DEPARTMENT OF VETERANS AFFAIRS
Veterans Health Administration
Washington DC 20420

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UNDER SECRETARY FOR HEALTH'S INFORMATION LETTER

EVALUATION OF VETERANS INVOLVED IN PROJECT SHAD TESTS -- AUTUMN GOLD, COPPER HEAD, SHADY GROVE AND OTHERS FOR POSSIBLE OCCUPATIONAL HEALTH EXPOSURES

1. This Under Secretary for Health's Information Letter provides guidance to clinicians on evaluating veterans who may have participated in Project Shipboard Hazard and Defense (SHAD). ***NOTE:*** *This is in follow up to IL 10-2000-012 and provides additional information obtained from the Department of Defense (DOD).*

2. **Background**

a. Project SHAD was conducted by DOD during the 1960s to determine the effectiveness of shipboard detection of chemical and biological warfare agents, the protective measures taken against chemical and biological warfare agents, and to determine the potential risk to American forces posed by these agents. Although the exact number of Project SHAD tests is unknown at this time, DOD has declassified and released information on three of the tests: Autumn Gold, Copper Head, and Shady Grove. DOD is currently researching suspected Project SHAD tests referred to as Eager Belle, Flower Drum, Night Train, Big Tom, Fearless Johnny, Half Note, Purple Sage, Red Beva, Scarlet Sage, 68-50, 69-31 and 69-32. In addition to veteran inquiries regarding Project SHAD, members of Congress, Veterans Service Organizations and the broadcast news media have maintained a steady level of interest in Project SHAD testing.

b. The tests were originally classified and much of the information concerning the tests will remain classified. However, DOD is collecting and reviewing documentation for each test to identify and declassify the relevant information needed for medical evaluation. Information is still limited, but we do know the following substances were used as part of the testing program:

(1) ***Coxiella burnetii*** (OU);

(2) ***Pasteurella tularensis*** (since renamed *Francisella tularensis*) (UL);

(3) **Biological Warfare Agent Simulants**: *Bacillus globigii* (BG), (since renamed *B. licheniformis*), *E. coli*, and *Serratia marcscens*;

(4) **Chemical Warfare Agents: GB (sarin) and VX;**

(5) **Chemical Warfare Agent Simulants:** Methylacetoacetate and sulfur dioxide;

(6) **Tracer Material:** zinc cadmium sulfide (ZnCdS); and

(7) **Various Chemical Decontaminants:** Beta-propiolactone, ethyl alcohol, Lysol™, peracetic acid, potassium hydroxide, sodium hydroxide, and sodium hypochlorite.

c. Information regarding some of the most hazardous of these selected substances is provided in the Attachment A, Fact Sheet. The Department of Veterans Affairs (VA) continues to work with DOD to obtain information on all of the substances utilized.

d. Project SHAD involved service members from the Navy and Marine Corps and may have involved a small number of personnel from the Army and Air Force. Test reports, prepared at the conclusion of each test, indicate all personnel who participated in each test were required to use the protective measures deemed appropriate at the time.

e. Ships involved in Autumn Gold, Copper Head and Shady Grove included USS Carpenter DD-825, USS George Eastman AG-39, USS Granville S. Hall YAG-40, USS Hoel DDG-13, USS Navarro LPA-215, USS Power DD-839, and USS Tioga County LST-158. In addition to ships, five Army light tugs (LT) manned by Navy personnel identified as LT-2080, LT- 2081, LT-2085, LT-2086 and LT-2087, were used.

f. For the Autumn Gold, Copper Head, and Shady Grove tests, DOD has compiled crew lists and unit rosters for the ships, LTs, and flight units involved. As DOD continues its research into the remaining tests, it will declassify and provide information on: test names and/or numerical designations, involved units, vessels, locations, dates, and substances used. DOD will research individual cases, as needed, if a veteran does not have documentation substantiating assignment to a participating unit or vessel during the relevant time period.

