



MSMR

Medical Surveillance Monthly Report

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Data in the MSMR is provisional, based on reports and other sources of data available to the Medical Surveillance Activity. Notifiable conditions are reported by date of onset (or date of notification when date of onset is absent). Only cases submitted as confirmed are included.

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE DEC 1995		2. REPORT TYPE		3. DATES COVERED 00-00-1995 to 00-00-1995	
4. TITLE AND SUBTITLE Medical Surveillance Monthly Report (MSMR). Volume 1, Number 9, December 1995				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Center for Health Promotion and Preventive Medicine, Armed Forces Health Surveillance Center (AFHSC), 2900 Linden Lane, Suite 200, Silver Spring, MD, 20910				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 16	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Outbreak Investigation

Hydrogen Sulfide exposure, Ft Irwin, CA

During the week of 25 September 1995, numerous health complaints were reported by a group of civilian contract employees working at Fort Irwin's Rotational Unit Field Maintenance Area (RUFMA). Some thirty employees were seen by MEDDAC personnel with a variety of symptoms, including headache, burning eyes, and nausea. Initial investigation of the worksite by a contract industrial hygienist failed to reveal any problems. A similar outbreak of symptoms in a separate maintenance area caused Fort Irwin MEDDAC and Preventive Medicine personnel to reassess these work areas. Strong odors led to industrial hygiene measurements that detected low levels of hydrogen sulfide (H_2S) gas in the area of the vehicle wash racks. USACHPPM was asked to assist in the investigation of this problem.

USACHPPM deployed a team consisting of three occupational medicine physicians, one industrial hygienist, and one waste water engineer. The three-day investigation completed on 26 October 1995 consisted of worksite walk-throughs, a medical survey questionnaire, industrial hygiene monitoring, and a waste water system investigation.

Worksite Description

The RUFMA is a large, open, sand-covered field where armored vehicles are cleaned and repaired following two weeks of field exercises (see Figure 1). A series of wash racks numbered 630, 641, 652, and 636 are located at the southeastern end of the RUFMA. Each wash rack consists of a sloped concrete pad that empties via a trough into its own oil/sand separator located directly adjacent to the pad. The wash racks are connected by an 8 inch sewer line which has several manholes numbered 8A through 8G. A series of metal shades run parallel to and approximately 50 meters from the sewer line. The shade area is largely used for administrative functions associated with vehicle processing. Approximately 350 civilian employees work throughout the RUFMA, with most employees spending only limited time in the shade area.

The basic operations of the RUFMA involves cleaning and repairing approximately 1,000 vehicles used by visiting armored units during their month of training at Fort Irwin. Vehicles returning from field exercises are first washed on a wash rack and are then taken to the field north of the work shades for maintenance and repairs. While the majority of washing and work is done by the soldiers of the training unit, civilian contractor employees work as mechanics, techni-

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Publishing office is the Executive Communications Division, U.S. Army Center for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, Maryland 21010-5422, telephone 1-800-222-9698, DSN 584-2088, Commercial 410 671-2088.

Views and opinions expressed are not necessarily those of the Department of the Army.

cians, inspectors and clerks to support this activity. All vehicles are processed through the RUFMA in 5-7 days during “turn-in” week. Most of the civilian workers are employed in other locations at Fort Irwin during non “turn-in” weeks.

