S. HRG. 107–861

THE DEPARTMENT OF DEFENSE'S INQUIRY INTO PROJECT 112/SHIPBOARD HAZARD AND DEFENSE (SHAD) TESTS

HEARING

BEFORE THE

SUBCOMMITTEE ON PERSONNEL

OF THE

COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

OCTOBER 10, 2002

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THURSDAY, OCTOBER 10, 2002

U.S. SENATE,
SUBCOMMITTEE ON PERSONNEL,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:55 a.m. in room SR–232A, Russell Senate Office Building, Senator Max Cleland (chairman of the subcommittee) presiding.

Committee members present: Senators Cleland, Akaka, Bill Nelson, and E. Benjamin Nelson.

Majority staff member present: Gerald J. Leeling, counsel.

Minority staff members present: Patricia L. Lewis, professional staff member; and Richard F. Walsh, minority counsel.

Staff assistants present: Dara R. Alpert and Andrew Kent.

Committee members' assistants present: Andrew Vanlandingham, assistant to Senator Cleland; Davelyn Noelani Kalipi, assistant to Senator Akaka; William K. Sutey and Peter A. Contostavlos, assistants to Senator Bill Nelson; Eric Pierce, assistant to Senator Ben Nelson; James P. Dohoney, Jr. and Michele A. Traficante, assistants to Senator Hutchinson.

OPENING STATEMENT OF SENATOR MAX CLELAND, CHAIRMAN

Senator CLELAND. Good morning, everyone. The hearing will come to order.

Representative Thompson, thank you so much for your leadership on this issue affecting America's veterans as this country contemplates committing young Americans into harm's way once again. I think it's the height of irony that we now discover that our own Government put our service men and women in the Vietnam era into harm's way without full disclosure to them of what they were up against. I thank you very much for bringing this to national attention. We know you have a vote in the House, so if you'd like to proceed, you're now recognized.

STATEMENT OF HON. C. MICHAEL THOMPSON, A U.S. REPRESENTATIVE FROM CALIFORNIA

Mr. THOMPSON. Thank you very much, Mr. Chairman. Senator Nelson, thank you for your interest.

I'd like to thank you, Mr. Chairman, not only for having this hearing and showing the leadership to bring this forward to get the good public attention we need so we can get the veterans the help that they need, but you've been an early proponent of this. It was awhile back when you and I sat out in the sun with the other Senator Nelson to introduce our bills to the press, the House bill and the Senate bill, both of which would be very important and help get the veterans, in this case as well as other situations, the help that they need.

I just want to make a couple of comments. This has been a long battle for a lot of us. It was brought to my attention by Jack Alderson, who is a constituent of mine, and he's here today. He'll testify, I believe, today. Jack was a tugboat commander, and he participated in the SHAD testing. It's Jack that brought it to my attention that he and a number of people that he commanded were getting sick, and he was concerned that it had something to do with the tests that they were doing. But being the great patriot and the great American that he is, that's all he'd tell me. He wouldn't tell me the extent of the tests, because they were still classified material.

I contacted the Department of Defense 4 years ago now and was told at the time that there was no such thing as Project SHAD and that I was worrying about nothing. We continued, with Jack's help, to pester the Department, and finally they said there was a Project SHAD, but not to worry; they didn't use any chemicals or any biological stuff that presented a problem. They used simulants.

I continued to pester, and, lo and behold, not yet 5 months ago they came forward and they said, actually, we did use chemical and biological agents, and they gave us a list. The two most frightening are VX nerve gas, which our Government says is one of the most potent synthesized agents to exist, and then they used sarin nerve gas, which we're all familiar with because of the Tokyo subway terrorist attack.

This has been a long, ongoing effort. Yesterday, we had another declassification made public. We know now that there were at least 5,500 military service members who were subjected to these tests. We know that there was a certain offensive application that we were testing. We know now that there were ground tests that were done, which opens up another issue. Were there civilians that were exposed? How are we going to track these folks? Hopefully we'll be able, with your help, to get some information on this.

I'd be remiss if I didn't plug the bill that I introduced in the House with Michael Bilirakis from Florida and that has been introduced by Senator Nelson, of Florida, and Senator Cleland, of Georgia, that would recognize that all veterans have a right to know what agents they were exposed to, what lasting health effects they may expect, and where they can receive medical care.

This is incredibly important right now Senator, as you mentioned, as we're on the eve of voting to create another population of veterans. Here we have a group that served honorably from probably 1962 to 1973, who don't know what sort of health problems they're going to have from tests that were done to them by our own folks.

I think this is an issue of trust and integrity. If we want veterans to believe in our Government, if we want young people who are signing up to be part of our military to believe in our Government, it's important that they know that they can trust us and that we have the integrity to stand with them in their time of need.

I want to thank all of you, your entire committee, for your commitment to make sure that this happens. I have a statement that I'd like to submit for the record and, again, just say thank you very much. I look forward to working with you to help these veterans.

Senator CLELAND. With no objection, we'll include your statement in the record.

[The prepared statement of Mr. Thompson follows:]

PREPARED STATEMENT BY REPRESENTATIVE MIKE THOMPSON

Thank you Chairman Cleland and Ranking Member Hutchinson for holding this hearing. It comes on the brink of an historic decision that Congress will be making regarding authorizing our Armed Forces to take action against Iraq. This hearing is even more imperative because we are once again asking our troops to answer the call of duty and to confront a dangerous enemy. Our service members must know that we stand by them during times of war and peace.

My own personal experience with this issue began over 3 years ago when a constituent of mine, Jack Alderson, asked me to investigate something he called Project SHAD. I am honored that Jack is here today and that he will be sharing his knowledge with you. He is a great patriot who has refused to disclose classified information regarding these tests until the DOD has acted. He has not broken the promise he made to his country nearly 40 years ago despite hearing of crew illness and experiencing illness himself.

Jack was the commander of five tugs used in these experiments. At first the Department of Defense told us that Project SHAD did not exist. Then we were told that it did exist but only simulants were used in the tests. Finally, after 3 years of pressure, DOD not yet 5 months ago revealed that these tests involved harmful chemical and biological agents the worst of which included VX nerve gas and Sarin nerve gas.

The DOD has called VX one of the most lethal substances ever synthesized, and as we all know, Sarin was used in the deadly terrorist attack on the Tokyo subway system. Yet we put at least 5,500 of our service members at risk by exposing them to these hazardous agents. It is incumbent upon this Congress to ensure that any service member who participated in these tests is provided with appropriate evaluation and treatment if they have long-lasting health problems associated with these tests.

I've introduced legislation along with my friends Representative Michael Bilirakis of Florida and Senator Bill Nelson of Florida that would seek to provide relief and care for veterans who were involved in these and similar tests by requiring the DOD to release all relevant information.

After all, veterans have the right to know:

(1) What agents they were exposed to;
(2) What the lasting health effects are; and
(3) Where they can receive medical care.

They have the right to know and they should have known a long time ago.

The Department of Defense released new declassified information yesterday which for the first time describes testing done on American soil and overseas. Alaska, Florida, Hawaii, Maryland, Utah, Canada, and England were the locations used and DOD claims that civilians were only exposed to simulants. Keep in mind that some of these simulants are still live biological agents and may be harmful. It appears that not only were soldiers put at risk but the civilian population the DOD is charged with protecting may also have been put at risk.

SHAD and similar cases of chemical and biological testing on service members is an issue of trust and integrity. Our military personnel put their trust in our Government to protect them and our integrity has been compromised because nearly 40 years later we are still not protecting them. How can we expect the current generation of soldiers to put their lives on the line knowing that harm from the enemy may not be the only danger they encounter? Jack and other crewmembers are beginning or have already experienced health problems that may be associated with these tests. It is deplorable and inexcusable that the Department of Defense has taken

nearly 40 years to begin to release this information. That's why this hearing is important and I want to thank each of you on the committee for your commitment to seeking the truth. I am grateful to you and I know that the thousands of veterans who participated in these tests are also grateful.

Senator CLELAND. Just one question. Don't you think it's ironic that our Government is "exercised" now about sarin gas and VX chemical and biological agents being in the hands of Saddam Hussein that we're actually creating this whole worldwide focus on that, and yet it's been very difficult to pry out of this administration the real story about the use of sarin gas and VX on our own forces when they were committed to war in the Southeast Asian area? Don't you think that's the height of irony?

Mr. THOMPSON. Senator, I agree that it's the height of irony, and I think it's absolutely deplorable and inexcusable that for 40 years our Government has sat on this information.

What came out just recently is that 10 years ago the military released some of this information. The Veterans Administration and the Department of Defense knew 10 years ago that these veterans were exposed to this stuff, and there's been a 10-year period where nothing has been done. So not only has it been hidden for 40 years; the last 10 years of that somebody within these administrations knew that this was a problem, and still nothing was done—5,500 veterans that we know of, and now possibly civilians, exposed to, as you say, the same gases that we're creating such a fuss over right now.

Senator CLELAND. They're so exercised again about these biological and chemical weapons. Shouldn't they support our legislation to take care of our own troops that were exposed by our own Government to these agents?

Mr. THOMPSON. I don't think there should be a member in either body that's not a coauthor. I think it's pretty straightforward. It's very pro-veteran. It's very American. It opens the process so folks know what they were exposed to and what the health problems are and how they need to get the help.

Senator CLELAND. Thank you very much for your leadership.

Mr. THOMPSON. Thank you.

Senator CLELAND. Senator Nelson, do you have any comments to make to the Congressman before he leaves?

Senator BEN NELSON. Yes. Thank you, Mr. Chairman. I, too, want to thank Congressman Thompson for being here today and for his support and leadership in providing for this legislation.

I want to thank you, as well, Mr. Chairman, for your leadership. As a member of the Veterans' Affairs Committee, I've already heard testimony from my colleague, Senator Nelson from Florida, and others on this issue.

There's no question that the United States is a great country. The men and women who serve our country do so knowing that there are some risks. But one of the risks that they ought not to assume is exposure to chemicals or biological conditions that would be detrimental to their health that would come from our own country. We recognize that exposure can occur in military operations when we're fighting an enemy, but, in this case, it's very clear that the classification of this information was more to protect the U.S. Treasury, I think, and perhaps those that made the decisions, than

it was to protect the American people, and certainly those who were exposed.

I appreciate very much your efforts to hold this hearing today, as well as your support of this legislation. I look forward to further testimony.

Thank you very much, Mr. Chairman.

Senator CLELAND. Thank you, Senator Nelson. We should mention and underscore the fact, as you pointed out, that Senator Bill Nelson from Florida has been a champion here in this regard and one of the ones that called it to my attention, as well. Thank you very much for your presence today.

We welcome everyone to the hearing today to receive testimony regarding a series of chemical and biological tests that may have exposed service members to hazardous substances.

I'd like to thank everybody for attending. All of us are concerned about this. It's late in the session, as we know, but, as such, I'm pleased that we are able to schedule this hearing in the midst of a debate on Iraq and conference and consideration of the Defense Authorization and Appropriations bills.

Before we begin on SHAD, I just thought I'd mention the issue that is close to my heart and close to the hearts of veterans out there, especially those who spent 20 years or more in the American military and are retirees and also disabled in the service of their country. Of course, what we're talking about here today is disabling to those veterans, and we want to get to the bottom of it.

I'd like to discuss the issue of concurrent receipt. This important issue may be the last stumbling block in order to move forward on the Defense Authorization bill.

I believe that we, in Congress, must address this issue in this year's bill. It is my hope the President will reconsider his threat to veto the Defense Authorization bill over a provision that will have a positive impact on our military retirees and those who were wounded in the military.

We must take care of those who served our country and protected us. That's what this hearing is about. That's what concurrent receipt is about, the ability to collect your retirement if you put 20 years or more in the American military—and as we now know, that is no mean feat—and then to be able to collect your disability compensation if you happened to be disabled in the line of duty. It seems to me that's a no-brainer, just like the good Congressman suggested, that we ought to take care of those who take care of us, especially as we're now thinking about sending young Americans again into harm's way.

So we'd like now to get at the bottom of this issue of SHAD, Shipboard Hazard and Defense, testing. As many of you know, earlier this year the Department of Veterans Affairs, in cooperation with the Department of Defense, began sending letters to veterans all over the country alerting them that they may have been exposed to chemical and biological agents while serving in the Navy in the 1960s. As this story has become more and more public, we're starting to understand the facts with a little more clarity.

SHAD was conducted in the 1960s, the very moment that I and others were on the ground in Vietnam fighting the Vietnam War and coming and going into the Pacific. The SHAD projects were

part of a larger testing operation known as Project 112. Project 112 was a DOD research and testing project, but it was research and testing on our own people. It was so named because it was number 112 of Secretary McNamara's 150 management initiatives, God help us. It consolidated the oversight of all of DOD's chemical and biological testing into one central location, in the Deseret Test Center at Ft. Douglas, Utah.

Project 112 included 134 planned tests. DOD has indicated that, of those, 46 were conducted, 62 were cancelled, and 26 are still unknown. From what we've been told, there were a total of 34 planned projects associated with the SHAD program.

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 by these agents. Some of these tests used live chemical and biological agents. Some used chemical and biological simulants, as well as tracers and decontaminants.