3. **Guidance**

a. VA medical centers need to provide evaluations to eligible veterans enrolled in VA health care who may have been exposed to chemical warfare agents, biological warfare agents, or other hazardous substances while participating in Project SHAD or other similar tests, and who request such evaluation. Since there are no markers for the agents known to have been involved in the tests, the evaluation needs to consist of a thorough military and medical history along with a basic medical examination including appropriate laboratory tests that relate to the veteran's complaints and medical findings.

(1) The military history needs to include the following:

(a) Test and ship name and/or unit to which the patient is connected,

(b) Dates served aboard the ship and/or in the unit,

(c) Involvement with Project SHAD,

(d) Usual job description and responsibility

(e) Details of experiments in which the patient believes the patient was involved,

(f) Perceived exposures, and

(g) Other relevant details.

(2) The medical history needs to include the following:

(a) Baseline health status or the usual state of health prior to Project SHAD,

(b) Health status during Project SHAD,

(c) Health status following Project SHAD,

(d) Perceived association with any health condition and the tests identified in the military history, and

(e) Other relevant details.

NOTE: *Additional specialized tests and consultations need to be ordered if clinically indicated.*

b. Veterans need to be informed that the examination does not constitute a claim for compensation. ***NOTE:*** *Veterans who wish to file a compensation claim should be referred to a Veterans Benefits Counselor, or advised to contact the appropriate VA Regional Office at 1-800-827-1000.*

c. Facility Directors are encouraged to ensure copies of this Information Letter are provided to the Primary Care Teams, the staff responsible for ambulatory care and outpatient clinics, community-based outpatient clinics, as well as Vet Centers.

4. **Follow-Up Responsibility.** Questions regarding this information letter may be addressed to the Environmental Agents Service (131) at (202) 273-8579.

S/ Frances Murphy, M.D. for
Thomas L. Garthwaite, M.D.
Under Secretary for Health

Attachment

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ATTACHMENT A

FACT SHEET

"PROJECT SHAD" HAZARDOUS ENVIRONMENTAL EXPOSURES

1. Project Shipboard Hazard and Defense (SHAD). Project SHAD was a series of tests conducted by the Department of Defense (DOD) from approximately 1962 to 1968. The tests were intended to evaluate the effectiveness of shipboard detection and protective procedures against chemical warfare agents and biological warfare agents. Based on information available to the Department of Veterans Affairs (VA) today, we understand these tests involved possible exposures to: the chemical warfare agents sarin and VX; the bacteria *Bacillus globigii*, *Coxiella burnetii*, and *Pasteurella tularensis*; tracer material zinc cadmium sulfide (ZnCdS); and the decontaminant beta-propiolactone. Although other substances were used, those reviewed here represent the greatest health concern. DOD is actively investigating its records to determine the names of ships and crew members who participated in these tests, and seeking additional information on the hazardous materials involved. ***NOTE:*** *This Fact Sheet will be updated as new information regarding additional tests becomes available.*

2. Long-term Health Effects from Sarin and VX

a. Sarin and VX are highly toxic chemical warfare nerve agents.

(1) In 1998 VA requested the National Academy of Sciences (NAS) to review possible long-term health effects from exposure to sarin. Although NAS focused on sarin, their findings are applicable to related nerve agents including VX.

(2) The NAS committee came to three conclusions about long-term effects of sarin exposure based on whether the exposure was high, medium, or low. They concluded that "there is sufficient evidence of a causal relationship between exposure to sarin and a dose-dependent acute cholinergic syndrome that is evident seconds to hours subsequent to sarin exposure and resolves in days to months." Thus, humans exposed to high doses of sarin show a well-characterized acute cholinergic syndrome as evidenced by acute cholinergic signs and symptoms. Synaptic buildup of acetylcholine following sarin exposure results in widespread over-stimulation of muscles and nerves. Resulting cholinergic signs and symptoms are evident in seconds to hours after exposure and usually resolve in days to months. At high doses, convulsions and death can occur.

b. The Institute of Medicine (IOM) of the National Academy of Sciences committee further concluded that "there is limited and/or suggestive evidence of an association between exposure to sarin at doses sufficient to cause acute cholinergic signs and symptoms and subsequent long-term health effects." Subsequent to acute cholinergic poisoning, some individuals show persistent symptoms which include:

(1) Fatigue;

(2) Headache;

(3) Visual disturbances such as asthenopia, blurred vision, and narrowing of the visual field;

(4) Asthenia;

(5) Shoulder stiffness;

(6) Symptoms of post-traumatic stress disorder; and

(7) Abnormal test results, of unknown clinical significance, on the digit symbol test of psychomotor performance, electroencephalogram (EEG) records of sleep, event-related potential, visual evoked potential, and computerized posturography.

c. The committee also concluded that "there is inadequate or insufficient evidence to determine whether an association does or does not exist between exposure to sarin at low doses insufficient to cause acute cholinergic signs and symptoms and subsequent long-term adverse health effects." In other words, there is not sufficient evidence to conclude that persistent symptoms will be observed in the absence of signs and symptoms of acute cholinergic poisoning. There are no well-controlled studies of long-term health effects in humans exposed to sarin at doses that do not produce acute signs and symptoms.

d. **Summary.** The committee noted that exposure to high doses of sarin can result in widespread over-stimulation of muscles and nerves and convulsions and death can occur. The IOM also concluded that there is limited or suggestive evidence of an association between exposure to sarin at doses sufficient to cause acute cholinergic signs and symptoms and subsequent long-term health effects, including fatigue, headache, visual abnormalities, asthenia, shoulder stiffness, symptoms of post-traumatic stress disorder, and abnormalities on various psychomotor and EEG tests. This conclusion was based on the review of the reports of a group of industrial workers in the United States accidentally exposed to sarin and two groups of civilians exposed during terrorism episodes in Japan. VX, the other related chemical warfare agent involved with Project SHAD, is likely to have similar toxicological properties as sarin.

3. Long-Term Health Effects from *Bacillus globigii*

a. *Bacillus globigii* (BG) is referred to in older literature as a synonym for *Bacillus licheniformis*. Members of the genus *Bacillus* are aerobic or facultatively anaerobic gram-positive or gram-variable spore-forming bacteria that are found ubiquitously in decaying organic matter, dust, soil, vegetables, and water. One species, *Bacillus anthracis*, is unusually pathogenic for humans, and is the basis of anthrax biological weapons (adapted from Principles and Practice of Infectious Diseases, 5th ed, GL Mandell, JE Bennett and R Dolin, eds, 2000).

b. BG is not normally considered to be pathogenic. DOD selected BG as a less infectious biological warfare agent simulant in the Project SHAD tests. However, BG is associated with a number of opportunistic infections, particularly in a hospital setting with debilitated, immune-suppressed or traumatized patients. Opportunistic infections would be expected to occur shortly

after an exposure event, and long-term health effects are not anticipated in individuals exposed to BG but who do not develop opportunistic infections.

c. Clinical manifestations from infection by some *Bacillus* species include food poisoning, localized infections related to trauma, e.g., ocular infections, deep-seated soft tissue infections, and systemic infections, e.g., meningitis, endocarditis, osteomyelitis, and recurrent bacteremia. Risk factors associated with *Bacillus* infections include intravenous drug use, sickle cell disease, foreign bodies including intravenous catheters, and immune-suppression from various causes including infection with human immunodeficiency virus (HIV). BG specifically has been clinically associated with intravenous catheter-acquired sepsis, and bacteremia can be a complication among patients with implanted intravenous catheters, usually requiring removal of the implanted device. BG has also been reported in food poisoning cases in which cooked meats and vegetables were most commonly implicated. The median period of incubation was about eight hours, and the predominant symptom was diarrhea with vomiting in about half the cases.

d. **Summary.** *B. licheniformis* is not generally considered to be pathogenic, but is recognized as a cause of such acute infections as intravascular catheter-acquired sepsis and food poisoning.

4. Long-Term Health Effects from *Coxiella burnetii*. *Coxiella burnetii* (OU) causes Q fever in humans. Domestic animals (sheep, cattle and goats), cats, wild animals and ticks usually host OU. Humans become infected after contact with contaminated materials such as feces or blood, inhaling contaminated dust or droplets, or ingesting contaminated food or unpasteurized milk. Symptoms of the disease include fever, headache, muscle pains, arthralgia and a dry, non-productive cough. Hepatitis or pneumonia also may develop during the early stages of the disease. In rare occurrences, Q fever can cause endocarditis and subsequent aortic heart valve complications. Generally, victims recover, even without treatment.