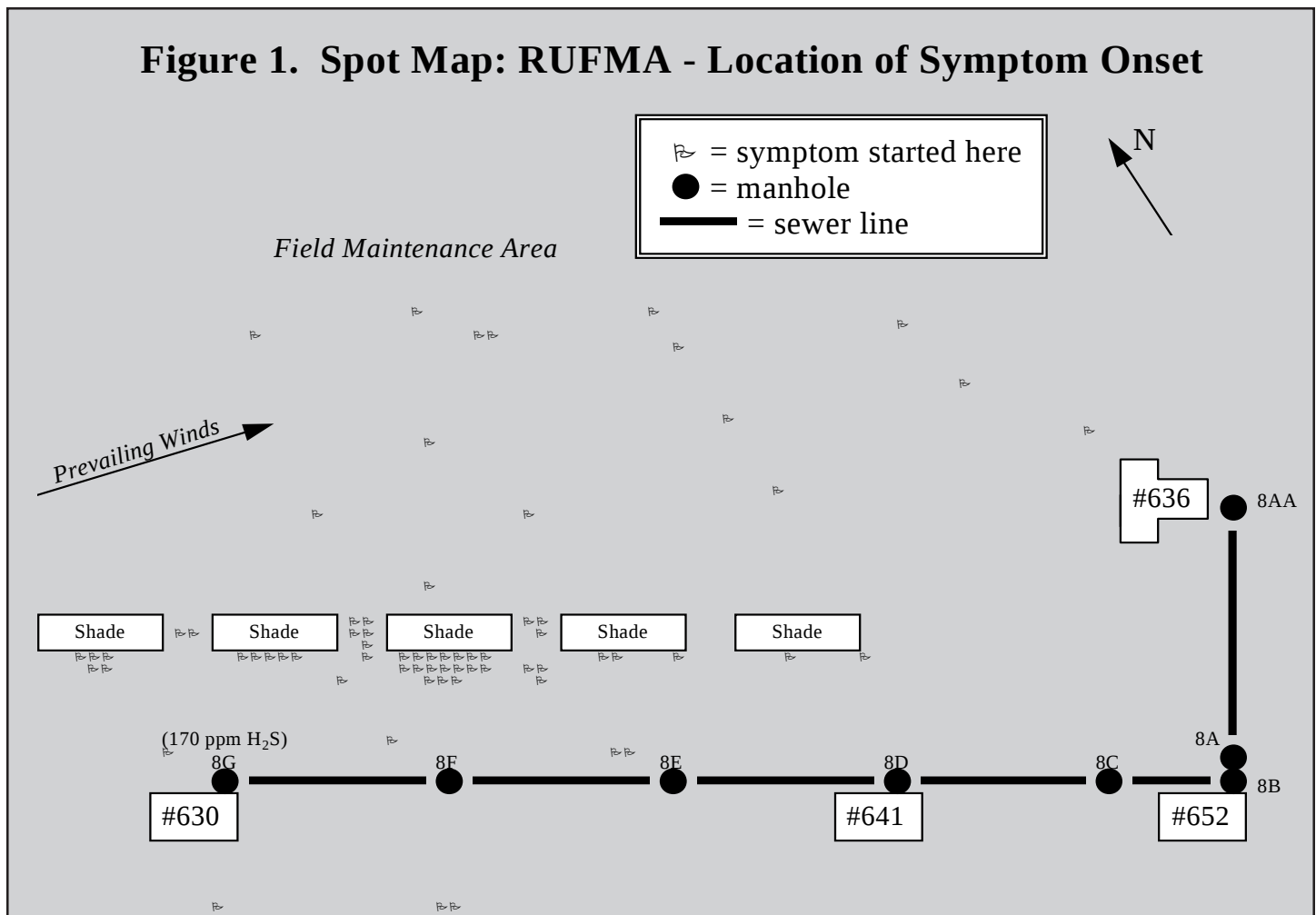
All of the 350 RUFMA civilian employees were invited to attend an information session held by the investigation team. A total of 75 self-selected employees attended one of four sessions. These sessions were used as an opportunity to address worker concerns and to gather information through informal discussions and a survey questionnaire. The survey asked workers about personal background information, the symptoms they experienced, and the circumstances surrounding the onset of those symptoms.

Employee Survey Results

The mean age of the employees completing the survey was 32 years old (range 22 to 58), with 71% being male. Seventy-one percent (71%) had been on the job for over one year. Fifty-three of the 75 employees experienced symptoms in the RUFMA. The ten most frequently noted symptoms are shown in Table 1 (page 7). Eighty-one percent (81%) noted the onset of symptoms in the morning and 97% associated their symptoms with odors at work. Eighty-eight percent (88%) described the odor as being that of “rotten eggs” or “propane gas.” Only 8% of the symptomatic workers reported experiencing similar symptoms in the past year. Figure 1 shows a spot map of the RUFMA, with each flag representing the location where a worker experi-

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Figure 1. Spot Map: RUFMA - Location of Symptom Onset



**TABLE I. Cases of selected notifiable conditions, United States Army*
November, 1995**

Reporting MTF/Post**	Total number of reports submitted November 1995	Environmental Injuries			Viral Hepatitis			Malaria	Varicella	
		Active Duty		CO intox.				Active Duty	Active Duty	Other Adult
		Heat	Cold		A	B	C			
		Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995
NORTH ATLANTIC HSSA										
Walter Reed AMC	57	-	-	-	3	5	-	2	7	3
Aberdeen Prov. Ground	1	-	-	-	1	-	-	-	-	-
FT Belvoir, VA	0	1	-	-	1	1	-	-	1	1
FT Bragg, NC	9	8	1	-	-	-	-	1	-	-
FT Drum, NY	3	4	21	-	-	-	-	1	14	1
FT Eustis, VA	7	-	-	-	-	-	-	-	3	-
FT Knox, KY	45	-	-	-	-	-	2	1	-	-
FT Lee, VA	3	5	-	-	-	-	-	-	10	-
FT Meade, MD	0	-	-	-	-	-	-	-	-	-
USMA, West Point, NY	0	-	-	-	-	-	-	-	-	-
CENTRAL HSSA										
Fitzsimons AMC	0	-	-	-	1	1	-	-	3	1
FT Carson, CO	59	-	-	-	-	-	-	-	9	-
FT Leonard Wood, MO	6	3	1	-	-	1	-	1	26	4
FT Leavenworth, KS	3	-	-	-	-	-	-	-	-	-
FT Riley, KS	0	11	1	-	-	-	-	-	-	-
SOUTH CENTRAL HSSA										
Brooke AMC	16	-	-	-	2	-	-	1	-	-
FT Hood, TX	68	14	-	-	1	2	-	1	26	2
FT Polk, LA	3	5	-	-	-	-	-	-	-	-
FT Sill, OK	17	19	-	18	-	3	-	1	-	-
Panama	21	4	-	-	5	4	1	-	-	-
SOUTHEAST HSSA										
Eisenhower AMC	19	-	-	-	-	1	3	-	1	-
FT Benning, GA	1	33	14	-	-	-	-	1	1	-
FT Campbell, KY	208	-	-	-	1	-	1	-	2	-
FT Jackson, SC	14	1	-	-	-	-	-	-	9	-
FT McClellan, AL	0	1	-	-	-	-	-	-	-	-
FT Rucker, AL	0	3	-	-	-	-	-	-	-	-
FT Stewart, GA	0	-	-	-	-	-	-	-	-	-
SOUTHWEST HSSA										
Wm Beaumont AMC	103	-	-	-	1	3	-	1	3	2
FT Huachuca, AZ	0	-	-	-	-	-	-	-	-	-
FT Irwin, CA	0	-	-	-	-	-	-	-	-	-
NORTHWEST HSSA										
Madigan AMC	0	-	-	-	-	3	-	-	-	-
FT Wainwright, AK	0	-	17	-	-	-	-	-	-	-
PACIFIC HSSA										
Tripler AMC	25	4	-	-	-	4	-	6	-	-
OTHER LOCATIONS										
Europe	9	2	4	2	-	3	1	-	6	1
Korea	5	2	8	-	-	3	-	-	21	-
Total	702	120	67	20	16	34	8	17	142	15