The Department of Veterans Affairs has identified that some of the agents that were being used during SHAD were very risky. They include VX and sarin chemical nerve agents, Q-fever and rabbit-fever biological agents, and strains of E. coli as biological simulants. Most tests that involved exposure of service members used simulants, things believed not harmful to human beings and not live agents.

Yesterday, the Department of Defense released additional fact sheets on some of the tests that were part of SHAD and other tests conducted out of the Deseret Test Center. Without objection, these fact sheets will be included in the record.

[The information referred to follows:]

FACT SHEET

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Version 10-09-2002

Deseret Test Center

Watch Dog

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The main purpose of Watch Dog was to obtain viability decay rates of *Francisella tularensis* (wet and dry forms), *Serratia marcesens*, and *Escherichia coli.* and stabilized *Francisella tularensis* animal infectivity data in a summer temperate environment. Six trials were conducted to measure the infectivity to monkeys in temperate environments using wet *Francisella tularensis*. The remaining trials determined biological decay rates for *Francisella tularensis* (wet and dry), *Serratia marcesens* and *Escherichia coli* in an environment considered analogous to the temperate humid areas of the northern hemisphere during the summer.

All of the Watch Dog trials were conducted in the area of Delta Creek in central Alaska near Fort Greely. The test was conducted in the summer of 1967.

Test Name	Watch Dog (DTC Test 67-8)
Testing Organization	US Army Deseret Test Center
Test Dates	Summer 1967
Test Location	Delta Creek area of central Alaska, near Fort Greely
Test Operations	To obtain biological decay rates on *Francisella tularensis* (wet and dry form), *Escherichia coli*, and *Serratia marcesens* in a summer temperate environment.
Participating Services	US Army, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Not Identified
Agents, Simulants, Tracers	*Bacillus globigii* *Serratia marcescens* *Escherichia coli* *Francisella tularensis* (wet) (TT) *Francisella tularensis* (dry) (ZZ)
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	*Bacillus globigii* (BG) Now considered to be *Bacillus subtilis var. niger*, a close relative of *Bacillus subtilis*, this bacterial species was used as a simulant and considered harmless to healthy individuals. *Bacillus subtilis* and similar *Bacillus* species are common in the environment, and are uncommon causes of disease. They have been associated with acute infections of the ear, meninges (brain lining), urinary tract, lung, heart valve, bloodstream, and other body sites, but always or nearly always in individuals whose health has already been compromised. Long-term or late-

	developing health effects would be very unlikely (except perhaps as a complication of the acute infection). (Sources: Tuazon CU, Other Bacillus Species (chap. 197), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2220-6; US Environmental Protection Agency, Bacillus subtilis Final Risk Assessment, February 1997, available at http://www.epa.gov as of October 4, 2002.) *Serratia marcescens* (SM) This bacterial species can cause acute infections of the urinary tract, lung, bloodstream, and other body sites. These infections commonly occur in individuals whose health has already been compromised, and often in patients who are already hospitalized. Long-term or late-developing health effects would be very unlikely. (Source: Eisenstein, Barry I., Zaleznik, Dori F., Enterobacteriaceae (chap. 206), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2303.) *Escherichia coli*, or *E. Coli* (EC) This bacterial species is a common inhabitant of the digestive tract but can also cause acute infection, especially when it gains access to other body sites, like the urinary tract, lung, and bloodstream. Long-term or late-developing health effects of E. coli infection would be unlikely.

	(Source: Eisenstein, Barry I., Zaleznik, Dori F., Enterobacteriaceae (chap. 206), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2299-301.) *Francisella tularensis* (TT and ZZ) Formerly identified as Pasteurella tularensis, this bacterial species can cause acute infection of the lung, bloodstream, and other body sites (tularemia), and is considered a potential biological warfare agent. While complications of the acute infection may be serious, even life threatening, long-term or late-developing health effects would be very unlikely. (Sources: Cross, J. Thomas Jr., Penn, Robert L., Francisella tularensis (Tularemia) (chap. 216), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2393-2402; and Dennis DT, Inglesby TV, Henderson DA, et al. Tularemia as a biological weapon; medical and public health management. JAMA 2001;285(21):2763-73.)

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Deseret Test Center

Red Cloud

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The main purpose of Red Cloud was to obtain biological decay rate and animal infectivity data on aerosols of *Francisella tularensis* (wet and dry forms) disseminated in a frigid field environment. Measurements of the infectivity to monkeys were made at extremely low ambient temperatures; determinations were also made for biological decay rates of *Francisella tularensis* (wet and dry), *Serratia marcesens* and *Escherichia coli.*

M143 bomblets were projected from a tower-mounted gun into a wintertime spruce forest simulating an operational drop. E26 and M32 dissemination devices were also used to disseminate aerosols for biological decay rate measurements. The liquid biologicals *Francisella tularensis*, *Serratia marcescens*, and *Escherichia coli* were released from E26 disseminators as an intermix with *Bacillus globigii*. Sampling crews were stationed in pressurized safety citadels at predetermined intervals, downwind of the agent release line to facilitate immediate assay of samples in an area free of background contamination.

Prior to conducting Red Cloud in the Tanana Valley, the Deseret Test Center had conducted a Special Study, Alaska, which was a preliminary field effort with vegetative, nonpathogenic bacteria to prepare for future tests with pathogenic vegetative bacteria at the Alaskan site. A DTC advisory committee concurred in the proposed method of pathogen testing, subject to certain restrictions on agent dissemination. These restrictions limited the amount of agent dissemination for each field trial to preclude possible travel of agent pathogens over inhabited areas of the valley.

Testing began in late November 1966 and was completed in mid-February 1967. All of the field trials were conducted in the Tanana Valley of central Alaska, near Fort Greely.

RED CLOUD
3-3-3-3

Test Name	Red Cloud (DTC Test 67-7)
Testing Organization	US Army Deseret Test Center
Test Dates	November 1966 – February 1967
Test Location	Tanana Valley of central Alaska, near Fort Greely
Test Operations	To obtain biological decay rates on *Francisella tularensis* (wet and dry form), *Escherichia coli*, and *Serratia marcesens* in a sub-zero overland environment.
Participating Services	US Army, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	M143 bomblets were projected from a tower-mounted gun into a wintertime spruce forest simulating an operational drop. E26 and M32 dissemination devices were also used to disseminate aerosols for biological decay rate measurements.
Agents, Simulants, Tracers	*Bacillus globigii* *Serratia marcescens* *Escherichia coli* *Francisella tularensis* (wet) (TT) *Francisella tularensis* (dry) (ZZ)
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	*Bacillus globigii (BG)* Now considered to be *Bacillus subtilis var. niger*, a close relative of *Bacillus subtilis*, this bacterial species was used as a simulant and considered harmless to healthy individuals. *Bacillus subtilis* and similar *Bacillus* species are common in the environment, and are uncommon causes of disease.

	They have been associated with acute infections of the ear, meninges (brain lining), urinary tract, lung, heart valve, bloodstream, and other body sites, but always or nearly always in individuals whose health has already been compromised. Long-term or late-developing health effects would be very unlikely (except perhaps as a complication of the acute infection). (Sources: Tuazon CU, Other Bacillus Species (chap. 197), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2220-6; US Environmental Protection Agency, Bacillus subtilis Final Risk Assessment, February 1997, available at http://www.epa.gov as of October 4, 2002.) *Serratia marcescens* (SM) This bacterial species can cause acute infections of the urinary tract, lung, bloodstream, and other body sites. These infections commonly occur in individuals whose health has already been compromised, and often in patients who are already hospitalized. Long-term or late-developing health effects would be very unlikely. (Source: Eisenstein, Barry I., Zaleznik, Dori F., Enterobacteriaceae (chap. 206), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2303.) *Escherichia coli*, or *E. Coli* (EC) This bacterial species is a common inhabitant of the digestive tract but can also cause acute infection, especially when it gains access to other body sites, like the urinary tract, lung, and bloodstream. Long-

	term or late-developing health effects of *E. coli* infection would be unlikely. (Source: Eisenstein, Barry I., Zaleznik, Dori F., Enterobacteriaceae (chap. 206), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2299-301.) *Francisella tularensis* (TT and ZZ) Formerly identified as *Pasteurella tularensis*, this bacterial species can cause acute infection of the lung, bloodstream, and other body sites (tularemia), and is considered a potential biological warfare agent. While complications of the acute infection may be serious, even life threatening, long-term or late-developing health effects would be very unlikely. (Sources: Cross, J. Thomas Jr., Penn, Robert L., Francisella tularensis (Tularemia) (chap. 216), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2393-2402; and Dennis DT, Inglesby TV, Henderson DA, et al. Tularemia as a biological weapon; medical and public health management. JAMA 2001;285(21):2763-73.)

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Rapid Tan I, II, III

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

Deseret Test Center Test 68-13 (Rapid Tan I, II, III) was a joint U.S., U.K., and Canadian program designed to investigate the extent and duration of hazard following a Tabun, Soman or V nerve agent attack. Phases I and III trials involving agents Tabun, Sarin, Soman and VX spray in both open grassland and wooded terrain were conducted at the Chemical Defence Establishment, Porton Down, England. Both Tabun and Soman spray and munition (Soman-filled) trials (Phase II) were conducted at the Suffield Defence Research Establishment, Ralston, Canada.

The purpose of the Rapid Tan I, II, III tests was to obtain rate-of-vapor return data for agents Tabun and Soman when sprayed on different terrain types in a summer (temperate) environment. Sarin and VX trials were also conducted to strengthen confidence in the Tabun and Soman data by allowing comparisons of data from Sarin and VX munition tests conducted in the same environment.

The weapons systems germane to this test were explosive munitions (Soman-filled), aircraft spray, rain-type munitions (using both Tabun and Soman), and massive bombs (Tabun- and Soman-filled).

DTC Test 68-13 trials were conducted during three time periods: July – August 1967; May – June 1968; and, August – September 1968.

Test Name	Rapid Tan I, II, III (DTC Test 68-13)
Testing Organization	US Army Deseret Test Center
Test Dates	Jul – Aug 1967; May – Jun 1968; Aug – Sep 1968
Test Location	Chemical Defence Establishment, Porton Down, England (Phases I and III) Suffield Defence Research Establishment, Ralston, Canada (Phase II)
Test Operations	To determine rate of evaporation of Tabun, Sarin, Soman, and VX as a function of contamination density, drop size, and terrain cover under a variety of meteorological conditions in a temperate environment.
Participating Services	Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Agent was disseminated using 155mm Howitzer shells (Soman-filled) and a crop sprayer to simulate agent dissemination from aircraft, rain type munitions, and massive bomb dissemination.
Agents, Simulants, Tracers	Sarin Nerve Agent Soman Nerve Agent Tabun Nerve Agent VX Nerve Agent
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Sarin Nerve Agent (GB) Sarin gas is a volatile and lethal nerve agent. It can enter the body by inhalation, ingestion, through the eyes, and to a lesser extent through the skin. After exposure to a sufficient dose, human symptoms may occur within minutes and include runny nose, watery

	eyes, difficulty breathing, dimness of vision, confusion, drowsiness, coma, and death. Very little information is available regarding long-term health effects following exposures to low levels that do not cause acute symptoms. No information is available regarding potential carcinogenicity. An Institute of Medicine committee concluded that there was insufficient evidence for or against an association between low-level sarin exposure and long-term health effects. (Sources: http://www.bt.cdc.gov/Agent/Nerve/Sarin/Sarin.asp [as of February 13, 2002] Institute of Medicine (National Academies), Gulf War and Health (vol.1): Depleted Uranium, Pyridostigmine Bromide, Sarin, Vaccines. National Academy Press, Washington DC, 2000.) Soman Nerve Agent (GD) Soman is a colorless liquid, which gives off an odor of rotting fruit when vaporizing. The vapor is colorless. Soman is a persistent agent that can easily remain in a particular area for a day or longer, depending on the atmospheric conditions. Acute health effects associated with exposure to soman include a runny nose, tightness in the chest, constriction of the pupils, difficulty in breathing, coma, and death. There is little information available regarding the long-term human health effects of exposure to soman. (Source: http://www.sbccom.army.mil/services/edu/soman.htm Zajtchuk R (ed.), Textbook of Military Medicine (part 1, Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997.)

