LUNG INJURY – IRAQ & AFGHANISTAN

Dona Upson, MD

It's the Pits

From: Brown, Sonja
Sent: Tuesday, January 25, 2011 9:40 AM
To: Deanna Sauceda
Subject: RE: Burn pit exposure interview w/ KRQE News 13

Hi, Dr. Dona Upson is available to speak with you. She has a procedure to conduct this morning but will be available later. Let me know what time please.

Sonja Brown
Chief, Voluntary Service & Public Affairs Operations

From: Deanna Sauceda
Sent: Tuesday, January 25, 2011 9:40 AM
To: Brown, Sonja
Subject: Burn pit exposure interview w/ KRQE News 13

Hello Sonja,

Hope you are well. I would like to speak with the Ex. Dir. At the VA about resources available to veterans for diagnosis and treatment of illnesses associated with the burn pits in Iraq and Afghanistan. Thanks so much!

Deanna Sauceda
Anchor, KRQE News 13

What Burn Pits?

Balad Air Base, Iraq

Rained soot on housing and hospital units for at least 4 years

- 10 square acre burn pit
- Up to 227 metric tons burned daily
- Asbestos, solvents, unexploded ordinance, hydrogen cyanide, batteries, tires, plastics, feces and medical waste, including body parts and unused pharmaceuticals
- Jet fuel - accelerant

www.thelancet.com/oncology Vol 11 April 2010

Joint Base Balad (JBB, formerly Balad Air Base), Iraq

U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE DEPLOYMENT ENVIRONMENTAL SURVEILLANCE PROGRAM - 2008

1. Based on U.S. Environmental Protection Agency (USEPA) guidance, long-term health effects are not expected to occur from breathing the smoke at JBB.
2. The Defense Health Board has reviewed and validated this assessment.
3. Anyone with health concerns should see a health care provider.

- Pentagon health officials had said troops faced no long-term effects from burn pits
- Military now says some troops exposed could be susceptible to long-term effects
- Service members have complained of chronic bronchitis, asthma, sleep apnea
- DoD and VA expanding investigations into the pits

-CNN 12/09

What are the Data?

More than 500 veterans have reported lung disease, neurological disorders and cancers following exposure to burn-pit smoke.

No studies have evaluated health effects on nearby civilians.

What's in the Literature?

As of November 2009, 74 installations in Iraq used burn pits.

According to Houston-based contractor KBR, the pit consumes 120 tons of garbage a day at Camp Taji, a US military base north of Baghdad.

Lindsay Wise & Lise Olsen, Houston Chronicle 2/1/10

The Defense Department and the Department of Veterans Affairs are proceeding cautiously in linking soldiers' symptoms to the burn pits. While dealing with disability claims on a case-by-case basis, they have not developed a broad policy on the issue.

James Risen, NYT 8/7/10

Agent Orange Act of 1991

- Any veteran who served in Vietnam is presumed exposed

- Includes (if not present prior to service):
  - Type II diabetes
  - Hodgkin's disease
  - Non-Hodgkin's lymphoma
  - Peripheral neuropathy
  - Porphyria cutanea tarda
  - Prostate cancer
  - Certain soft tissue sarcomas
  - Cancer of the lung, bronchus or larynx
  - Chloracne
- Added in 2009:
  - B-cell leukemias
  - Parkinson's disease
  - Ischemic heart disease

- Primarily due to exposure to dioxin, or 2,4-dichlorophenoxyacetic acid

- Based on Institute of Medicine's assessment

Is there a smoking gun?