* Based on date of onset.

** Reports are included from main and satellite clinics. Not all sites reporting.

Date of Report: 7-Dec-95

TABLE I. Cases of selected notifiable conditions, United States Army* (continued)
November, 1995

Reporting MTF/Post**	Salmonellosis			Shigella			Campylobacteriosis			Tuberculosis	
	Active Duty	Other		Active Duty	Other		Active Duty	Other		Active Duty	Other
		Adult	Child		Adult	Child		Adult	Child		
	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995	Cum. 1995
NORTH ATLANTIC HSSA											
Walter Reed AMC	5	2	1	1	2	2	1	4	-	-	-
Aberdeen Prov. Ground	-	-	-	-	-	-	-	-	-	-	-
FT Belvoir, VA	1	7	5	-	5	1	2	6	1	-	-
FT Bragg, NC	3	3	12	6	1	5	2	2	1	-	-
FT Drum, NY	2	-	2	-	-	1	-	1	-	-	-
FT Eustis, VA	-	-	-	1	-	-	-	-	-	-	-
FT Knox, KY	1	-	-	1	-	-	-	1	1	-	-
FT Lee, VA	-	-	-	-	-	1	-	-	-	-	-
FT Meade, MD	-	-	-	-	-	-	-	-	-	-	-
USMA, West Point, NY	-	-	-	-	-	-	-	-	-	-	-
CENTRAL HSSA											
Fitzsimons AMC	-	-	-	-	-	-	-	-	-	-	-
FT Carson, CO	1	2	2	1	-	1	1	1	1	-	-
FT Leonard Wood, MO	-	1	1	-	-	-	-	-	-	-	-
FT Leavenworth, KS	-	-	-	1	3	2	-	-	-	-	-
FT Riley, KS	-	1	-	-	-	1	1	-	1	-	-
SOUTH CENTRAL HSSA											
Brooke AMC	-	-	-	-	-	-	-	-	-	-	-
FT Hood, TX	1	-	1	-	1	-	-	-	-	3	-
FT Polk, LA	-	-	-	-	-	-	-	-	-	-	-
FT Sill, OK	-	-	-	-	-	-	-	-	-	-	-
Panama	4	3	21	1	2	3	5	3	18	-	-
SOUTHEAST HSSA											
Eisenhower AMC	1	-	-	-	-	2	-	-	1	-	-
FT Benning, GA	-	-	-	-	-	-	-	-	-	-	-
FT Campbell, KY	-	-	-	2	-	2	-	-	1	-	-
FT Jackson, SC	-	-	1	-	-	3	-	-	-	3	-
FT McClellan, AL	-	-	-	-	-	3	-	-	-	-	-
FT Rucker, AL	-	-	-	-	-	-	-	-	-	-	-
FT Stewart, GA	-	-	-	-	-	-	-	-	-	-	-
SOUTHWEST HSSA											
Wm Beaumont AMC	-	2	4	-	1	2	-	-	-	-	-
FT Huachuca, AZ	-	-	-	-	-	-	-	-	-	-	-
FT Irwin, CA	-	-	-	-	-	-	-	-	-	-	-
NORTHWEST HSSA											
Madigan AMC	1	3	2	-	-	1	2	-	2	-	-
FT Wainwright, AK	-	-	-	-	-	-	1	-	-	-	-
PACIFIC HSSA											
Tripler AMC	1	-	3	1	-	-	10	1	1	-	-
OTHER LOCATIONS											
Europe	10	7	6	-	1	-	3	3	1	-	-
Korea	2	-	3	-	-	-	-	-	-	-	-
Total	33	31	64	15	16	30	28	22	29	6	0

* Based on date of onset.