	Tabun Nerve Agent (GA) Tabun is an amber, non-persistent liquid, which gives off little odor when vaporizing. The vapor is colorless. When exposed to tabun, the symptoms a victim will experience include a runny nose, tightness in the chest, constriction of the pupils, difficulty breathing, and nausea. Ultimately the victim will become comatose and will suffocate as a consequence of convulsive spasms. Tabun is mainly absorbed through the skin; however, vapors can also be hazardous. If a person does not receive an immediately lethal dose, death will occur after approximately 20 minutes. Those receiving a less than lethal dose who do not receive immediate medical care may suffer permanent neurological damage. There is little information available regarding the long-term human health effects of exposure to low doses of tabun. (Source: http://www.sbccom.army.mil/services/edu/tabun.htm Zajtchuk R (ed.), Textbook of Military Medicine (part 1, Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997. VX Nerve Agent – (Synonyms: Phosphonothioic acid, VX) VX nerve agent is extremely lethal. It is an oily liquid that is clear, odorless, and tasteless. Death usually occurs within 10-15 minutes after absorption of a fatal dosage. VX nerve agent is one of the most toxic substances ever synthesized. Symptoms of overexposure may occur within minutes or hours, depending upon the dose. They include: constriction of pupils, headaches, runny nose, salivation, tightness in the chest, nausea, vomiting, anxiety, difficulty in thinking, muscle twitches, tremors, and weakness. With severe exposure, symptoms

	progress to convulsions and respiratory failure. There is little information available regarding the long-term human health effects of exposure to low doses of VX. (Sources: Centers for Disease Control and Prevention http://www.bt.cdc.gov/Agent/Nerve/VX/ctc0006.asp [as of January 25, 2002]Zajtchuk R (ed.), Textbook of Military Medicine (part 1, Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997. SBCCOM Online, Edgewood Chemical Biological Center http://in1.apgea.army.mil:80/RDA/msds/vx.htm [as of April 2, 2002] World Health Organization, Department of Sustainable Development & Environmental Protection, http://209.61.192.180/phe/factsheet_5.htm [as of April 2, 2002] Department of the Army Pamphlet 40-8: Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX http://books.army.mil:80/cgi-bin/bookmgr/BOOKS/P40_8/CCONTENTS [as of February 5, 2002])

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Pine Ridge

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The purposes of Pine Ridge were to ascertain the percentage of BLU-19/B23 and BLU-20/B23 bomblets that function and to determine their dissemination points in or below a jungle canopy; to determine area-time-dosage and diffusion characteristics of agent BZ and Sarin nerve agent when disseminated from single bomblets; and, to estimate the effective area coverage that could be expected if agent BZ and Sarin nerve agent were disseminated from single or multiple SUU-13/A dispenser loads. A secondary objective was to determine any peculiar handling, storage, or safety requirements associated with BLU-19/B23 or BLU-20/B23 bomblets.

BZ is a code name for an ester of benzilic acid. The chemical affects the human mind causing those contaminated to be unable to perform an assignment or have a reduced will to resist for a short period of time. Sarin is a volatile and lethal nerve agent.

PINE RIDGE
2-2-2-2

Sarin filled BLU-19/B23 and BZ filled BLU-20/B23 bomblets were detonated in test areas in the upper Waiakea Forest Reserve and in the Olaa Forest Preserve, southwest of Hilo, on the island of Hawaii in May and June 1966.

PINE RIDGE
3-3-3-3

Test Name	Pine Ridge (DTC Test 65-16)
Testing Organization	US Army Deseret Test Center
Test Dates	May – June 1966
Test Location	Island of Hawaii
Test Operations	To evaluate the effectiveness of the BLU-19/B23 Sarin-filled bomblet and the BLU20/B23 agent BZ-filled bomblet in a tropical rain forest.
Participating Services	US Air Force, US Navy, US Army, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Bomblets were projected with an airgun to determine burst height and static detonations were used for area-time-dosage determinations.
Agents, Simulants, Tracers	Ester of benzilic acid (BZ) Sarin Nerve Agent
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Ester of benzilic acid (Agent BZ) This chemical is an incapacitating agent designed to cause stupor, confusion, and hallucinations when inhaled or absorbed through the skin. It is a white powder and may irritate the eyes, skin, and digestive and respiratory tracts, if inhaled or ingested. While some effects may last several days or weeks, long-term or late-developing health effects have not been documented and seem unlikely. (Source: Incapacitating Agents (chap. 5), in US Army Medical Research Institute of Chemical Defense, Medical Management of Chemical

	Casualties Handbook, 3rd edition, 1998; Ketchum JS, Sidell FR Incapacitating Agents (chap. 11), in ed. Zajtchuk R., Textbook of Military Medicine (part 1), Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997. http://www.fas.org/nuke/guide/russia/cbw/jptac008_194001.html [as of September 25, 2002].) Sarin Nerve Agent (GB) Sarin gas is a volatile and lethal nerve agent. It can enter the body by inhalation, ingestion, through the eyes, and to a lesser extent through the skin. After exposure to a sufficient dose, human symptoms may occur within minutes and include runny nose, watery eyes, difficulty breathing, dimness of vision, confusion, drowsiness, coma, and death. Very little information is available regarding long-term health effects following exposures to low levels that do not cause acute symptoms. No information is available regarding potential carcinogenicity. An Institute of Medicine committee concluded that there was insufficient evidence for or against an association between low-level sarin exposure and long-term health effects. (Sources: http://www.bt.cdc.gov/Agent/Nerve/Sarin/Sarin.asp [as of February 13, 2002]Institute of Medicine (National Academies), Gulf War and Health (vol.1): Depleted Uranium, Pyridostigmine Bromide, Sarin, Vaccines. National Academy Press, Washington DC, 2000.)

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Deseret Test Center

West Side, Phase I

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The purpose of West Side, Phase I was to evaluate the A/B 45Y-4 dry agent disseminator in a frigid environment. The A/B 45Y-4 was wing-mounted on an F-105D aircraft. Specifically, the objectives of the test were to evaluate the source strength, dissemination efficiency, and functional characteristics of the dry disseminator with the simulant *Bacillus globigii*, and to measure the diffusion of particulate biological aerosols disseminated by line source in a cold-weather test environment. To aid this investigation, two tracer materials – green and yellow zinc cadmium sulfide (FP) – were disseminated from a light aircraft under similar test conditions.

West Side, Phase I was conducted in the Tanana Valley of central Alaska, near Fort Greely, during the period January 8 through February 21, 1965.

WEST SIDE I
2-2-2-2

Test Name	West Side, Phase I (DTC Test 65-3)
Testing Organization	US Army Deseret Test Center
Test Dates	January 8 – February 21, 1965
Test Location	Tanana Valley of central Alaska near Fort Greely
Test Operations	To evaluate the A/B 45Y-4 dry agent disseminator in a frigid environment.
Participating Services	US Army, US Air Force, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Tracer material sprayed from an A/B 45Y 4 disseminator tank mounted on an F 105D aircraft.
Agents, Simulants, Tracers	*Bacillus globigii* Zinc Cadmium Sulfide (FP)
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	*Bacillus globigii* (BG) Now considered to be *Bacillus subtilis var. niger,* a close relative of *Bacillus subtilis*, this bacterial species was used as a simulant and considered harmless to healthy individuals. *Bacillus subtilis* and similar *Bacillus* species are common in the environment, and are uncommon causes of disease. They have been associated with acute infections of the ear, meninges (brain lining), urinary tract, lung, heart valve, bloodstream, and other body sites, but always or nearly always in individuals whose health has already been compromised. Long-term or late-developing health effects would be very unlikely (except perhaps as a complication of the acute infection).

	(Sources: Tuazon CU, *Other Bacillus Species* (chap. 197), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2220-6; US Environmental Protection Agency, *Bacillus subtilis* Final Risk Assessment, February 1997, available at http://www.epa.gov as of October 4, 2002.) Zinc cadmium sulfide (ZCdS) This compound was aerosolized as a tracer material for the dispersion of biological warfare agents because it had similar properties. There has been little scientific study on the toxicity of this compound when inhaled. A National Research Council (NRC) committee focused on the cadmium component as potentially most toxic. While higher concentrations and more prolonged exposures to cadmium are associated with the development of lung cancer, the concentrations and durations of exposure in the Army's tests were substantially lower. The NRC committee concluded that the risk of adverse health effects to populations in the area was low. (Sources: National Research Council (National Academies), Toxicologic Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests, and Toxicologic Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests: Answers to Commonly Asked Questions, National Academy Press, Washington DC, 1997, both available at http://www.nap.edu as of October 1, 2002.)

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Swamp Oak

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1975.

The objective of Swamp Oak was to determine area-time-dosage relationships as a function of burst height and agent diffusion characteristics, within subarctic forested areas, for Sarin nerve agent-filled artillery munitions in temperatures ranging from -1°C to -18°C.

Sarin nerve agent-filled M121A1 (155mm) artillery shells were detonated statically and singly in a coniferous forest under winter conditions. To simulate an air burst, the shell was suspended using a cable, a hoist, and a special strap-steel sling.

Swamp Oak trials were conducted during March and April 1966 at the Gerstle River test site near Fort Greely, Alaska.

SWAMP OAK
2-2-2-2

Test Name	Swamp Oak (DTC Test 66-3)
Testing Organization	US Army Deseret Test Center
Test Dates	March - April 1966
Test Location	Gerstle River test site, near Fort Greely, Alaska
Test Operations	To determine time-area-dosage relationships as a function of burst height and agent diffusion characteristics, within subarctic forested areas, for Sarin nerve agent-filled artillery munitions in temperatures ranging from -1°C to -18°C.
Participating Services	US Army, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Sarin nerve agent-filled M121A1 (155mm) artillery shells were statically and singly detonated in a coniferous forest under winter conditions.
Agents, Simulants, Tracers	Sarin Nerve Agent
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Sarin Nerve Agent (GB) Sarin gas is a volatile and lethal nerve agent. It can enter the body by inhalation, ingestion, through the eyes, and to a lesser extent through the skin. After exposure to a sufficient dose, human symptoms may occur within minutes and include runny nose, watery eyes, difficulty breathing, dimness of vision, confusion, drowsiness, coma, and death. Very little information is available regarding long-term health effects following exposures to low levels that do not cause acute symptoms. No information is available regarding potential carcinogenicity. An Institute of Medicine committee concluded that there was insufficient evidence for or against an association

	between low-level sarin exposure and long-term health effects. (Sources: http://www.bt.cdc.gov/Agent/Nerve/Sarin/Sarin.asp [as of February 13, 2002] Institute of Medicine (National Academies), Gulf War and Health (vol.1): Depleted Uranium, Pyridostigmine Bromide, Sarin, Vaccines. National Academy Press, Washington DC, 2000.)

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Deseret Test Center

West Side, Phase II

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The purpose of West Side, Phase II was to evaluate the area coverage capabilities of the A/B 45-Y-4/F-105 powdered agent dissemination system as used operationally over a northern open plains region during cold weather. Twelve trials were conducted in which both *Bacillus globigii* and zinc cadmium sulfide (FP) were simultaneously disseminated, each from separate, wing-mounted Y-4 disseminators on an F-105 aircraft. A second release of FP of a different fluorescent color was made by a contractor aircraft immediately after the dissemination run by the F-105. The contractor aircraft, a JHC-47, and EW-2 disseminator released FP both above and below the inversion top to measure its influence on aerosol travel.

The Canadian government permitted three flight paths for the dissemination of tracers. These flight paths and the corresponding trajectories of aerosol travel were selected to preclude travel of simulants and tracers over heavily populated areas, or over the inhabited areas of Suffield Experimental Station.

WEST SIDE, PHASE II

2-2-2-2

West Side, Phase II was conducted in the Great Plains Region of central Canada, with the test area extending north and east from the Suffield Experimental Station, southern Alberta Province, and into southwestern Saskatchewan. The testing period extended from January 5 through March 7, 1965.

WEST SIDE, PHASE II
3-3-3-3

Test Name	West Side, Phase II (DTC Test 66-8)
Testing Organization	US Army Deseret Test Center
Test Dates	January 5 – March 7, 1965
Test Location	Great Plains Region of Central Canada, north and east of the Suffield Experimental Station, southern Alberta Province, and into southwestern Saskatchewan
Test Operations	To evaluate the area coverage capability of an airborne dry agent dissemination system when operated in a frigid environment.
Participating Services	US Air Force, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Simulant and tracer material sprayed from an AB 45-Y4 powdered agent disseminator mounted on an F-105 aircraft. Tracer material was also disseminated above and below the inversion layer using an EW-2 disseminator mounted on a contractor-operated JHC-47 aircraft.
Agents, Simulants, Tracers	*Bacillus globigii* Zinc Cadmium Sulfide (FP)
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	*Bacillus globigii* (BG) Now considered to be *Bacillus subtilis var. niger*, a close relative of *Bacillus subtilis*, this bacterial species was used as a simulant and considered harmless to healthy individuals. *Bacillus subtilis* and similar *Bacillus* species are common in the environment, and are uncommon causes of disease. They have been associated with acute infections of

	the ear, meninges (brain lining), urinary tract, lung, heart valve, bloodstream, and other body sites, but always or nearly always in individuals whose health has already been compromised. Long-term or late-developing health effects would be very unlikely (except perhaps as a complication of the acute infection). (Sources: Tuazon CU, Other Bacillus Species (chap. 197), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2220-6; US Environmental Protection Agency, Bacillus subtilis Final Risk Assessment, February 1997, available at http://www.epa.gov as of October 4, 2002.) Zinc cadmium sulfide (ZCdS) This compound was aerosolized as a tracer material for the dispersion of biological warfare agents because it had similar properties. There has been little scientific study on the toxicity of this compound when inhaled. A National Research Council (NRC) committee focused on the cadmium component as potentially most toxic. While higher concentrations and more prolonged exposures to cadmium are associated with the development of lung cancer, the concentrations and durations of exposure in the Army's tests were substantially lower. The NRC committee concluded that the risk of adverse health effects to populations in the area was low. (Sources: National Research Council (National Academies), Toxicologic Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests, and Toxicologic Assessment of the Army's Zinc

	Cadmium Sulfide Dispersion Tests: Answers to Commonly Asked Questions, National Academy Press, Washington DC, 1997, both available at http://www.nap.edu as of October 1, 2002.)