Dioxin testing

- Dioxins are produced in virtually all combustion processes
- Reportedly no attempt to determine level of exposure and dioxin body burdens based on workplace location
- Army provided CDC with 1 ml serum from each soldier, rather than the normal 7 ml

National Academy of Sciences
Institute of Medicine

Smoke billows from a burn pit on a base in Al Taqaddum, Iraq - 2007

At the request of VA, the Institute of Medicine began an 18-month study in Nov '09 to determine the long-term health effects of exposure to burn pits in Iraq and Afghanistan. The study will compare the health of 30,000 combat Veterans deployed in Iraq and Afghanistan to 30,000 non-deployed Veterans. The report is due out by summer of 2011.*

1st meeting to address burn pit exposure was 2/23/10.

*www.publichealth.va.gov/exposures/burnpits/index.asp

It's a Mess

Figure 2. Solid waste material sorting area at Joint Base Balad, Iraq. (Photo provided by the author.)

- Up to 100# of solid and liquid wastes per soldier per day under field conditions
- Breeding area for flies, rats, other vermin
- Can result in the development/spread of disease – dysentery (amoebic and bacillary), typhoid, paratyphoid and cholera

Burning Issues

- Viable organisms may aerosolize
- Personnel should practice good personal hygiene and not stand in the smoke plume
- When recommended by preventive medicine staff, personnel in the immediate area should be fitted with air-filtering respirators (N-95 or -99) and placed in the respiratory protection program

Health Assessments

- Major lesson learned after the Gulf War was the need to assess the health of Service members systematically, before and after deployments
- Assessments started in 1998
- Assessments at 3 time points:
  - Pre-deployment health assessment
    - Within 60 days before deployment
  - Post-deployment health assessment (PDHA)
    - Within 30 days after return home
  - Post-deployment health reassessment (PDHRA)
    - 90-180 days after return home

PDHA and PDHRA

- 409,380 PDHRA were completed 1/08 – 6/09
  - 30% of veterans reported physical health concerns
  - 40% reported mental health concerns
  - 24% reported environmental concerns
- 23% of veterans referred for further medical evaluation
  - 16% of active-duty and 28% of Reservists
- Of 40,870 veterans who were referred in PDHRA to VA medical care, and for whom VA diagnoses are available:
  - 25% diagnosed with PTSD
  - 20% with low back pain
  - 15% with depression
  - 15% with tobacco use disorder
  - 13% with joint pain in the lower leg
  - These are very common conditions in VA primary care

Newly Reported Respiratory Symptoms and Conditions Among Military Personnel Deployed to Iraq and Afghanistan: A Prospective Population-based Study

- Millennium Cohort Study – designed to investigate long-term health consequences related to military service
- Included 46,077 participants who completed baseline (7/01 – 6/03) & follow-up (6/04 – 2/06) questionnaires
- Deployers had a higher rate of newly reported respiratory symptoms (cough, dyspnea) than non-deployers (14% vs. 10%)
  - Highest for those in Iraq: 18%
- Similar rates of chronic bronchitis/emphysema (1% vs. 1%) & asthma (1% vs. 1%)
- Long-term consequences not yet evaluated