** Reports are included from main and satellite clinics. Not all sites reporting.

Date of Report: 7-Dec-95

**TABLE II. Cases of notifiable sexually transmitted diseases, United States Army
November, 1995**

Reporting MTF/Post*	Chlamydia		Gonorrhea		Herpes Simplex		Syphilis Prim/Sec		Syphilis Latent		Urethritis non-spec.		Other STDs**	
	Cur. Month	Cum. 1995	Cur. Month	Cum. 1995	Cur. Month	Cum. 1995	Cur. Month	Cum. 1995	Cur. Month	Cum. 1995	Cur. Month	Cum. 1995	Cur. Month	Cum. 1995
NORTH ATLANTIC HSSA														
Walter Reed AMC	4	58	6	48	7	44	-	4	-	2	4	17	-	10
Aberdeen Prov. Ground	2	34	2	20	-	-	-	-	-	1	4	21	-	1
FT Belvoir, VA	-	30	-	15	-	2	-	1	-	-	-	-	-	5
FT Bragg, NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FT Drum, NY	-	65	1	34	-	10	-	-	-	-	1	17	-	-
FT Eustis, VA	3	28	-	23	-	-	-	-	-	-	-	-	-	-
FT Knox, KY	21	212	6	65	4	73	-	-	-	1	-	-	-	-
FT Lee, VA	-	44	2	37	1	3	-	1	-	-	-	1	-	-
FT Meade, MD	-	-	-	-	-	-	-	-	-	-	-	-	-	-
USMA, West Point, NY	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CENTRAL HSSA														
Fitzsimons AMC	-	37	-	8	-	2	-	-	-	1	-	-	-	2
FT Carson, CO	12	248	12	130	3	60	-	-	-	-	29	315	-	4
FT Leonard Wood, MO	3	45	4	35	-	10	-	2	-	-	3	38	-	2
FT Leavenworth, KS	-	5	-	1	3	9	-	-	-	-	-	-	-	-
FT Riley, KS	-	88	-	17	-	2	-	3	-	-	-	-	-	-
SOUTH CENTRAL HSSA														
Brooke AMC	-	1	-	-	-	-	-	-	-	-	-	-	-	-
FT Hood, TX	14	737	4	288	-	31	-	6	-	9	-	152	-	5
FT Polk, LA	2	52	1	18	-	2	3	3	-	-	-	-	-	1
FT Sill, OK	12	85	6	101	3	12	-	-	-	-	6	38	1	17
Panama	-	1	4	13	3	17	-	6	-	-	-	-	1	8
SOUTHEAST HSSA														
Eisenhower AMC	9	82	5	42	4	43	-	4	-	-	-	2	-	5
FT Benning, GA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FT Campbell, KY	3	358	1	93	-	23	-	1	-	-	-	122	-	-
FT Jackson, SC	3	163	-	45	-	29	2	3	-	1	-	1	-	7
FT McClellan, AL	-	26	-	15	-	2	-	-	-	-	-	-	-	-
FT Rucker, AL	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FT Stewart, GA	-	68	-	58	-	19	-	-	-	1	-	92	-	9
SOUTHWEST HSSA														
Wm Beaumont AMC	18	206	1	34	3	30	-	-	-	-	-	-	-	3
FT Huachuca, AZ	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FT Irwin, CA	-	11	-	1	-	2	-	-	-	-	-	-	-	-
NORTHWEST HSSA														
Madigan AMC	-	-	-	-	-	-	-	-	-	-	-	-	-	3
FT Wainwright, AK	-	23	-	9	-	-	-	-	-	2	-	-	-	-
PACIFIC HSSA														
Tripler AMC	14	193	4	75	3	109	-	-	-	1	-	-	-	4
OTHER LOCATIONS														
Europe	-	70	-	9	-	3	-	-	-	-	-	-	-	6
Korea	-	22	-	12	-	5	-	-	-	1	-	-	-	5
Total	120	2992	59	1246	34	542	5	34	0	20	47	816	2	97

* Reports are included from main and satellite clinics. Not all sites reporting.

Date of Report: 7-Dec-95

** Other STDs: (a) Chancroid (b) Granuloma Inguinale (c) Lymphogranuloma Venereum (d) Syphilis unspec. (e) Syph, tertiary (f) Syph, congenital

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enced the onset of symptoms. A significant work change during the week of 25 September involved the use of wash rack #630, which had not been used for several months. Civilian workers noted that soldiers also experienced symptoms, but were reluctant to report them as it may delay their out-processing for home.

Industrial Hygiene Survey Results

An industrial hygiene survey of the RUFMA revealed work practices which included running vehicles in work areas (diesel exhaust exposure), the limited use of petroleum-based products on and in vehicles, and little use of personal protective equipment. Levels of H₂S were detected in and around the wash rack. Table 2 (page 8) shows the levels which were measured in air samples collected from 6 inches inside the manhole covers (at the source) and within five feet of the cover (breathing zone). Sludge taken from the waste water system produced up to 33 ppm H₂S in head space samples.