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Sun Down

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The purpose of Sun Down was to evaluate simulant and sarin-filled BLU-19/B23 bomblets in forested and open terrain with snow cover at temperatures between -18°C and -1°C.

Trials were conducted using BLU-19/B23 bomblets filled with methylacetoacetate, tiara, and sarin nerve agent. Bomblets filled with methylacetoacetate were both statically detonated under snow and projected into an open, snow-covered area to determine their depth of detonation in the snow. Bomblets filled with tiara were fired into a spruce forest to determine height of detonation. Five sarin-filled BLU-19/B23 bomblets were statically detonated.

Sun Down was conducted at the Gerstle River test site on Fort Greely, Alaska during February and April 1966.

SUN DOWN
2-2-2-2

Test Name	Sun Down (DTC Test 65-11)
Testing Organization	US Army Deseret Test Center
Test Dates	February, April 1966
Test Location	Gerstle River test site, Fort Greely, Alaska
Test Operations	To evaluate the simulant and sarin-filled BLU-19/B23 bomblet in forested and open terrain with snow cover at temperatures between -18°C and -1°C.
Participating Services	US Army, Desert Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Bomblets were statically detonated as well as projected into the open to determine depth and height of detonations.
Agents, Simulants, Tracers	Sarin Nerve Agent Methylacetoacetate Tiara
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Sarin Nerve Agent (GB) Sarin gas is a volatile and lethal nerve agent. It can enter the body by inhalation, ingestion, through the eyes, and to a lesser extent through the skin. After exposure to a sufficient dose, human symptoms may occur within minutes and include runny nose, watery eyes, difficulty breathing, dimness of vision, confusion, drowsiness, coma, and death. Very little information is available regarding long-term health effects following exposures to low levels that do not cause acute symptoms. No information is available regarding potential carcinogenicity. An Institute of

	Medicine committee concluded that there was insufficient evidence for or against an association between low-level sarin exposure and long-term health effects. (Sources: http://www.bt.cdc.gov/Agent/Nerve/Sarin/Sarin.asp [as of February 13, 2002]Institute of Medicine (National Academies), Gulf War and Health (vol.1): Depleted Uranium, Pyridostigmine Bromide, Sarin, Vaccines. National Academy Press, Washington DC, 2000.) Methylacetoacetate (MAA) This compound was used as a simulant. While acute exposure has been associated with irritation of skin, eyes, respiratory tract, and digestive tract, there is little or no evidence of long-term or late-developing health effects and it is not known to cause cancer in animal testing. (Sources: NLM TOXNET, Methyl acetoacetate 105-45-3, HSDB Human Health Effects and Animal Toxicity Studies, available at http://toxnet.nlm.nih.gov.http://hazard.com/msds/tox/f/q4/q936.html [as of January 28, 2002] and http://www.hbcollege/chem/lab/organic/gilbert3e/resources/studenttools/dl/e_mmsds.pdf) Tiara is a luminescent gelatinous material. No further information is available on this substance.

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Whistle Down

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

Whistle Down was primarily an investigation of the existence, nature, and extent of the hazard from Sarin nerve agent and VX nerve agent on environmental clothing, snow, and frozen ground.

Manikins dressed in arctic clothing and white camouflage overgarments were exposed downwind of the burst of Sarin-filled munitions as well as downwind of a detonated VX-filled M23 land mine.

Whistle Down was conducted at the Gerstle River test site, Fort Greely, Alaska, from December 1, 1962 to February 5, 1963.

Test Name	Whistle Down (DTC Test 63-3)
Testing Organization	US Army Deseret Test Center
Test Dates	December 1, 1962 – February 5, 1963
Test Location	Gerstle River test site, Fort Greely, Alaska
Test Operations	To investigate the existence, nature, and extent of the hazard from Sarin and VX nerve agents on environmental clothing, snow, and frozen ground.
Participating Services	US Army, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Sarin-filled M55 rockets and M121 155mm shells,and VX-filled M23 land mines were remotely detonated.
Agents, Simulants, Tracers	Sarin Nerve Agent, VX Nerve Agent
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Sarin Nerve Agent (GB) Sarin gas is a volatile and lethal nerve agent. It can enter the body by inhalation, ingestion, through the eyes, and to a lesser extent through the skin. After exposure to a sufficient dose, human symptoms may occur within minutes and include runny nose, watery eyes, difficulty breathing, dimness of vision, confusion, drowsiness, coma, and death. Very little information is available regarding long-term health effects following exposures to low levels that do not cause acute symptoms. No information is available regarding potential carcinogenicity. An Institute of Medicine committee concluded that there was insufficient evidence for or against an association between low-level sarin exposure and long-term

	health effects. (Sources: http://www.bt.cdc.gov/Agent/Nerve/Sarin/Sarin.asp [as of February 13, 2002] Institute of Medicine (National Academies), Gulf War and Health (vol.1): Depleted Uranium, Pyridostigmine Bromide, Sarin, Vaccines. National Academy Press, Washington DC, 2000.) VX Nerve Agent – (Synonyms: Phosphonothioic acid, VX) VX nerve agent is extremely lethal. It is an oily liquid that is clear, odorless, and tasteless. Death usually occurs within 10 15 minutes after absorption of a fatal dosage. VX nerve agent is one of the most toxic substances ever synthesized. Symptoms of overexposure may occur within minutes or hours, depending upon the dose. They include: constriction of pupils, headaches, runny nose, salivation, tightness in the chest, nausea, vomiting, anxiety, difficulty in thinking, muscle twitches, tremors, and weakness. With severe exposure, symptoms progress to convulsions and respiratory failure. There is little information available regarding the long-term human health effects of exposure to low doses of VX. (Sources: Centers for Disease Control and Prevention http://www.bt.cdc.gov/Agent/Nerve/VX/ctc0006.asp [as of January 25, 2002] Zajtchuk R (ed.), Textbook of Military Medicine (part 1, Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997. SBCCOM Online, Edgewood Chemical Biological Center http://in1.apgea.army.mil:80/RDA/msds/vx.htm [as of April 2, 2002]

	World Health Organization, Department of Sustainable Development & Environmental Protection, http://209.61.192.180/phe/factsheet_5.htm [as of April 2, 2002] Department of the Army Pamphlet 40-8: Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX http://books.army.mil:80/cgi-bin/bookmgr/BOOKS/P40_8/CCONTENTS [as of February 5, 2002])

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Deseret Test Center

Tall Timber

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The purpose of Tall Timber was to test the effectiveness of the M138 bomblet filled with agent BZ in a tropical forested environment. BZ is a code name for an ester of benzilic acid. The chemical affects the human mind causing those contaminated to be unable to perform an assignment or have a reduced will to resist for a short period of time.

M138 bomblets filled with agent BZ were statically-ignited in a test area in the upper Waiakea Forest Reserve, southwest of Hilo, on the island of Hawaii during the period April through June 1966.

TALL TIMBER
2-2-2-2

Test Name	Tall Timber (DTC Test 64-8)
Testing Organization	US Army Deseret Test Center
Test Dates	April – June 1966
Test Location	Island of Hawaii
Test Operations	To test the effectiveness of the BZ-agent filled M138 bomblet in a tropical forested environment.
Participating Services	Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Statically-ignited M138 bomblets filled with agent BZ
Agents, Simulants, Tracers	Ester of benzilic acid (BZ)
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Ester of benzilic acid (Agent BZ) This chemical is an incapacitating agent designed to cause stupor, confusion, and hallucinations when inhaled or absorbed through the skin. It is a white powder and may irritate the eyes, skin, and digestive and respiratory tracts, if inhaled or ingested. While some effects may last several days or weeks, long-term or late-developing health effects have not been documented and seem unlikely. (Source: Incapacitating Agents (chap. 5), in US Army Medical Research Institute of Chemical Defense, Medical Management of Chemical Casualties Handbook, 3rd edition, 1998; Ketchum JS, Sidell FR Incapacitating Agents (chap. 11), in ed. Zajtchuk R., Textbook of Military Medicine (part 1), Medical Aspects of Chemical and Biological

	Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997. http://www.fas.org/nuke/guide/russia/cbw/jptac008_194001.html [as of September 25, 2002].)

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Deseret Test Center

Night Train

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The primary purpose of Night Train was to study the penetration of an arctic inversion by a biological aerosol cloud. A secondary purpose was to study the downwind travel and diffusion of this cloud when disseminated into different arctic meteorological regimes.

A total of 14 trials were conducted in which the biological simulant *Bacillus globigii* was released from an A/B45Y-1 spray tank carried on an F-105 or F-100 aircraft. Four trials were surface trials in which dry *Bacillus globigii* was disseminated from the rear of a moving, M116 Personnel Carrier. In addition, biological release was accompanied by the release of two colors (yellow and green) of fluorescent particles of zinc cadmium sulfide. The fluorescent particles were released from contractor-flown aircraft. The yellow fluorescent particles were disseminated from an Aero Commander aircraft; the green fluorescent particles from a Cessna 180.

Night Train was conducted in the vicinity of Fort Greely, Alaska during the period November 30, 1963 to January 8, 1964.

The Department of Defense (DoD) is providing this information, at the request of the Department of Veterans Affairs (VA), to assist the VA in providing healthcare services to qualified veterans and to assist veterans in establishing service connection for disability claims. The Deployment Health Support Directorate (DHSD) collected this information from multiple sources and requested that the military services declassify it to allow its public distribution. The VA accepts this information provided on location, dates, units and/or ships, and substances involved in this exercise, which DHSD extracted from classified DoD records, and will provide it to individual veterans as necessary, but the VA cannot verify its accuracy.

NIGHT TRAIN
2-2-2-2

Test Name	Night Train (DTC Test 64-5)
Testing Organization	US Army Deseret Test Center
Test Dates	November 30, 1963 – January 8, 1964
Test Location	Near Fort Greely, Alaska
Test Operations	To obtain data on the downwind travel of a biological agent simulant under arctic conditions, when disseminated from the A/B 45Y-1 wet biological spray tank mounted on an operational aircraft and when sprayed from a tracked vehicle mounted dissemination device.
Participating Services	US Army, US Air Force, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Biological simulant *Bacillus globigii* was released from an A/B45Y-1 spray tank carried on an F-105 or F-100 aircraft. In surface trials, *Bacillus globigii* was disseminated from the rear of a moving, tracked vehicle. Fluorescent particles were released from contractor-flown aircraft (Aero Commander - yellow particles and Cessna 180 - green particles).
Agents, Simulants, Tracers	*Bacillus globigii,* Zinc Cadmium Sulfide
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	*Bacillus globigii* (BG) Now considered to be *Bacillus subtilis var. niger,* a close relative of *Bacillus subtilis*, this bacterial species was used as a simulant and considered harmless to healthy individuals. *Bacillus subtilis* and similar *Bacillus* species are common in the

	environment, and are uncommon causes of disease. They have been associated with acute infections of the ear, meninges (brain lining), urinary tract, lung, heart valve, bloodstream, and other body sites, but always or nearly always in individuals whose health has already been compromised. Long-term or late-developing health effects would be very unlikely (except perhaps as a complication of the acute infection). (Sources: Tuazon CU, *Other Bacillus Species* (chap. 197), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2220-6; US Environmental Protection Agency, *Bacillus subtilis* Final Risk Assessment, February 1997, available at http://www.epa.gov as of October 4, 2002.) Zinc cadmium sulfide (ZCdS) This compound was aerosolized as a tracer material for the dispersion of biological warfare agents because it had similar properties. There has been little scientific study on the toxicity of this compound when inhaled. A National Research Council (NRC) committee focused on the cadmium component as potentially most toxic. While higher concentrations and more prolonged exposures to cadmium are associated with the development of lung cancer, the concentrations and durations of exposure in the Army's tests were substantially lower. The NRC committee concluded that the risk of adverse health effects to populations in the area was low. (Sources: National Research Council (National Academies), Toxicologic Assessment of the Army's

	Zinc Cadmium Sulfide Dispersion Tests, and Toxicologic Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests: Answers to Commonly Asked Questions, National Academy Press, Washington DC, 1997, both available at http://www.nap.edu as of October 1, 2002.)

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Deseret Test Center
Project SHAD

High Low

Project Shipboard Hazard and Defense (SHAD) was part of the joint service chemical and biological warfare test program conducted during the 1960s. Project SHAD encompassed tests designed to identify US warships' vulnerabilities to attacks with chemical or biological warfare agents and to develop procedures to respond to such attacks while maintaining a war-fighting capability.

The primary purpose of the High Low test was to assess the vulnerability of ships to an enveloping cloud of toxic G-series nerve agent. The test had two primary objectives. Objective one was to investigate the penetration of a simulant for the nerve agent Sarin (GB) into four types of naval ships operating at sea. Objective two was to estimate the penetration of Sarin into the four types of operational naval ships by evaluating the results of Objective one in conjunction with the Sarin/Sarin-simulant relationship established in Flower Drum, Phase I (DTC Test 64-2.) This was done mathematically, no Sarin was used in this test.