Smith et al. Am J Epidemiol 2009;170:1433–1442

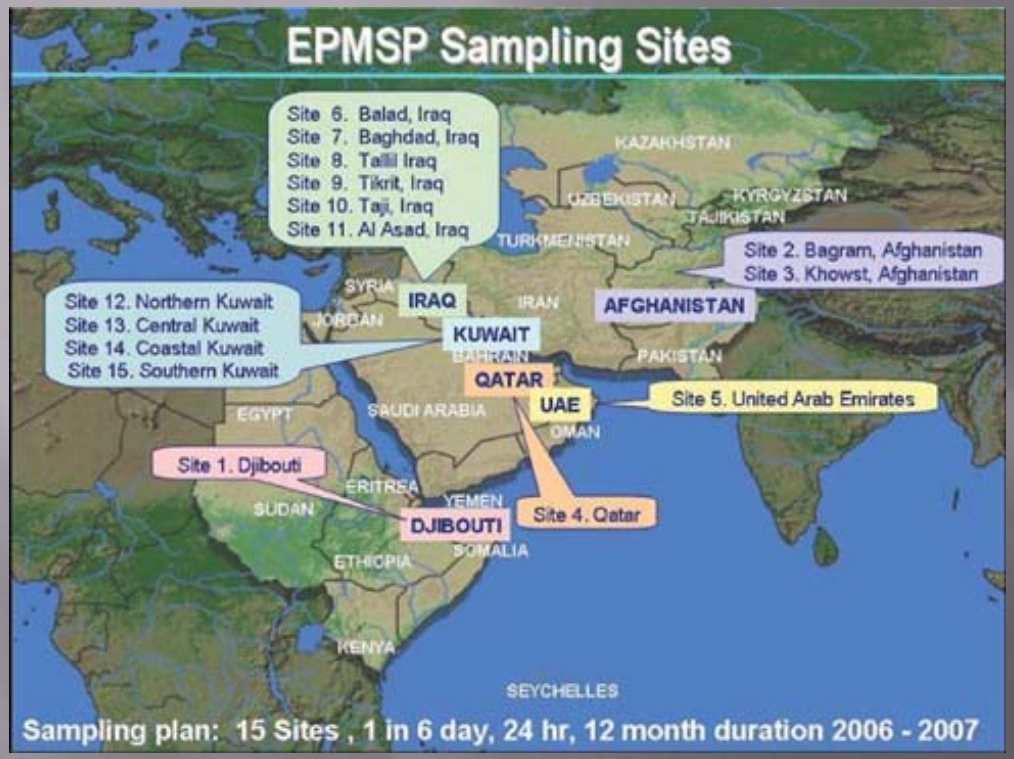
Deployment Matters

- Deployment associated with respiratory symptoms for:
  - Army (adjusted OR 1.73, 95% CI: 1.57, 1.91)
  - Marine Corps (adjusted OR 1.49, 95% CI: 1.06, 2.08)
  - No significant difference for Air Force, Navy, Coast Guard
  - Independent of smoking status
- Deployment length linearly associated with increased symptoms in Army personnel ($P < 0.0001$), not other branches
  - Exposures rather than deployment may determine post-deployment respiratory illness
- Among deployers, elevated odds of symptoms were associated with land-based deployment as compared with sea-based deployment
  - Exposures related to ground combat may be important

Exposure Concerns Listed in PDHA & PDHRA

- Animal bites
- Animal bodies (dead)
- Chlorine gas
- Depleted uranium
- Excessive vibration
- Fog oils (smoke screen)
- Garbage
- Human blood, body fluids, body parts or dead bodies
- Industrial pollution
- Insect bites
- Ionizing radiation
- JP8 or other fuels
- Lasers
- Loud noises
- Paints
- Pesticides
- Radar/Microwaves
- Sand/dust
- Smoke from burning trash or feces
- Smoke from oil fire
- Solvents
- Tent heater smoke
- Vehicle or truck exhaust fumes
- Other exposures to toxic chemicals or materials, such as ammonia, nitric acid, etc.

Ambient Sampling of Mineral Dusts & Other Aerosols from the Middle East



Characterized 3 main air pollution sources:

- geological dust
- smoke from burn pits
- lead-zinc smelters and battery-processing facilities

Average PM10 and PM2.5 levels from the Middle East deployment sites were as much as 10x greater than those from 5 rural and 5 urban sites in southwestern US

There are reports from soldiers that monitoring equipment was set up away from housing units and burn-pit smoke.