A review of the waste water system in the RUFMA revealed this system to be a dead end line, with the dead end being in the vicinity of wash rack #630. The only known connections to this line are the four sand/oil separators and one line from a seldom used rest room. The exact location of the line's dead end is unknown and the available as-built drawings did not indicate elevations of the sewer lines. The sand/oil separators are cleaned out annually, with the last clean out occurring 4 months earlier by a new contractor. This cleaning was not observed by Fort Irwin personnel. The system's integrity is unknown and its capacity has been stretched to its limit, as the number of vehicles used for each training rotation has increased over the years.

Recommendations

The investigation team recommended that further exposure to H₂S be prevented through a combination of administrative and engineering con-

trols. Short-term recommendations included discontinuing the use of wash rack #630 and moving the shade areas away from the wash racks. The lethal levels of H₂S present inside the manholes were particularly troublesome and mandated that the manholes be secured until H₂S levels could be controlled. Means of controlling the generation of H₂S might include cleaning the waste water system, ensuring its integrity, and using a variety of techniques, such as agitating the sewage to improve oxygenation and raising sewage pH to inhibit H₂S forming bacteria, to control the system's environment. Ultimately, a new system with greater capacity may be needed.

Submitted by J Martin, MAJ, MC, Occupational Medicine Residency Director, USACHPPM, APG, MD

Editorial Comment: Exposure to H₂S is the most likely explanation for the symptoms experienced by the RUFMA contract workers. The characteristic "rotten egg" odor and the symptom complex listed in Table 1 are consistent with H₂S exposure (see box, page 8). In addition, Figure 1 shows the highest levels of H₂S were measured upwind from the shade

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Table 1. Frequency of Symptoms Noted By Workers Affected in RUFMA*

Headache	88%
Burning Eyes	69%
Dizziness	54%
Nausea	50%
Shortness of Breath	42%
Sore Throat	35%
Cough	27%
Burning Nose	23%
Dry Eyes	23%
Confusion	19%

* 53 of 77 employees surveyed

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area where most workers experienced the onset of symptoms. The problem seems linked wash rack #630. The reactivation of this wash rack may have contributed to the high levels of H₂S measured inside manhole 8G. While exposure to diesel exhaust and petroleum-based products may have contributed to some symptoms, these exposures were not found to be excessive.

Hydrogen sulfide is normally produced by the anaerobic bacterial decay of organic material. A significant load of organic material was entering the RUFMA sewer system in the form of vegetation, food scraps, and organic materials dumped by soldiers into the manholes. Anaerobic conditions occurred in the system as large amounts of solids were collected, causing stagnant "dead zones." Hydrogen sulfide is denser than air and therefore concentrates in low areas, permitting high levels to accumulate in the RUFMA sewer system.

Exposures to H₂S are relatively common in the petroleum industry, on farms (e.g. manure pits), from sewers, and in waste water treatment facilities. The gas is notorious for its odor, which the human nose can detect at low levels. Interestingly, this odor disappears as concentrations increase above 100 ppm. Low level exposure causes predominately irritant symptoms, especially of the eyes and mu-

cous membranes. The occupational exposure limit of 10 ppm (8 hour time weighted average) is based on these irritant effects. Because H₂S is relatively insoluble, it penetrates deep into the lungs, potentially resulting in pulmonary edema. Exposure to higher levels of H₂S can result in loss of consciousness through inhibition of the cellular cytochrome oxidases (blocking cellular respiration by the same mechanism as cyanide) and death may result.

Editorial comment submitted by J Martin, MAJ, MC, Occupational Medicine Residency Director, USACHPPM, APG, MD

Table 2. Hydrogen Sulfide Sampling Results at the RUFMA on 25 September 1995

Location	At the Source	Breathing Zone
Manhole 8G	5-170 ppm*	0-5 ppm
Manhole 8F	1-12 ppm	0-1 ppm
Manhole 8E	1-3 ppm	1-3 ppm
Manhole 8D	2 ppm	1 ppm
Manhole 8C	2-6 ppm	1-2 ppm
Manhole 8B	0 ppm	0 ppm

* ppm = parts per million

Acute Health Effects of Hydrogen Sulfide Exposure

H ₂ S Level	Health Effect
0.01-0.3 ppm	Odor threshold
1-5 ppm	Offensive odor; may be associated with nausea, headache, eye irritation
20-50 ppm	Keratoconjunctivitis and lung irritation
100 ppm	Eye and lung irritation; olfactory paralysis (odor disappears)
150-200 ppm	Severe eye and lung irritation; lethal if exposure prolonged
250-500 ppm	Non-cardiogenic pulmonary edema
500 ppm	"Knockdown" = loss of consciousness with even brief exposure
1,000 ppm	Breathing may stop with one or two breaths

Source: Guidotti TL. Occupational exposure to hydrogen sulfide in the sour gas industry; some unresolved issues. Int Arch Occup Environ Health 1994; 66(3): 153-60.

