₁₀ size range. But, the maximum total dose of silica and soot received by US personnel was significantly less than the level at which one would expect to see the onset of adverse health effects.</p>
<p>COMMON ACUTE AND CHRONIC HEALTH EFFECTS</p>	<p>ACUTE: Sand and dust can obscure vision (without causing actual injury), irritate the skin and sensitive membranes of the eyes, nose, and throat, and aggravate pre-existing sinus and asthmatic conditions. Typical symptoms reported by US personnel during the 1991 PGW were cold- or flu-like and included cough, runny nose, eye and throat irritation, and shortness of breath. These symptoms are generally short-term and reversible and are due mainly to the particulate matter and not silica content. Some flare-up of asthma could be anticipated, although DNBI reporting does not classify the type of respiratory condition making it difficult to tell.</p> <p>CHRONIC: The number of chronic pulmonary function studies from the PGW is limited and the results are inconclusive. Some increase in asthma was suggested. In the workplace long-term or chronic-exposures to respirable crystalline silica causes silicosis—a fibrotic lung disease caused by the inhalation of freshly fractured (formed) crystalline silica. Silicosis is a chronic disease that may progress for decades before significant or detectable respiratory symptoms develop. However, analysis of the silica content of the sand has concluded that the silica is below harmful levels.</p>
<p>REVERSIBILITY OF HEALTH EFFECTS</p>	<p>Respiratory and dermal exposures to sand and soot at the levels encountered during the PGW produce short-term, reversible symptoms. The cumulative exposures and total dosages to personnel were below the guidelines established by the US EPA for the protection of human health and chronic health effects would not be expected to occur.</p>
<p>TREATMENT REQUIRED/AVAILABLE FOR EXPOSURE</p>	<p>Skin rashes and respiratory complaints should be treated symptomatically as needed. The respiratory complaints experienced during the PGW were not solely the result of exposure to high particulate matter levels. Common viral and bacterial agents were the cause of many respiratory infections. Crowded living conditions also contributed to the incidence of respiratory illness. It was noted that personnel who slept in air-conditioned buildings were much more likely to develop a cough and sore throat than those billeted in tents and warehouses. This is similar to the experience of personnel in the US.</p>
<p>LONG TERM MEDICAL SURVEILLANCE REQUIREMENTS OF HEALTH EFFECTS MONITORING</p>	<p>No medical surveillance is required based upon the recommendations accepted by the Office of the Special Assistant for Gulf War Illnesses (Thomas Report, 2000*). Thomas et al evaluated contaminant concentrations at seven locations in Kuwait and Saudi Arabia. The estimated annual exposure levels calculated for silica were between 1/50th to 1/10th of the acceptable <i>cumulative exposure</i> to respirable silica “no observed adverse effects level” (NOAEL). The authors conclude that the maximum total dose of silica and soot received by US personnel was significantly less than the level at which one would expect to see the onset of adverse health effects. If an individual complains of chronic respiratory conditions, a baseline pulmonary function test may be useful.</p>
<p>SPECIAL RISK COMMUNICATION ISSUES</p>	<p>Dry air, dust and wind dry out the nose and throat and can cause nosebleeds, coughing, wheezing, and other short-term respiratory problems. However, sand exposure has not been found to be a long-term health risk for veterans of the first Gulf War in 1991. Also, sand exposure has not been shown to cause chronic lung problems among Western contract employees working in the Persian Gulf.</p> <p>Although US personnel are exposed to high levels of particulate matter, the duration of these exposures is generally short as compared to occupational exposures that can occur over a working lifetime. The total doses received by US personnel are likely to be small when compared to an occupational exposure of longer duration.</p> <p>The conclusions of the Thomas Report are based on inhalation exposure scenarios involving individual contaminants of concern (i.e., silica or soot) and do not take into account the possible synergistic effect of other toxic compounds that may be present. Further research is required to develop an understanding of the dose-response mechanisms associated with these types of exposure.</p>

* Thomas, R.B. and T. Vigerstad, J. Meagher, C. McMullin, "Particulate Exposure During the Persian Gulf War," (The Thomas Report). March 2000