Engelbrecht, Inhalation Toxicology, 21:297–326, 2009

Dust Samples

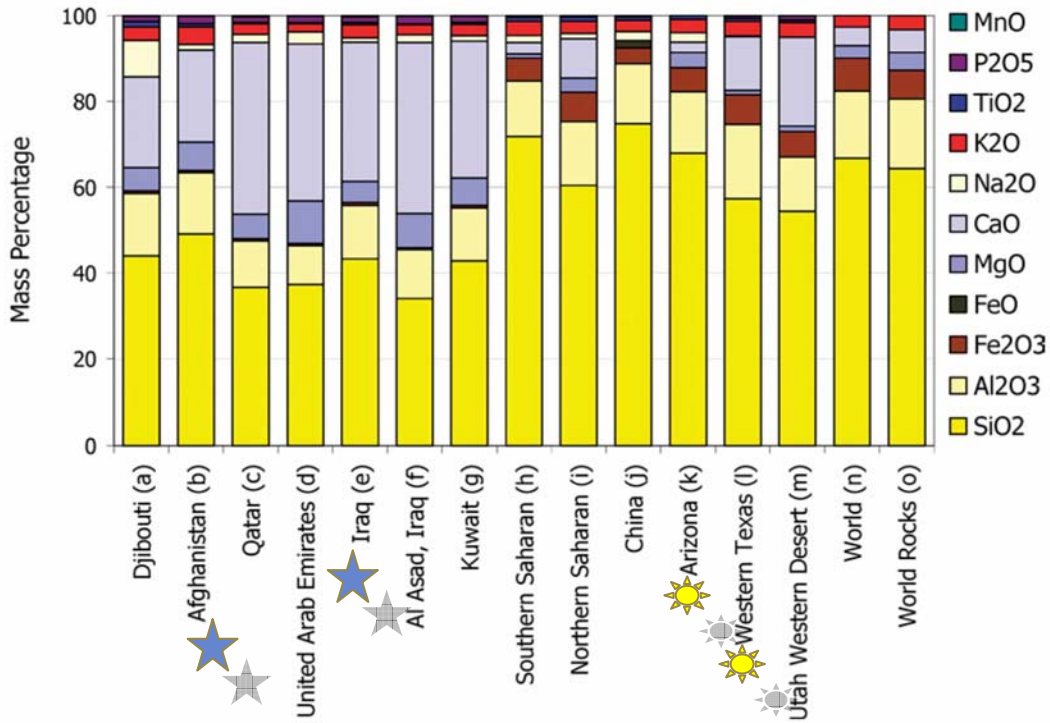
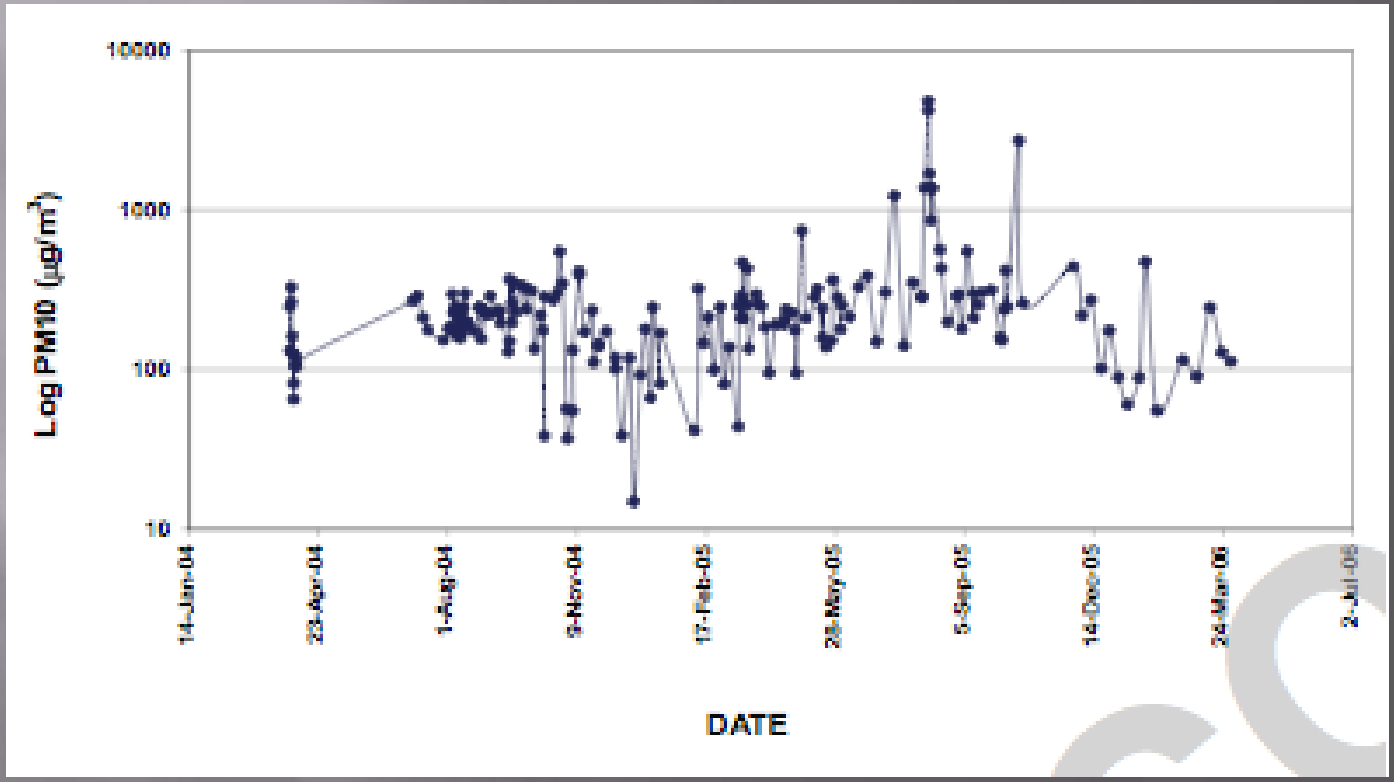