Report from the field

Guillain-Barre Syndrome Following Influenza Immunization Fort Sam Houston, Texas

This case involves a 61-year-old Hispanic woman, a military dependent, who was being seen in the Surgical Clinic at Brooke Army Medical Center, Fort Sam Houston, Texas, for acute diverticulitis. She presented to the clinic with symptoms of fever and left lower quadrant pain without diarrhea or vomiting. Her white blood cell count was elevated. She was started on oral antibiotic therapy and was scheduled for a follow-up appointment in 72 hours. At the time of her next appointment, she was somewhat improved and was continued on her present regimen. While exiting the clinic on that day, she noticed the influenza vaccination team and requested a flu shot. Three days later, she presented

to the Surgical Clinic with worsening symptoms and was admitted for intravenous antibiotic therapy. Later, on the day of admission, she complained of mild motor weakness on the right side. Upon examination she was found to have a right hemiparesis, reflexes intact.

Within 24 hours of admission, she had progressed to a complete bilateral flaccid paralysis and suffered a respiratory arrest. She was intubated and placed in the Intensive Care Unit. On neurological examination, she was able to move only her eyelids. Initial diagnosis was Guillain-Barre Syndrome, sub-type acute motor axonal neuropathy (AMAN). Treatment has included a course of five plasmapheresis

Continued on page 10

Report from the field

Korean Hemorrhagic Fever, Korea, October - November 1995

Case #1: The first case involved a 24-year-old, white male, active duty scout, assigned to the 2nd Infantry Division unit. He presented to the Camp Casey emergency room on 22 October, 1995 with complaints of fever, chills, chest pain, nausea, dizziness, and malaise. The initial assessment was pneumonia versus viral syndrome and he was sent to quarters for 24 hours and treated with erythromycin and symptomatic medications. On 24 October, he returned to the Camp Casey Clinic feeling worse. He was evacuated to the 121th General Hospital to rule out Korean Hemorrhagic Fever (KHF). His KHF IgM titer was strongly positive on the day of admission and he responded well to treatment with ribavirin. He was discharged from the hospital on 08 November

1995. This soldier reported a recent history of bivouacking for three weeks in mountainous terrain, returning approximately two weeks prior to the onset of his illness.

Case #2: The second case involved a 28-year-old, white male, active duty officer, assigned to a Field Artillery unit at Camp Hovey. He was seen at Camp Casey Clinic on 31 October 1995 with complaints of fever, chills, nausea, headache, dizziness, and myalgias involving the neck, shoulder, and back. He was initially diagnosed as a viral syndrome and returned to duty. On 02 November, 1995, he returned to the clinic with persistent fever,

Continued on page 10

GBS: Continued from page 9

exchanges between hospital days seven and fifteen without noticeable improvement. Her past medical history, including any prior infections, exposures or immunizations, was noncontributory.

The patient remains intubated in the ICU as of hospital day fifty and has had no significant return of motor function. She follows commands through the use of eye movements.

Information on case report submitted by COL JJ Karwacki, MC, Chief, Preventive Medicine Service, Brooke Army Medical Center, Fort Sam Houston, TX.

Editorial Comment: According to the Vaccine Adverse Event Reporting System (VAERS) there were forty-four reports of Guillain-Barre Syndrome

(GBS) following influenza vaccination received during the 1994-1995 influenza season with forty cases confirmed. Eighteen of the forty confirmed cases had received influenza vaccinations in previous years whereas eleven had never received a flu shot prior to the 1994-1995 season. Twenty-seven of the forty confirmed cases were between the ages of 18 - 64 years. Thirteen of the cases were older than 64 years of age.

The onset interval of these cases varied from less than one week to over four weeks and the majority developed symptoms between one to two weeks. Thus far, during the 1995 -1996 influenza season, there have been fifteen reported cases of GBS after influenza immunization with five confirmed cases.

KHF: Continued from page 9

malaise, headache, dizziness, and diarrhea. He was evacuated to the 121th General Hospital to rule out KHF. On admission his KHF IgM titer was strongly positive. He was started on ribavirin protocol on 03 November 1995 and improved clinically. This soldier also had been in the field in mountainous terrain prior to his illness.

Case #3: The third case is a 23-year-old, white male, active duty E4, who was assigned to the same Field Artillery unit at Camp Hovey as the former case. He presented to the Troop Medical Clinic on 06 November, 1995 with complaints of chills, mild headache, low back and flank pain of approximately three days duration. His oral temperature was 106°F and he was evacuated to the 121th General Hospital to rule out KHF. On admission his KHF IgM titer was strongly positive. He is currently responding well to ribavirin therapy. Rodent sightings were not reported in any of these three cases.

Case reports and editorial comment submitted by MAJ WL Novakoski, MC, Preventive Medicine Staff Officer, 18th MEDCOM, Unit #15281, APO AP 96205-0054

Editorial Comments: Korean Hemorrhagic Fever is an endemic disease in the Republic of Korea and is found throughout the country (See MSMR, Vol 01 No 06). The majority of cases are identified north and east of Seoul. The disease is reported throughout the year with the peak incidence occurring in October through December each year. The reported cases and number of deaths in the Korean population since 1991 are shown in the table below.