Methylacetoacetate was used to simulate Sarin nerve agent. The simulant was disseminated from a modified Model T-45M-2 MARS Portable Gas Turbine located on the bow of the test ship. All personnel (ships' crews and civilian test personnel) were instructed in the use of protective masks, and masks were worn by personnel directly exposed to significant quantities of methylacetoacetate.

HIGH LOW
2-2-2-2

The ships which operated in High Low were the USS *Berkely* (DDG-15), the USS *Fechteler* (DD-870), the USS *Okanogan* (APA-220), and the USS *Wexford County* (LST-1168).

High Low tests were conducted in the Pacific Ocean off the coast of San Diego, California, during the period January 11 through February 26, 1966.

Test Name	High Low (DTC Test 65-13)
Testing Organization	US Army Deseret Test Center
Test Dates	January 11 – February 26, 1966
Test Location	Testing was conducted in the Pacific Ocean, off the coast of San Diego, California
Test Operations	To assess the vulnerability of ships to an enveloping cloud of toxic G-series nerve agent.
Participating Services	U.S. Navy, Deseret Test Center personnel
Units and Ships Involved	USS *Berkely* (DDG-15) USS *Fechteler* (DD-87) USS *Okanogan* (APA-220) USS *Wexford County* (LST-1168)
Dissemination Procedures	Agent cloud was generated by dissemination from a modified Model T-45M-2 MARS Portable Gas Turbine located on the bow of the test ship.
Agents, Simulants, Tracers	Methylacetoacetate
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Methylacetoacetate (MAA) This compound was used as a simulant. While acute exposure has been associated with irritation of skin, eyes, respiratory tract, and digestive tract, there is little or no evidence of long-term or late-developing health effects and it is not known to cause cancer in animal testing. (Sources: NLM TOXNET, Methyl acetoacetate 105-45-3, HSDB Human Health Effects and Animal Toxicity Studies, available at http:// toxnet.nlm.nih.gov. http://hazard.com/msds/tox/f/q4/

HIGH LOW
4-4-4-4

	q936.html [as of January 28, 2002] and http://www.hbcollege/chem/lab/organic/gilbert3e/resources/studenttools/dl/e_mmsds.pdf)

The Department of Defense (DoD) is providing this information, at the request of the Department of Veterans Affairs (VA), to assist the VA in providing healthcare services to qualified veterans and to assist veterans in establishing service connection for disability claims. The Deployment Health Support Directorate (DHSD) collected this information from multiple sources and requested that the military services declassify it to allow its public distribution. The VA accepts this information provided on location, dates, units and/or ships, and substances involved in this exercise, which DHSD extracted from classified DoD records, and will provide it to individual veterans as necessary, but the VA cannot verify its accuracy.

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Deseret Test Center

Green Mist

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The primary purpose of Green Mist was to estimate the effective dosage area coverage that could be expected if sarin nerve agent-filled M139 bomblets were disseminated from four different weapons systems over a rain forest canopy.

Trials were conducted using sarin nerve agent and the simulant methylacetoacetate.

Green Mist was conducted on the island of Hawaii during the period of March 25 through April 24, 1967.

Test Name	Green Mist (DTC Test 66-4)
Testing Organization	US Army Deseret Test Center
Test Dates	March 25 – April 24, 1967
Test Location	Island of Hawaii
Test Operations	To determine the average dosage in a mountain rain forest of four chemical weapon systems employing the M139 sarin nerve agent bomblet.
Participating Services	Deseret Test Center
Units and Ships Involved	Not identified
Dissemination Procedures	M139 sarin nerve agent-filled bomblets were statically detonated at several heights below the canopy.
Agents, Simulants, Tracers	Sarin Nerve Agent Methylacetoacetate
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Sarin Nerve Agent (GB) Sarin gas is a volatile and lethal nerve agent. It can enter the body by inhalation, ingestion, through the eyes, and to a lesser extent through the skin. After exposure to a sufficient dose, human symptoms may occur within minutes and include runny nose, watery eyes, difficulty breathing, dimness of vision, confusion, drowsiness, coma, and death. Very little information is available regarding long-term health effects following exposures to low levels that do not cause acute symptoms. No information is available regarding potential carcinogenicity. An Institute of Medicine committee concluded that there was insufficient evidence for or against an association

	between low-level sarin exposure and long-term health effects. (Sources: http://www.bt.cdc.gov/Agent/Nerve/Sarin/Sarin.asp [as of February 13, 2002]Institute of Medicine (National Academies), Gulf War and Health (vol.1): Depleted Uranium, Pyridostigmine Bromide, Sarin, Vaccines. National Academy Press, Washington DC, 2000.) Methylacetoacetate (MAA) This compound was used as a simulant. While acute exposure has been associated with irritation of skin, eyes, respiratory tract, and digestive tract, there is little or no evidence of long-term or late-developing health effects and it is not known to cause cancer in animal testing. (Sources: NLM TOXNET, Methylacetoacetate 105-45-3, HSDB Human Health Effects and Animal Toxicity Studies, available at http://toxnet.nlm.nih.gov.http://hazard.com/msds/tox/f/q4/q936.html [as of January 28, 2002] and http://www.hbcollege/chem/lab/organic/gilbert3e/resources/studenttools/dl/e_mmsds.pdf)

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Deseret Test Center

Elk Hunt, Phase I

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The Elk Hunt, Phase I tests were designed to determine the amount of either standard or modified VX nerve agent picked up on the clothing of personnel traversing various types of contaminated terrain. The tests examined the length of time a barrier is effective in producing casualties. Elk Hunt, Phase I also compared pickup of agent when M23 mines filled with standard and modified VX nerve agent were detonated under water and under ground.

In Elk Hunt, Phase I, standard or modified VX nerve agent was disseminated from M23 mines detonated under ground in three types of terrain – shrubbery, wooded, and ground covered in rye grass – and under water. Personnel, assuming various tactical positions, traversed the contaminated test grids at specified times and the amount of VX picked up on their clothing was measured. Personnel wore complete, impermeable, butyl-rubber outfits and M9A1 masks.

Twenty trials were conducted in the vicinity of Fort Greely, Alaska from July 3 through August 15, 1964.

ELK HUNT, PHASE I
2-2-2-2

Test Name	Elk Hunt, Phase I (DTC Test 65-14)
Testing Organization	US Army Deseret Test Center
Test Dates	July 3 – August 15, 1964
Test Location	Fort Greely, Alaska
Test Operations	To determine the amount of either standard or modified VX nerve agent picked up on the clothing of personnel traversing various types of contaminated terrain. To determine the length of time a barrier is effective in producing casualties. To compare pickup of agent when M23 mines filled with standard and modified VX are detonated under ground and under water.
Participating Services	US Army, Deseret Test Center personnel
Units and Ships Involved	Selected personnel assigned to HHC, 171st Infantry Brigade, 15th Artillery Battalion, 40th Armor Battalion, 4th Battalion, 9th Infantry, 1st Battalion, 47th Infantry, 538th Ordnance Company (Direct Support)
Dissemination Procedures	Standard or modified VX was disseminated from M23 mines detonated under ground and under water.
Agents, Simulants, Tracers	VX Nerve Agent Modified VX Nerve Agent (one percent polyisobutyl-methacrylate added as thickener)
Ancillary Testing	Not identified
Decontamination	Not identified

Potential Health Risks Associated with Agents, Simulants, Tracers	VX Nerve Agent – (Synonyms: Phosphonothioic acid, VX) VX nerve agent is extremely lethal. It is an oily liquid that is clear, odorless, and tasteless. Death usually occurs within 10-15 minutes after absorption of a fatal dosage. VX nerve agent is one of the most toxic substances ever synthesized. Symptoms of overexposure may occur within minutes or hours, depending upon the dose. They include: constriction of pupils, headaches, runny nose, salivation, tightness in the chest, nausea, vomiting, anxiety, difficulty in thinking, muscle twitches, tremors, and weakness. With severe exposure, symptoms progress to convulsions and respiratory failure. There is little information available regarding the long-term human health effects of exposure to low doses of VX. (Sources: Centers for Disease Control and Prevention http://www.bt.cdc.gov/Agent/Nerve/VX/ctc0006.asp [as of January 25, 2002]Zajtchuk R (ed.), Textbook of Military Medicine (part 1, Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997. SBCCOM Online, Edgewood Chemical Biological Center http://in1.apgea.army.mil:80/RDA/msds/vx.htm [as of April 2, 2002] World Health Organization, Department of Sustainable Development & Environmental Protection, http://209.61.192.180/phe/factsheet_5.htm [as of April 2, 2002] Department of the Army Pamphlet 40-8: Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX http://books.army.mil:80/cgi-bin/bookmgr/BOOKS/P40_8/CCONTENTS [as of February 5, 2002])

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Deseret Test Center

DTC Test 69-12

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

In 1967 and 1968, Deseret Test Center Test conducted DTC Test 68-13 (Rapid Tan I, II, III) jointly with the United Kingdom and Canada. Rapid Tan was designed to investigate the extent and duration of hazard following a Tabun, Soman or V nerve agent attack. DTC Test 69-12 was planned as a more sophisticated test than Rapid Tan. DTC Test 69-12 was originally scheduled for conduct near Fort Greely, Alaska; however, the test site was moved to Edgewood Arsenal, Maryland. Only three trials (of 54 scheduled) were completed prior to the imposition of open-air toxic test restrictions and the suspension of the test.

The three completed DTC Test 69-12 trials were conducted at Edgewood Arsenal, Maryland during the spring of 1969.

Test Name	DTC Test 69-12
Testing Organization	US Army Deseret Test Center
Test Dates	Spring 1969
Test Location	Edgewood Arsenal, Maryland
Test Operations	To determine rate of evaporation of Tabun, Sarin, Soman, and VX as a function of contamination density, drop size, and terrain cover under a variety of meteorological conditions in a temperate environment.
Participating Services	Deseret Test Center Personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Not identified
Agents, Simulants, Tracers	Sarin Nerve Agent Soman Nerve Agent Tabun Nerve Agent VX Nerve Agent
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Sarin Nerve Agent (GB) Sarin gas is a volatile and lethal nerve agent. It can enter the body by inhalation, ingestion, through the eyes, and to a lesser extent through the skin. After exposure to a sufficient dose, human symptoms may occur within minutes and include runny nose, watery eyes, difficulty breathing, dimness of vision, confusion, drowsiness, coma, and death. Very little information is available regarding long-term health effects following exposures to low levels that do not cause acute symptoms. No information is available regarding potential carcinogenicity. An Institute of

	Medicine committee concluded that there was insufficient evidence for or against an association between low-level sarin exposure and long-term health effects. (Sources: http://www.bt.cdc.gov/Agent/Nerve/Sarin/Sarin.asp [as of February 13, 2002]Institute of Medicine (National Academies), Gulf War and Health (vol.1): Depleted Uranium, Pyridostigmine Bromide, Sarin, Vaccines. National Academy Press, Washington DC, 2000.) Soman Nerve Agent (GD) Soman is a colorless liquid, which gives off an odor of rotting fruit when vaporizing. The vapor is colorless. Soman is a persistent agent that can easily remain in a particular area for a day or longer, depending on the atmospheric conditions. Acute health effects associated with exposure to soman include a runny nose, tightness in the chest, constriction of the pupils, difficulty in breathing, coma, and death. There is little information available regarding the long-term human health effects of exposure to soman. (Source: http://www.sbccom.army.mil/services/edu/soman.htm Zajtchuk R (ed.), Textbook of Military Medicine (part 1, Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997.) Tabun Nerve Agent (GA) Tabun is an amber, non-persistent liquid, which gives off little odor when vaporizing. The vapor is colorless. When exposed to tabun, the symptoms a victim will experience include a runny nose, tightness in the chest, constriction of the pupils, difficulty breathing,

	and nausea. Ultimately the victim will become comatose and will suffocate as a consequence of convulsive spasms. Tabun is mainly absorbed through the skin; however, vapors can also be hazardous. If a person does not receive an immediately lethal dose, death will occur after approximately 20 minutes. Those receiving a less than lethal dose who do not receive immediate medical care may suffer permanent neurological damage. There is little information available regarding the long-term human health effects of exposure to low doses of tabun. (Source: http://www.sbccom.army.mil/services/edu/tabun.htm Zajtchuk R (ed.), Textbook of Military Medicine (part 1, Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997. VX Nerve Agent – (Synonyms: Phosphonothioic acid, VX) VX nerve agent is extremely lethal. It is an oily liquid that is clear, odorless, and tasteless. Death usually occurs within 10-15 minutes after absorption of a fatal dosage. VX nerve agent is one of the most toxic substances ever synthesized. Symptoms of overexposure may occur within minutes or hours, depending upon the dose. They include: constriction of pupils, headaches, runny nose, salivation, tightness in the chest, nausea, vomiting, anxiety, difficulty in thinking, muscle twitches, tremors, and weakness. With severe exposure, symptoms progress to convulsions and respiratory failure. There is little information available regarding the long-term human health effects of exposure to low doses of VX.