FIG. 9. Comparison of dust samples from the Middle East, Sahara, China, US, world average dust, and world rocks. In the case of the EPMSP samples, mean TSP results are shown: (a) Djibouti; (b) Bagram and Khowst in Afghanistan; (c) Qatar; (d) the UAE; (e) Balad, Baghdad, Tallil, Tikrit, and Taji in Iraq; (f) Al Asad in Iraq; (g) Northern, Central, Coastal, and Southern Kuwait; (h) average Southern Sahara (Goudie, 2006); (i) average Northern Sahara (Goudie, 2006); (j) average China (Goudie, 2006); (k) Arizona (Goudie, 2006); (l) Western Texas (Labban et al., 2004); (m) Utah Western Desert (Labban et al., 2004); (n) average world dust (Goudie, 2006); and (o) average world crustal rocks (Clarke, 1916).

Particulate Matter – Balad 6/04 – 7/06



The National Ambient Air Quality Standards limit for air pollution is 150 ug/m^3

Szema; Allergy Asthma Proc 31: 2010

Increased Asthma among Deployed

- Since 6/4/04, asthma has been an exclusion criterion for military enlistment (unless exempted via medical waiver)
- The Department of Defense determined that 13% of U.S. Army Medic visits in Iraq were for new-onset acute respiratory illness
- Retrospective review of asthma diagnoses among computerized charts for military personnel discharged from active duty and examined between 3/1/04 – 5/1/07
  - Veterans Affairs Medical Center, Northport, NY
- VA diagnosis of asthma per ICD codes
- Out of 6233 patients, 290 new-onset/prevalent asthma cases identified
- Deployment to Iraq was associated with a significantly higher risk of asthma compared with stateside soldiers
  - 6.6% versus 4.3%; crude odds ratio, 1.58; 95% CI: 1.18, 2.11
- Deployment to Iraq and Afghanistan is associated with new-onset asthma

Szema; Allergy Asthma Proc 31: 2010

Plastic Water Bottles

Figure 3. A pile of plastic water bottles at the Joint Base Balad solid waste material sorting area at Joint Base Balad, Iraq. (Photo provided by the author.)