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Table 3. Reported Cases of Korea Hemorrhagic Fever among the Native Population 1991 - 1995*

Year	Number of Cases	Deaths
1991	85	2
1992	76	0
1993	111	3
1994	133	1
1995	22	0

* through October 1995

Continued from page 10

Recently, the USFK Reg 40-1, Prevention, Surveillance, and Treatment of Hemorrhagic Fever with Renal Syndrome was published. The USFK Surgeon informed the command that there are documented cases of KHF this year as in the past several seasons and that these cases are epidemiologically similar. The Infantry Division Preventive Medicine Officer has alerted 2nd Infantry Division commanders of the risk and the appropriate preventive measures.

The 2nd Infantry Division health care providers and the 121th General Hospital providers have been alerted to the risk so that the index of suspicion to consider KHF in the differential diagnosis for patients presenting with febrile or flu-like symptoms will be heightened. Each of the three recent cases were identified early in their clinical course and all were responding well to ribavirin therapy which is being given under an IND protocol.

Table 4. Number of KHF cases in active duty USFK personnel since 1984

Year	Cases	Deaths	Year	Cases	Deaths
1984	4	0	1990	6	0
1985	3	0	1991	0	0
1986	9	2	1992	2	0
1987	6	0	1993	0	0
1988	6	0	1994	8	1
1989	9	0	1995*	3	0*

* through November 09, 1995

Report from the field

Escherichia coli O157:H7, Fort Leavenworth, Kansas

Beginning on 02 October 1995, and ending on 26 October 1995, there were five children diagnosed with E.coli O157:H7 infection who were admitted to Children's Mercy Hospital, Kansas City, Missouri from the Fort Leavenworth area. The first case involved a nine-year-old male, military dependent, who resided off-post in the city of Leavenworth. He was hospitalized for four days and did not develop hemolytic uremic syndrome (HUS).

On October 04, 1995, a four-year-old female, who resides on post, was admitted with HUS due to E. coli O157:H7 infection and required renal dialysis and a three week hospitalization. Six days later, her 2-year-old male sibling was admitted for HUS, required dialysis and a prolonged hospitalization.

On October 23, 1995, a 13-year-old female, who resides off-post, was hospitalized for four days due to the infection but did not develop HUS.

The fifth and final case within the military community occurred on October 26, 1995, in a three-year-old female who was hospitalized for HUS but did not require dialysis.

An outbreak investigation was performed by an epidemiologist at the Kansas State Department of Health for these and other reported cases within the tri-state area. All of the cases were confirmed and typed as E.coli O157:H7 by the state laboratory and two different DNA strains were found in four of the cases. The two siblings were found to have DNA strain # 2, (these two also required renal dialysis). The two children who resided off-post both had DNA strain # 1 and required shorter hospitalizations.

An extensive traceback investigation was conducted to identify a common-source of the outbreak. Although a weak association was found between

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Preventive Medicine Guidance: Deployment to the Former Republics of Yugoslavia

Most Significant Medical Threats:

1. Respiratory diseases
2. Diarrheal diseases
3. Injuries due to
 - Recreational activities
 - Motor vehicle accidents
 - Unexploded ordnance
4. Arthropod-borne diseases
5. Cold weather injuries
6. Exertional heat injuries
 - and dehydration
7. Emotional stress
8. Zoonotic diseases

Immunizations / Tests:

1. Standard vaccinations up to date:
 - Tetanus, Diphtheria (Td)
 - Measles, Mumps, Rubella (MMR)
 - Oral Polio
 - Influenza
2. Deployment specific vaccinations:
 - Hepatitis A
 - Typhoid (oral or parenteral)
3. Required tests:
 - TB tine within last 12 months
 - Negative HIV within last 6 months

References:

1. USEUCOM ECMD message, DTG 081700Z NOV 95, Subject: Preventive Medicine Guidance for US Forces Deploying in Support of NATO IFOR Peace Implementation in the Former Yugoslavia
2. *Staying Healthy in the Former Republics of Yugoslavia: A Guide for Leaders and Medical Planners.* US Army MEDCOM, Nov 1995.
3. FM 8-33, *Control of Communicable Diseases in Man.* Benenson AS (ed), 15th ed, 1990.

Continued from page 11

the consumption of apple cider and the outbreak, no definitive common-source was discovered. The five children were discharged in stable condition and suffered no long-term sequelae from their infections.

Information on case reports submitted by LTC RL Ferguson, AN, and LTC RL Dru, MC, Preventive Medicine Service, Fort Leavenworth, KS.

Editorial Comment: *Escherichia coli* O157:H7 is the most common cause of hemolytic uremic syndrome (HUS) in children.¹ This strain was first recognized as a human pathogen in 1982 and is now an important cause of bloody diarrhea and a leading cause of acute renal failure during childhood. Each year in the United States, *E. coli* O157:H7 infection accounts for approximately 20,000 cases of illness and 250 deaths.