	(Sources: Centers for Disease Control and Prevention http://www.bt.cdc.gov/Agent/Nerve/VX/ctc0006.asp [as of January 25, 2002] Zajtchuk R (ed.), Textbook of Military Medicine (part 1, Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997. SBCCOM Online, Edgewood Chemical Biological Center http://in1.apgea.army.mil:80/RDA/msds/vx.htm [as of April 2, 2002] World Health Organization, Department of Sustainable Development & Environmental Protection, http://209.61.192.180/phe/factsheet_5.htm [as of April 2, 2002] Department of the Army Pamphlet 40-8: Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX http://books.army.mil:80/cgi-bin/bookmgr/BOOKS/P40_8/CCONTENTS [as of February 5, 2002]).

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Deseret Test Center
Project SHAD

DTC Test 69-31

Project Shipboard Hazard and Defense (SHAD) was part of the joint service chemical and biological warfare test program conducted during the 1960s. Project SHAD encompassed tests designed to identify US warships' vulnerabilities to attacks with chemical or biological warfare agents and to develop procedures to respond to such attacks while maintaining a war-fighting capability.

The primary purpose of DTC Test 69-31 was to evaluate the continued effectiveness of the Shipboard Toxicological Operational Protection System (STOPS) of the USS *Herbert J. Thomas* (DD-833). The ship was challenged by five chemical vapor attacks using methylacetoacetate, a simulant for Sarin nerve agent. An additional 11 attacks were conducted in which the USS *Herbert J. Thomas* was enveloped with the nonpathogenic biological aerosol, *Bacillus globigii* (BG).

A MARS generator mounted on the bow of the ship was used to disseminate methylacetoacetate; PCF "swift boats" were used to disseminate BG during simulated biological warfare agent attacks.

DTC Test 69-31 trials were conducted in the Pacific Ocean, off the coast of San Diego, California, during the period August 19 - September 4, 1968.

DTC TEST 69-31
2-2-2-2

Test Name	DTC Test 69-31
Testing Organization	US Army Deseret Test Center
Test Dates	August 19 – September 4, 1968
Test Location	Testing was conducted in the Pacific Ocean, off the coast of San Diego, California
Test Operations	To test the Shipboard Toxicological Operational Protective System (STOPS) using methylacetoacetate, a simulant for Sarin nerve agent (GB) and *Bacillus globigii*, a nonpathogenic biological aerosol.
Participating Services	US Navy, Deseret Test Center personnel
Units and Ships Involved	USS *Herbert J. Thomas* (DD-833)
Dissemination Procedures	MARS generator to disseminate MAAPCF "swift boats" for BG dissemination
Agents, Simulants, Tracers	*Bacillus globigii* (BG) Methylacetoacetate
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	*Bacillus globigii* (BG) Now considered to be *Bacillus subtilis var. niger*, a close relative of *Bacillus subtilis*, this bacterial species was used as a simulant and considered harmless to healthy individuals. *Bacillus subtilis* and similar *Bacillus* species are common in the environment, and are uncommon causes of disease. They have been associated with acute infections of the ear, meninges (brain lining), urinary tract, lung, heart valve, bloodstream, and other body sites, but always or nearly always in individuals whose health has already been compromised. Long-term or late-

	developing health effects would be very unlikely (except perhaps as a complication of the acute infection). (Sources: Tuazon CU, Other Bacillus Species (chap. 197), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2220-6; US Environmental Protection Agency, Bacillus subtilis Final Risk Assessment, February 1997, available at http://www.epa.gov as of October 4, 2002.) Methylacetoacetate (MAA) This compound was used as a simulant. While acute exposure has been associated with irritation of skin, eyes, respiratory tract, and digestive tract, there is little or no evidence of long-term or late-developing health effects and it is not known to cause cancer in animal testing. (Sources: NLM TOXNET, Methyl acetoacetate 105-45-3, HSDB Human Health Effects and Animal Toxicity Studies, available at http://toxnet.nlm.nih.gov. http://hazard.com/msds/tox/f/q4/q936.html [as of January 28, 2002] and http://www.hbcollege/chem/lab/organic/gilbert3e/resources/studenttools/dl/e_mmsds.pdf)

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Deseret Test Center

DTC Test 69-14

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center (DTC) was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The purpose of DTC Test 69-14 was to determine the hazards associated with inadvertent release of the MC-1 bomb during takeoff and landing, as well as the hazards resulting from bomb damage caused by hostile fire. The secondary objective was to determine the adequacy of leak suppressant and disposal procedures for damaged MC-1 bombs.

Simulant and/or water-filled 750 pound MC-1 bombs with or without bursters were used in the test. The simulant used was di (2-ethylhexyl) phthalate (DEHP.)

DTC Test 69-14 was conducted between July and November 1971 at Dugway Proving Ground, Utah.

Test Name	DTC Test 69-14
Testing Organization	US Army Deseret Test Center
Test Dates	July – November 1971
Test Location	Dugway Proving Ground, Utah
Test Operations	DTC Test 69-14 consisted of 26 trials. Eighteen bullet-impact trials and eight simulated inadvertent releases were conducted. The primary test objective was to determine the hazards associated with inadvertent release of the MC-1 bomb during takeoff and landing and to determine the adequacy of leak suppressant and disposal procedures for damaged MC-1 bombs.
Participating Services	US Army, US Air Force, and Deseret Test Center Personnel
Units and Ships Involved	F-4 aircraft with MC-1 bombs
Dissemination Procedures	In the simulated inadvertent release trials, an MC-1 bomb was released from an F-4 aircraft. All bombs were equipped with the MAU-91 tail fin mounted "lo-drag" display. Six releases were made over a dry lake bed. These were followed by releases over concrete. For the bullet-impact trials, bombs were again filled with water and equipped with the central burster. Both water-filled and simulant-filled bombs were subjected to 50- and 30-caliber fire, 20mm armor piercing incendiary fire and 20mm high explosive incendiary fire.
Agents, Simulants, Tracers	Di (2-ethylhexyl) phthalate (DEHP)
Ancillary Testing	Not identified
Decontamination	Not identified

Potential Health Risks Associated with Agents, Simulants, Tracers	Di (2-ethylhexyl) phthalate (DEHP) This chemical is commonly present in flexible plastics and therefore widespread in the environment and of some concern for the general population. While low level exposures have not been shown to cause serious health effects, acute exposure to high levels of this chemical can cause irritation of the skin, eyes, and respiratory tract. DEHP has caused cancer in some animal testing, but the relevance of this testing to cancer in humans is uncertain. (Sources: DHHS PHS ATSDR ToxFAQs, Di(2-ethylhexyl)phthalate #117-81-7, April 1993, and Toxicological Profile for Di(2-ethylhexyl)phthalate (DEHP), draft for public comment, September 2000, both available at http://www.atsdr.cdc.gov as of October 1, 2002. Also WHO International Agency for Research on Cancer (IARC) Monographs on the Evaluation of Carcinogenic Risks to Humans (vol. 77, Some Industrial Chemicals updated February 23, 2000), available at http://193.51.164.11/htdocs/announcements/vol77.htm as of October 4, 2002.)

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Deseret Test Center

DTC Test 69-75

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The objective of Deseret Test Center (DTC) Test 69-75 was to investigate the effectiveness of the F-4/A/B 45Y-2/TX weapon system to reduce wheat crop yields in selected geographic areas. The objective was subdivided into other tasks: determine the downwind travel of agent TX released from the A/B 45Y-2 spray tank; estimate the yield reduction and loss of wheat crops attacked by this weapon system; study the effectiveness of killed TX as a simulant for agent TX; and, evaluate the adequacy to predict downwind dosages of TX.

TX is the agent symbol for the fungus *Puccinia graminis var. tritici*, commonly known as stem rust of wheat. Killed TX is defined as spores killed by a gaseous mixture of ethylene oxide. Dead spores are those that have died as a result of causes other than intentional killing.

Four killed TX trials and seven live agent trials were conducted. All trials were conducted in the vicinity of Yeehaw Junction, Florida, from October 31 to December 1, 1968.

Test Name	DTC Test 69-75
Testing Organization	US Army Deseret Test Center
Test Dates	October 31 – December 1, 1968
Test Location	In the vicinity of Yeehaw Junction, Florida
Test Operations	To investigate the effectiveness of the F-4/A/B 45Y-2/TX weapon system to reduce wheat crop yields in selected geographic areas.
Participating Services	US Air Force, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	TX was sprayed from an A/B 45Y-2 spray tank mounted on an F-4 aircraft.
Agents, Simulants, Tracers	*Puccinia graminis var. tritici* (TX)
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	*Puccinia graminis tritici* (TX) This fungal species is toxic to plants, and therefore was considered a potential biological warfare agent directed against agricultural crops. It is not ordinarily considered to have either short-term or long-term human health effects. (Sources: Zajtchuk R., ed., Textbook of Military Medicine (part 1, Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997, p. 60, 460. Also http://www.cbwinfo.com/Biological/PlantPath/PG.html as of October 4, 2002.)

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Deseret Test Center

DTC Test 68-53

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center (DTC) was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The primary test objective of DTC Test 68-53 was to establish safety distances downwind of CS2 drop zones. A secondary objective required the determination of agent deposition patterns, percent of agent recovery, and airborne agent particle size in defining direct assault effects such as those related to rescue missions.

Five types of CS2 munitions, including the BLU-52A/B, Mk77, Mk20, and XM925 bombs and the XM28 dispenser system, were tested in flat, open terrain. The BLU-52A/B bombs were delivered by A-4/Skyhawk aircraft. The Mk77 and Mk20 bombs were deployed in pairs fromA-4/Skyhawk aircraft. The XM925 drum was tested statically and in dynamic drops from a CH47 helicopter. Bag submunitions were released from an XM28 dispenser carried by a UH-1B helicopter.

While the United States does not classify CS2 as a chemical warfare agent, Deseret Test Center managed DTC Test 68-53 as a matter of convenience. Testing CS2 was not part of a chemical-biological warfare agent assessment.

DTC Test 68-53 was conducted during the period April to December 1969 at Dugway Proving Ground, Utah.

DTC TEST 68-53
3-3-3-3

Test Name	DTC Test 68-53
Testing Organization	US Army Deseret Test Center
Test Dates	April – December 1969
Test Location	Dugway Proving Ground, Utah
Test Operations	DTC Test 68-53 established safety distances downwind of CS2 riot control agent drop zones. The test also determined agent deposition patterns, percent of agent recovery, and airborne agent particle size in defining direct assault effects such as those related to rescue missions.
Participating Services	Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Five types of CS2 munitions, including the BLU-52A/B, Mk77, Mk20, and XM925 bombs and the XM28 dispenser system, were tested in flat, open terrain. The BLU-52A/B bombs were delivered by A-4/Skyhawk aircraft. The Mk77 and Mk20 bombs were deployed in pairs fromA-4/Skyhawk aircraft. The XM925 drum was tested statically and in dynamic drops from a CH47 helicopter. Bag submunitions were released from an XM28 dispenser carried by a UH-1B helicopter.
Agents, Simulants, Tracers	Ortho-chlorobenzylidene malontrile (CS2)
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	CS2 Riot–Control Agent CS2 is one of several chemicals commonly called "Tear Gas." CS2 is a white, crystalline powder and is dispersed into the air as either an aerosol or powder. The chemical name for CS2 is ortho-chlorobenzylidene

	malononitrile. It is chemically identical to CS but differs in its physical characteristics. This chemical is an incapacitating/riot-control agent that acts as a contact irritant on the exposed body surfaces (eyes and skin), and on the respiratory tract. Exposure to CS2 causes burning, irritation, tearing and pain in the eyes. Airway symptoms include burning, sneezing, coughing, shortness of breath and increased secretions, such as runny nose and increased salivation. High concentrations of CS2 can cause blistering of the skin. With commonly used concentrations, these effects are short-term and the potential for long-term health consequences is low. (Sources: Riot-Control Agents (chap. 6), in US Army Medical Research Institute of Chemical Defense, Medical Management of Chemical Casualties Handbook, 3rd edition, 1998; Sidell FR, Riot Control Agents (chap. 12), in Zajtchuk R (ed.), Textbook of Military Medicine (part 1, Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997, p. 310-6. http://www.metrokc.gov/health/hazard/riotcontrol.htm#cs [as of September 26, 2002]Cornell University, http://msds.pdc.cornell.edu/msds/siri/files/chl/chlfz.html [as of August 26, 2002]).

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Deseret Test Center

DTC Test 70-73

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center (DTC) was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The purpose of DTC Test 70-73 was to examine potential secondary aerosol hazards to friendly troops following a biological agent attack. A secondary aerosol is defined as bacterial, toxic, or viral particles resuspended in the air after once settling from a primary aerosol attack or after the biological agent has been intentionally deposited on surfaces.

The types of biological attack simulated in this study were (a) a liquid filled bomblet point source, (b) an aerial liquid spray line source, and (c) a surface deposition with dry biological spores. *Bacillus globigii* (BG) was used in these trials. Liquid BG was dispersed by an explosive test fixture or by a vehicle mounted generator. The dry form of BG was manually deposited with a gravity test fixture at an area designated for road deposit trials. Zinc cadmium sulfide (FP) was disseminated with the BG.