5. Long-Term Health Effects from *Pasteurella tularensis*. *Pasteurella tularensis* (UL) causes the infectious disease tularemia (rabbit fever, deer fly fever, Ohara's disease), most commonly in people who handle infected wild rabbits. Other infected animals, ticks or contaminated food or water also transmit tularemia. The symptoms, high fever and severe constitutional distress, appear suddenly within 10 days of exposure. One (or more) ulcerating lesion develops at the infection site, usually the arm, eye, or mouth. The regional lymph nodes enlarge, suppurate, and drain. Pneumonia, meningitis, or perionitis may complicate the infection, whose mortality rate is about 6 percent.

6. Long-Term Health Effects from Zinc Cadmium Sulfide

a. Zinc cadmium sulfide (ZnCdS) was used by DOD as a tracer material for studying potentially harmful particles dispersed in air. ZnCdS particles dispersed in air behave similarly to some biological agents, and they fluoresce under ultraviolet light and, therefore, can easily be detected. DOD used ZnCdS in Project SHAD and in other tests conducted in the 1950s and 1960s in several urban and rural locations in the United States and Canada.

b. In 1994, DOD asked the National Research Council (NRC) to review the potential human health risks of ZnCdS. In their 1997 report, the NRC committee reviewed the toxicokinetics, bioavailability and toxicity of ZnCdS, and the exposures related to its in studies conducted in the

1950s and 1960s in urban and rural U.S. and Canadian locations. ***NOTE:*** *The full report is available on-line at http://www.nap.edu/books/0309057833/html/index.html.*

c. The NRC committee reported that animal data indicate that ZnCdS is not acutely toxic when given orally, consistent with its low solubility and apparent lack of bioavailability. The committee found that the particle size used in these tests could have been inhaled and deposited in the deep lung. Given the lack of reports of toxicity of inhaled ZnCdS, the committee instead reviewed related toxicity data on cadmium as the most toxic component of ZnCdS.

d. The NRC Committee concluded that "inhaled cadmium has been shown in occupational studies and laboratory studies of animals to cause lung cancer, but not cancer at other body sites." Further, "cadmium inhalation exposures associated with increased lung-cancer risk in animal studies involved higher concentrations (100 – 1,000 times higher), longer periods (lifetime exposures), and more-soluble compounds than the exposures to cadmium from ZnCdS in the Army's testing program." The estimated upper-bound, lung-cancer risks ranged from less than 0.01 $X10^{-6}$ to 24.0 $X\ 10^{-6}$ (less than one per million to 24 per million).

e. **Summary.** The NRC previously concluded that the risks to civilian populations of non-cancer health effects and lung cancer from ZnCdS tests conducted by DOD appear to be low.

7. Long-term Effects of Beta-propiolactone. An International Agency for research on Cancer (IARC) working group reported no data was available to evaluate the carcinogenicity of beta-propiolactone in humans.

8. References. Medical and toxicology texts may be consulted for more information on the agents. However, the following summarizes the currently accepted information on the risks of exposure for selected agents:

a. Gulf War and Health Volume 1, Depleted Uranium, Sarin, Pyridostigmine Bromide, Vaccines, Institute of Medicine, National Academy of Sciences, 2000.

b. Mandell et. al., Principles and Practice of Infectious Diseases, 5th edition, 2000 pages 2220-2226.

c. Toxicologic Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests, National Research Council, 1997.

d. Mitretek Systems website, www.mitretek.org/mission/envene/biological/agents/rickettsia.htm

e. University of Maryland School of Medicine website, umm.drkoop.com/conditions/ency/article/ 001337.htm

f. Colorado State University, Environmental Health Services website, chemdat1.ehs.colostate.edu/LARmanual/tular.htm

g. The Columbia Encyclopedia, 6th ed., New York: Columbia University Press, 2001, website, www.bartleby.com/65/