Beginning in 1993, the Council of State and Territorial Epidemiologists recommended that *E. coli* O157:H7 become a nationally reportable disease and that clinical laboratories screen at least all bloody stools for this pathogen.² In response to increased culturing, during 1993-1994, a total of 46 clusters of *E. coli* O157:H7 infections involving approximately 1300 persons were recognized in the United States. In January 1995, an estimated 29% of clinical laboratories were culturing all diarrheal specimens for *E. coli* O157:H7 and the proportion is rapidly increasing.

References:

- 1) CDC. Outbreak of Acute Gastroenteritis Attributable to *Escherichia coli* Serotype O104:H21 - Helena, Montana, 1994. MMWR 1995;44:502.
- 2) CDC. *Escherichia coli* O157:H7 Outbreak Linked to Commercially Distributed Dry-Cured Salami - Washington and California, 1994. MMWR 1995;44:158-159.

TABLE III. Rates of Cold Weather Injuries, United States Army*
Winter Months Only (Jan, Feb, Mar)

Reporting MTF/Post	IPDS Hospitalizations, ICD-9 Category 991					Reported Cold Weather Injuries**
	1991	1992	1993	1994	1995	1995
NORTH ATLANTIC HSSA						
Walter Reed AMC	0.0	0.0	0.0	7.2	0.0	0.0
Aberdeen Prov. Ground	0.0	0.0	0.0	0.0	0.0	0.0
FT Belvoir, VA	0.0	0.0	0.0	0.0	0.0	0.0
FT Bragg, NC	0.0	0.0	0.0	2.3	2.3	0.0
FT Drum, NY	9.4	0.0	0.0	0.0	0.0	220.8
FT Eustis, VA	11.3	0.0	0.0	0.0	0.0	0.0
FT Knox, KY	13.3	0.0	0.0	0.0	0.0	0.0
FT Lee, VA	0.0	0.0	0.0	0.0	0.0	0.0
FT Meade, MD	0.0	0.0	14.3	0.0	0.0	0.0
USMA, West Point, NY	0.0	0.0	0.0	0.0	0.0	0.0
CENTRAL HSSA						
Fitzsimons AMC	0.0	0.0	0.0	0.0	0.0	0.0
FT Carson, CO	5.9	5.6	6.3	5.8	0.0	0.0
FT Leonard Wood, MO	8.7	8.8	0.0	71.0	14.3	14.3
FT Leavenworth, KS	0.0	0.0	0.0	0.0	0.0	0.0
FT Riley, KS	0.0	0.0	7.0	6.7	6.9	6.9
SOUTH CENTRAL HSSA						
Brooke AMC	0.0	0.0	0.0	0.0	0.0	0.0
FT Hood, TX	2.8	0.0	0.0	0.0	0.0	0.0
FT Polk, LA	0.0	6.2	0.0	0.0	58.1	0.0
FT Sill, OK	0.0	0.0	19.8	6.3	0.0	0.0
Panama	0.0	0.0	0.0	0.0	0.0	0.0
SOUTHEAST HSSA						
Eisenhower AMC	0.0	0.0	0.0	9.3	0.0	0.0
FT Benning, GA	12.0	0.0	5.4	5.3	37.6	94.1
FT Campbell, KY	0.0	63.4	114.9	17.2	8.8	0.0
FT Jackson, SC	9.8	0.0	0.0	61.6	0.0	0.0
FT McClellan, AL	0.0	0.0	0.0	0.0	0.0	0.0
FT Rucker, AL	0.0	0.0	19.2	0.0	0.0	0.0
FT Stewart, GA	0.0	0.0	0.0	0.0	0.0	0.0
SOUTHWEST HSSA						
Wm Beaumont AMC	0.0	0.0	0.0	0.0	0.0	0.0
FT Huachuca, AZ	0.0	0.0	0.0	0.0	0.0	0.0
FT Irwin, CA	73.2	23.3	0.0	21.1	0.0	0.0
NORTHWEST HSSA						
Madigan AMC	0.0	0.0	6.1	0.0	0.0	0.0
FT Wainwright, AK	52.1	20.4	31.5	32.0	0.0	237.0
PACIFIC HSSA						
Tripler AMC	0.0	0.0	5.2	0.0	0.0	0.0
OTHER LOCATIONS						
Europe	7.3	3.0	3.9	2.2	2.6	5.3
Korea	8.6	0.0	6.7	0.0	3.2	25.5
Total	5.5	3.1	6.7	5.4	4.2	13.8

* Rates are per 100,000 soldiers. Denominators based on duty zip which does not account for TDY.

** Includes both hospitalized and non-hospitalized cases based on date of onset.

ARD Surveillance Update

Legend

—

ARD Rate

= (ARD cases / Trainees) * 100

■ ■ ■

SASI*

= ARD Rate * Strep Rate**

FT Benning

Ft Jackson

Ft Knox

Ft Leonard
Wood

Ft McClellan

Ft Sill

Table IV. ARD surveillance rates, submitted by Army TRADOC posts

* Strep/ARD Surveillance Index (SASI)

**Strep Rate = (GABHS(+) / Cultures) * 100

Note: SASI has proven to be a reliable predictor of serious strep-related morbidity, especially acute rheumatic fever.

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