DTC Test 70-73 was conducted between July and December 1970 at Dugway Proving Ground, Utah.

DTC TEST 70-73
2-2-2-2

Test Name	DTC Test 70-73
Testing Organization	US Army Deseret Test Center
Test Dates	July – December 1970
Test Location	Dugway Proving Ground, Utah
Test Operations	DTC Test 70-73 examined potential secondary aerosol hazards to friendly troops following a biological agent attack. The types of biological attack simulated in this study were (a) a liquid filled bomblet point source, (b) an aerial liquid spray line source, and (c) a surface deposition with dry biological spores.
Participating Services	Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Liquid BG was dispersed by an explosive test fixture or by a vehicle mounted generator. Dry BG was manually deposited with a gravity test fixture at an area designated for road deposit trials. Zinc cadmium sulfide (FP) was disseminated with the BG.
Agents, Simulants, Tracers	*Bacillus globigii* (BG) Zinc cadmium sulfide (FP)
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	*Bacillus globigii* (BG) Now considered to be *Bacillus subtilis var. niger*, a close relative of *Bacillus subtilis*, this bacterial species was used as a simulant and considered harmless to healthy individuals. *Bacillus subtilis* and similar *Bacillus* species are common in the environment, and are uncommon causes of disease. They have been associated with acute infections of

	the ear, meninges (brain lining), urinary tract, lung, heart valve, bloodstream, and other body sites, but always or nearly always in individuals whose health has already been compromised. Long-term or late-developing health effects would be very unlikely (except perhaps as a complication of the acute infection). (Sources: Tuazon CU, Other Bacillus Species (chap. 197), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2220-6; US Environmental Protection Agency, Bacillus subtilis Final Risk Assessment, February 1997, available at http://www.epa.gov as of October 4, 2002.) Zinc cadmium sulfide (ZCdS) This compound was aerosolized as a tracer material for the dispersion of biological warfare agents because it had similar properties. There has been little scientific study on the toxicity of this compound when inhaled. A National Research Council (NRC) committee focused on the cadmium component as potentially most toxic. While higher concentrations and more prolonged exposures to cadmium are associated with the development of lung cancer, the concentrations and durations of exposure in the Army's tests were substantially lower. The NRC committee concluded that the risk of adverse health effects to populations in the area was low.

	(Sources: National Research Council (National Academies), Toxicologic Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests, and Toxicologic Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests: Answers to Commonly Asked Questions, National Academy Press, Washington DC, 1997, both available at http://www.nap.edu as of October 1, 2002.)

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Deseret Test Center
Project SHAD

DTC Test 69-10

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

In DTC Test 69-10, units of a US Marine Corps Ready Group were subjected to a simulated chemical agent spray attack while engaged in an amphibious assault. The purpose of the test was to determine the operational effects of a persistent, toxic, chemical agent spray attack on US amphibious forces. The objectives of the test were to assess the performance degradation of troops wearing protective clothing and to illustrate the effectiveness of existing chemical weapons. Contamination of ships and equipment supporting the landing was also assessed.

The test was conducted in two parts: aerial spray attacks against Battalion Landing Team (Minus), BLT(-), and company sized USMC amphibious landing forces; and, an aerial spray attack against the primary control ship of an amphibious assault force. During all trials, sampling was conducted on exposed personnel, and their clothing, to determine if they were contaminated with the simulant. Performance of the troops, the landing craft crews, and the

ship's crew was evaluated with regard to the response of personnel to the attack and their subsequent ability to operate in a simulated toxic environment.

Missions flown by Marine A-4 aircraft carrying Aero 14B spray tanks delivered trioctyl phosphate (tri [2-ethylhexyl] phosphate) to simulate VX nerve agent. The USS *Fort Snelling* (LSD-30) was the target ship for the ship trial.

DTC Test 69-10 was conducted in May 1969 on the beaches of Vieques island, six miles east of Puerto Rico.

DTC TEST 69-10
3-3-3-3

Test Name	DTC Test 69-10
Testing Organization	US Army Deseret Test Center
Test Dates	May 1969
Test Location	Vieques island, six miles east of Puerto Rico
Test Operations	To determine the operational effects of a persistent, toxic, chemical agent spray attack on US amphibious forces.
Participating Services	US Navy, US Marine Corps, Deseret Test Center personnel
Units and Ships Involved	Landing Force Carib 1-69/BLT 1/8 (attached and supporting personnel from 2d Marine Division)VMA-324, MAG-32, 2d Marine Aircraft Wing USS *Fort Snelling* (LSD-30)
Dissemination Procedures	Sprayed from Marine A-4 aircraft equipped with Aero 14B spray tanks.
Agents, Simulants, Tracers	Tri (2-ethylhexyl) phosphate
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Trioctyl phosphate (tri(2-ethylhexyl) phosphate) (TOF) Used as a nontoxic simulant for VX nerve agent. TOF is a viscous, colorless or pale yellow liquid. It can irritate the eyes, skin, and respiratory tract on contact. It can cause cancer in some animal species, but this has not been demonstrated in humans.

	(Sources: NLM TOXNET, Trioctyl phosphate 1806-54-8 or Tris(2-ethylhexyl)phosphate 78-42-2, HSDB Human Health Effects and Animal Toxicity Studies, available at http://toxnet.nlm.nih.gov. http://physchem.ox.ac.uk/MSDS/TR/tris(2-ethylhexyl)phosphate.html [as of September 25, 2002] and http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/_icsc09/icsc0968.pdf [as of September 25, 2002]).

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Deseret Test Center

Dew Point

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The purpose of Dew Point was to determine the effectiveness of Sarin nerve agent-filled BLU-19/B23 bomblets ejected from an SUU-13/A dispenser, and M139 bomblets dropped from a SADEYE dispenser in a temperate summer forest environment

The test area was situated in a heavy stand of deciduous aspen trees. A test grid was established in the aspen forest. Sarin nerve agent-filled M139 bomblets were used in Dew Point trials. The bomblets were individually statically detonated.

The test was conducted from June through July 1967 at the Gerstle River test site, near Fort Greely, Alaska.

DEW POINT
2-2-2-2

Test Name	Dew Point (DTC Test 67-2)
Testing Organization	US Army Deseret Test Center
Test Dates	June – July 1967
Test Location	Gerstle River test site, near Fort Greely, Alaska
Test Operations	To determine the effectiveness of Sarin nerve agent-filled BLU-19/B23 bomblets ejected from an SUU-13/A dispenser, and M139 bomblets dropped from a SADEYE dispenser in a temperate summer forest environment.
Participating Services	US Army, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Single bomblets were statically detonated.
Agents, Simulants, Tracers	Sarin Nerve Agent
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Sarin Nerve Agent (GB) Sarin gas is a volatile and lethal nerve agent. It can enter the body by inhalation, ingestion, through the eyes, and to a lesser extent through the skin. After exposure to a sufficient dose, human symptoms may occur within minutes and include runny nose, watery eyes, difficulty breathing, dimness of vision, confusion, drowsiness, coma, and death. Very little information is available regarding long-term health effects following exposures to low levels that do not cause acute symptoms. No information is available regarding potential carcinogenicity. An Institute of Medicine committee concluded that there was insufficient evidence for or against an association between low-level sarin exposure and long-term

	health effects. (Sources: http://www.bt.cdc.gov/Agent/Nerve/Sarin/Sarin.asp [as of February 13, 2002] Institute of Medicine (National Academies), Gulf War and Health (vol.1): Depleted Uranium, Pyridostigmine Bromide, Sarin, Vaccines. National Academy Press, Washington DC, 2000.)

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Deseret Test Center
Project SHAD

Half Note

Project Shipboard Hazard and Defense (SHAD) was part of the joint service chemical and biological warfare test program conducted during the 1960s. Project SHAD encompassed tests designed to identify US warships' vulnerabilities to attacks with chemical or biological warfare agents and to develop procedures to respond to such attacks while maintaining a war-fighting capability.

The purpose of the Half Note test was to determine biological decay rates of vegetative nonpathogens in a marine environment and to compare the field decay rates with chamber decay rates when conducted under similar conditions. Trials included the release of *Escherichia coli* or *Serratia marcescens* with *Bacillus globigii*.

In each trial, a slurry of *Bacillus globigii* and one of the two other organisms were released from Aero 14B spray tanks, wing-mounted on an A-4 aircraft. During each trial, the USS *George Eastman* (YAG-39) and five Army light tugs would traverse upwind attempting to remain in the aerosol cloud for several hours. In addition, the USS *Granville S. Hall* (YAG-40) took complete surface observations, every half-hour during the trials.

Calcofluor, a fluorescent tracer, was used as a tool for determining cloud arrival and departure. For this test, a contractor released and sampled a stable inorganic tracer, zinc cadmium sulfide (FP), type 3206 green.

Half Note tests were conducted in the Pacific Ocean off the coast of Hawaii, approximately 80 nautical miles south-southwest of Oahu from August 18 – September 30, 1966.

HALF NOTE
2-2-2-2

Test Name	Half Note (DTC Test 66-13)
Testing Organization	US Army Deseret Test Center
Test Dates	August 18 – September 30 1966
Test Location	In the Pacific Ocean off the coast of Hawaii, Approximately 80 nautical miles south-southwest of Oahu
Test Operations	To determine biological decay rates of *Escherichia coli* and *Serratia marcescens* in a marine environment.
Participating Services	US Navy, Deseret Test Center personnel
Units and Ships Involved	USS *George Eastman* (YAG-39) USS *Granville S. Hall* (YAG-40) Army light tugs 2080, 2081, 2085, 2086, and 2087, all staffed by USN personnel
Dissemination Procedures	Sprayed from A-4 aircraft equipped with Aero 14B spray tanks.
Agents, Simulants, Tracers	*Bacillus globigii* *Serratia marcescens* *Escherichia coli* Calcofluor (fluorescent brightner 28) Zinc cadmium sulfide (FP)
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Bacillus globigii (BG) Now considered to be *Bacillus subtilis var. niger*, a close relative of *Bacillus subtilis*, this bacterial species was used as a simulant and considered harmless to healthy individuals. *Bacillus subtilis* and similar *Bacillus* species are common in the environment, and are uncommon causes of disease.

	They have been associated with acute infections of the ear, meninges (brain lining), urinary tract, lung, heart valve, bloodstream, and other body sites, but always or nearly always in individuals whose health has already been compromised. Long-term or late-developing health effects would be very unlikely (except perhaps as a complication of the acute infection). (Sources: Tuazon CU, Other Bacillus Species (chap. 197), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2220-6; US Environmental Protection Agency, Bacillus subtilis Final Risk Assessment, February 1997, available at http://www.epa.gov as of October 4, 2002.) *Serratia marcescens* (SM) This bacterial species can cause acute infections of the urinary tract, lung, bloodstream, and other body sites. These infections commonly occur in individuals whose health has already been compromised, and often in patients who are already hospitalized. Long-term or late-developing health effects would be very unlikely. (Source: Eisenstein, Barry I., Zaleznik, Dori F., Enterobacteriaceae (chap. 206), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2303.) *Escherichia coli*, or *E. Coli* (EC) This bacterial species is a common inhabitant of the digestive tract but can also cause acute infection, especially when it gains access to other body sites,

	like the urinary tract, lung, and bloodstream. Long-term or late-developing health effects of E. coli infection would be unlikely. (Source: Eisenstein, Barry I., Zaleznik, Dori F., Enterobacteriaceae (chap. 206), in Principles and Practice of Infectious Diseases, 5th edition (vol. 2), ed., Mandell GL, Bennett JE, Dolin R, Churchill Livingstone, Philadelphia, 2000, p. 2299-301.) Calcofluor (fluorescent brightener 28, Calcofluor White ST) Used as a fluorescent tracer with Bacillus globigii. Chemical formula is C40H42N12Na2O10S2. This chemical has been used as a medical laboratory stain and as a whitening agent in detergents. It can cause eye irritation in animal testing, but there is limited evidence for or against human health effects. (Source: http://hazard.com/msds/tox/f/q127/q679.html [as of April 30, 2002]NLM TOXNET, Cellufluor 4193-55-9, available at http://toxnet.nlm.nih.gov) Zinc cadmium sulfide (ZCdS) This compound was aerosolized as a tracer material for the dispersion of biological warfare agents because it had similar properties. There has been little scientific study on the toxicity of this compound when inhaled. A National Research Council (NRC) committee focused on the cadmium component as potentially most toxic. While higher concentrations and more prolonged exposures to cadmium are associated with the development of lung cancer, the concentrations and durations of exposure in the Army's tests were substantially lower. The NRC committee concluded that the risk of adverse health effects to populations in the area

HALF NOTE
5-5-5-5

	was low. (Sources: National Research Council (National Academies), Toxicologic Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests, and Toxicologic Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests: Answers to Commonly Asked Questions, National Academy Press, Washington DC, 1997, both available at http://www.nap.edu as of October 1, 2002.)

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Deseret Test Center

Elk Hunt, Phase II

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

The Elk Hunt, Phase II tests were designed to determine the amount of VX nerve agent picked up on the clothing of personnel traversing breached paths through contaminated areas and M23 minefields; the amount of VX nerve agent deposited on the surface of vehicles traversing VX-contaminated areas or under which an M23 mine had been detonated; the amount of VX nerve agent deposited on the clothing of personnel actively or passively contacting contaminated vehicles; vehicle decontamination by wet steam, high-pressure cold water hosing, and wallow pit; and, the amount of VX vapor rising from VX-contaminated areas.