The practice of dousing discarded plastic water bottles with jet fuel (JP-8) and setting them on fire is to be discouraged.

- Polyethylene terephthalate
  - phthalates known to cause occupational asthma
- Carcinogens released:
  - benzene
  - formaldehyde
  - aromatic hydrocarbons
- JP-8 releases:
  - benzene
  - N-hexane
    - neurotoxin – causes Parkinson-like disorder

Szema; Allergy Asthma Proc 31: 2010

Incinerators

Figure 4. Incinerators in operation at Joint Base Balad, Iraq, November 2009. (Photo provided by the author.)

Balad burn pit closed in 10/09

Replaced by 4 closed incinerators

"It is amazing the burn pit has been able to operate without restrictions over the past few years."

-- Lieutenant Colonel Darrin Curtis, 2006 Air Force memo warning of potential health effects

Now What?

Figure 1. A section of an operating burn pit in Afghanistan, 2009. (Photo provided by the author)

As of April 2010:

50 open-air burn pits still operating in Iraq

34 in Afghanistan

Department of Defense has awarded a grant to Cecile Rose, MD at National Jewish Hospital

Registry has been proposed in Congress

Mishraq State Sulfur Mine Plant - Iraq

U.S. Army Center for Health Promotion and Preventive Medicine, Environmental Medicine Program, 2007

- Fire accidentally ignited 6/24/03
- Burned 3 weeks
- Smoke plume visible on satellite imagery for up to 50 miles (Mosul)
- Contained various contaminants
  - Particulate matter
  - Sulfur dioxide (SO_2)
  - Hydrogen sulfide (H_2S)
- Acute effect levels found at Q-West Air Base and Life Support Area, 25 km south
- No way to identify individual exposures
  - Limited field sampling data
  - Lack of specificity on individual locations and activities
- 191 firefighters, medics & others
- Thousands of troops exposed to the plume over Q-west

Sulfur dioxide (SO_2) & Hydrogen sulfide (H_2S)

- Acute Effects
  - Irritation and reddening of the nose & throat
  - Eye irritation/pain
  - Cough
- Can reach the lungs if:
  - Heavy breathing
  - Breathing only through the mouth
  - High concentrations
- Information on exposures to combined gases is not definitive, plausible that effects exacerbated

Sulfur dioxide (SO_2) & Hydrogen sulfide (H_2S)

- Very high concentrations of SO_2
  - Severe airway obstruction, hypoxemia, pulmonary edema & death in minutes
  - Pulmonary edema may be delayed for hours or days
  - Permanent lung injury may occur
  - Repeated, long term exposure to low levels of SO_2 has caused permanent pulmonary impairment
  - Sensitivity varies, short exposure to relatively low concentrations has caused reversible decrease in lung function & bronchiole constriction
- People with asthma – greater susceptibility to lower concentrations

Constrictive Bronchiolitis

- 41 soldiers citing exposure to the fire & reporting unexplained dyspnea on exertion referred to Vanderbilt Medical Center (late 2004-Feb 2007; Robert Miller MD)
- 19 open lung biopsies (as of 2/07)
  - All had constrictive bronchiolitis
    - Inflammatory and fibrotic lesions of terminal bronchioles
    - Very uncommon
    - Associated with inhalation exposures, organ transplant, drugs & collagen vascular disorders
    - Can be mistaken as asthma or COPD
- Over 6000 troops who were within 50km of the Mishraq State Sulfur Plant during the event are being evaluated
  - A “conservative yet representative” cohort
- Actual cohort of all exposed persons unknown

Constrictive Bronchiolitis

- Soldiers with unexplained dyspnea on exertion seen at Vanderbilt Medical Center (Robert Miller MD)
- Now 53 open lung biopsies
  - 51with constrictive bronchiolitis
  - 2 with hypersensitivity pneumonitis
- Similar findings from National Jewish Hospital, Denver

The End