Thirty-five trials were conducted near Fort Greely, Alaska, between June 7 and July 27, 1965. Five trials were conducted by the Canadian government in conjunction with the Deseret Test Center trials. Chemical Research and Development Laboratories, Edgewood Arsenal, Maryland, performed 11 additional vehicle decontamination trials from October 27 to December 17, 1965.

Personnel who participated in Elk Hunt, Phase II wore complete, impermeable butyl-rubber outfits and M9A1 masks.

ELK HUNT, PHASE II
2-2-2-2

Test Name	Elk Hunt, Phase II (DTC Test 65-14)
Testing Organization	US Army Deseret Test Center
Test Dates	June 7 – July 27, 1965 October 27 – December 17, 1965
Test Location	Fort Greely, Alaska Edgewood Arsenal, Maryland Canada
Test Operations	To determine the amount of standard VX nerve agent picked up on the clothing of personnel traversing paths formed by the breaching of minefields and areas contaminated by detonated M23 mines. Tests were made to determine the amount of VX nerve agent picked up by personnel contacting contaminated vehicles.
Participating Services	US Army, Deseret test personnel
Units and Ships Involved	Selected personnel assigned to HHC, 171st Infantry Brigade, 15th Artillery Battalion, 40th Armor Battalion, 4th Battalion, 9th Infantry1st Battalion, 47th Infantry, 538th Ordnance Company (Direct Support)
Dissemination Procedures	Standard VX was disseminated from M23 mines buried with pressure plates flush with the ground.
Agents, Simulants, Tracers	VX Nerve Agent
Ancillary Testing	Not identified
Decontamination	Wet steam, high-pressure cold water hosing, and wallow pit for decontaminating vehicles

Potential Health Risks Associated with Agents, Simulants, Tracers	VX Nerve Agent – Lethal Nerve Agent (Synonyms: Phosphonothioic acid, VX): VX nerve agent is extremely lethal. It is an oily liquid that is clear, odorless, and tasteless. Death usually occurs within 10-15 minutes after absorption of a fatal dosage. VX nerve agent is one of the most toxic substances ever synthesized. Symptoms of overexposure may occur within minutes or hours, depending upon the dose. They include: miosis (constriction of pupils) and visual effects, headaches and pressure sensation, runny nose and nasal congestion, salivation, tightness in the chest, nausea, vomiting, giddiness, anxiety, difficulty in thinking, difficulty sleeping, nightmares, muscle twitches, tremors, weakness, abdominal cramps, diarrhea, involuntary urination and defecation. With severe exposure symptoms progress to convulsions and respiratory failure. The permissible airborne exposure concentration for VX nerve agent in any 8-hour work shift can be found in Department of the Army Pamphlet 40-8. To date, however, the Occupational Safety and Health Administration has not promulgated a permissible exposure concentration for VX nerve agent. (Sources: Centers for Disease Control and Prevention http://www.bt.cdc.gov/Agent/Nerve/VX/ctc0006.asp [as of January 25, 2002].SBCCOM Online, Edgewood Chemical Biological Center http://in1.apgea.army.mil:80/RDA/msds/vx.htm [as of April 2, 2002].World Health Organization, Department of Sustainable Development & Environmental Protection, http://209.61.192.180/phe/factsheet_5.htm [as of April 2, 2002]. Department of the Army Pamphlet 40-8: Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve

	Agents GA, GB, GD, and VX, http://books.army.mil:80/cgi-bin/bookmgr/BOOKS/P40_8/CCONTENTS [as of February 5, 2002]).

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Deseret Test Center
Project SHAD

Big Tom

Project Shipboard Hazard and Defense (SHAD) was part of the joint service chemical and biological warfare test program conducted during the 1960s. Project SHAD encompassed tests designed to identify US warships' and ashore installations' vulnerabilities to attacks with chemical or biological warfare agents and to develop procedures to respond to such attacks while maintaining a war-fighting capability.

The purpose of Big Tom was to evaluate the feasibility of a biological attack against an island complex and to evaluate doctrine and tactics for delivery of such an attack.

Test personnel investigated the diffusion and downwind travel of biological simulant and tracer aerosols; estimated area coverage in both jungle and surrounding tropical terrain; investigated the degree of aerosol penetration of a jungle canopy, ventilation rate, and time resolution of aerosols; and, investigated the degree of penetration and aerosol time resolution of typical fortifications.

The test consisted of a series of aerial line-source trials during which a biological simulant, *Bacillus globigii*, was disseminated from a high performance aircraft. Both liquid and dry *Bacillus globigii* were used. Liquid *Bacillus globigii* was disseminated from an Aero 14B spray tank mounted on a US Navy A-4 aircraft. Dry *Bacillus globigii* was disseminated from an A/B Y45-4 spray tank mounted on a US Air Force F-105 aircraft. Aerosol sampling was done at various land-based stations.

For this test, a contractor-flown Aero Commander aircraft also released two colors (yellow and green) of fluorescent particles of zinc cadmium sulfide (FP).

Big Tom was conducted on the island of Oahu, Hawaii and its surrounding waters and airspace during May and June 1965.

Test Name	Big Tom (DTC Test 65-6)
Testing Organization	US Army Deseret Test Center
Test Dates	May – June 1965
Test Location	Oahu, Hawaii and surrounding waters and airspace
Test Operations	To evaluate the feasibility of a biological attack against an island complex and to evaluate doctrine and tactics for delivery of such an attack.
Participating Services	US Navy, US Marine Corps, US Air Force, Deseret Test Center personnel
Units and Ships Involved	USS *Granville Hall* (YAG-40)
Dissemination Procedures	Liquid *Bacillus globigii* was disseminated from an Aero 14B spray tank mounted on a US Navy A-4 aircraft; dry *Bacillus globigii* was disseminated from an A/B Y45-4 spray tank mounted on a US Air Force F-105 aircraft.
Agents, Simulants, Tracers	*Bacillus globigii* Zinc Cadmium Sulfide
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	*Bacillus globigii (BG)* Now considered to be *Bacillus subtilis var. niger,* a close relative of *Bacillus subtilis*, this bacterial species was used as a simulant and considered harmless to healthy individuals. *Bacillus subtilis* and similar *Bacillus* species are common in the environment, and are uncommon causes of disease. They have been associated with acute infections of the ear, meninges (brain lining), urinary tract, lung, heart valve, bloodstream, and other body sites, but always or nearly always in individuals whose health

	has already been compromised. Long-term or late-developing health effects would be very unlikely (except perhaps as a complication of the acute infection).

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Deseret Test Center
Project SHAD

Magic Sword

Project Shipboard Hazard and Defense (SHAD) was part of the joint service chemical and biological warfare test program conducted during the 1960s. Project SHAD encompassed tests designed to identify US warships' and ashore installations' vulnerabilities to attacks with chemical or biological warfare agents and to develop procedures to respond to such attacks while maintaining a war-fighting capability.

The purpose of Magic Sword was to study the feasibility of an offshore release of *Aedes aegypti* mosquitoes and to obtain information on mosquito biting habits, mosquito trap technology, and operational and logistical problems associated with the delivery of mosquitoes to remote sites.

The *Aedes aegypti* mosquito is a main vector for various infectious diseases, including dengue and yellow fevers.

Uninfected mosquitoes were released from the USS *George Eastman* (YAG-39), off the coast of Baker Island and traps were placed on the island as part of the test. As part of an onshore biting study, volunteers were placed at specific locations and a designated number of vectors were released centrally. Volunteers recorded the number of bites received.

A thermal fog generator was used to eradicate the mosquito population on the island at the conclusion of the test. Mosquitoes were eradicated aboard ship through a combination of high heat and insecticide.

The trials for Magic Sword were conducted in the Pacific Ocean, on or in the vicinity of Baker Island, during May 1965.

Test Name	Magic Sword (DTC Test 65-4)
Testing Organization	US Army Deseret Test Center
Test Dates	May 1965
Test Location	In the Pacific Ocean, on or in the vicinity of Baker Island
Test Operations	To study the feasibility of an offshore release of *Aedes aegypti* mosquitoes and to obtain information on mosquito biting habits, mosquito trap technology, and operational and logistical problems associated with the delivery of mosquitoes to remote sites.
Participating Services	US Navy, Deseret Test Center personnel
Units and Ships Involved	USS *George Eastman* (YAG-39)
Dissemination Procedures	Mosquitoes were released from the USS *George Eastman* near the coast of Baker Island.
Agents, Simulants, Tracers	Uninfected *Aedes aegypti* (mosquitoes).
Ancillary Testing	Not identified.
Decontamination	A thermal fog generator was used o eradicate the mosquito population on the island at the conclusion of the test. Mosquitoes were eradicated aboard ship through a combination of high heat and insecticide.
Potential Health Risks Associated with Agents, Simulants, Tracers	*Aedes aegypti* mosquitoes *Aedes aegypti* mosquitoes used in this test were not infected. Health effects at the time would be the usual swelling and irritation associated with mosquito bites. No long-term or latent effects would be expected.

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Deseret Test Center

Devil Hole, Phase I

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

Devil Hole, Phase I was conducted in temperate aspen and spruce forests to determine area-time-dosage information for Sarin nerve agent-filled artillery munitions (M121A1 155mm shells) and Sarin nerve agent –filled rocket warheads (M55 115 mm warheads.) Particulate simulants were used to study airflow patterns at the intersection of a spruce forest with open terrain. During the preliminary diffusion trials of the test, zinc cadmium sulfide (FP) was used as a particulate substitute for Sarin nerve agent. The fluorescent particles used in this test were of two colors, green and yellow.

Single static and single and multiple dynamic detonations were conducted with the M121A1 artillery shells. Testing of the M55 115mm rocket warhead was limited to single static detonations.

Safety equipment – such as protective clothing, protective masks, barriers, etc. – was used during the test as conditions dictated.

DEVIL HOLE, PHASE I
2-2-2-2

All Devil Hole, Phase I trials were conducted in forested terrain at the Gerstle River test site in the vicinity of Fort Greely, Alaska during the summer of 1965.

Test Name	Devil Hole, Phase I (DTC Test 65-12)
Testing Organization	US Army Deseret Test Center
Test Dates	Summer 1965
Test Location	Gerstle River test site, near Fort Greely, Alaska
Test Operations	To determine area-time-dosage information for Sarin nerve agent-filled artillery munitions and rocket warheads detonated in a temperate forested terrain.
Participating Services	US Army, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Single static and single and multiple-round detonations of Sarin-filled M121A1 artillery shells and single static detonations of Sarin-filled M55 rocket warheads.
Agents, Simulants, Tracers	Sarin Nerve Agent Zinc Cadmium Sulfide (FP)
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	Sarin Nerve Agent (GB) Sarin gas is a volatile and lethal nerve agent. It can enter the body by inhalation, ingestion, through the eyes, and to a lesser extent through the skin. After exposure to a sufficient dose, human symptoms may occur within minutes and include runny nose, watery eyes, difficulty breathing, dimness of vision, confusion, drowsiness, coma, and death. Very little information is available regarding long-term health effects following exposures to low levels that do not cause acute symptoms. No information is available regarding potential carcinogenicity. An

	Institute of Medicine committee concluded that there was insufficient evidence for or against an association between low-level sarin exposure and long-term health effects. (Sources: http://www.bt.cdc.gov/Agent/Nerve/Sarin/Sarin.asp [as of February 13, 2002]Institute of Medicine (National Academies), Gulf War and Health (vol.1): Depleted Uranium, Pyridostigmine Bromide, Sarin, Vaccines. National Academy Press, Washington DC, 2000.) Zinc cadmium sulfide (ZCdS) This compound was aerosolized as a tracer material for the dispersion of biological warfare agents because it had similar properties. There has been little scientific study on the toxicity of this compound when inhaled. A National Research Council (NRC) committee focused on the cadmium component as potentially most toxic. While higher concentrations and more prolonged exposures to cadmium are associated with the development of lung cancer, the concentrations and durations of exposure in the Army's tests were substantially lower. The NRC committee concluded that the risk of adverse health effects to populations in the area was low. (Sources: National Research Council (National Academies), Toxicologic Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests, and Toxicologic Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests: Answers to Commonly Asked Questions, National Academy Press, Washington DC, 1997, both available at http://www.nap.edu as of October 1, 2002.)

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Devil Hole, Phase II

Shortly after President Kennedy's inauguration in 1961, the Secretary of Defense, Robert McNamara, directed that a total review of the U.S. military be undertaken. The study consisted of 150 separate projects. The chemical and biological warfare review was known as Project 112. As part of the Project 112 review, the Joint Chiefs of Staff convened a working committee that recommended a research, testing, and development program for chemical and biological weapons. To oversee this program, the Deseret Test Center was established at Fort Douglas, Utah, in 1962. Both land-based and ship-based tests were conducted during the period 1962 – 1973. The Deseret Test Center closed in 1973.

Devil Hole, Phase II was conducted in temperate aspen and spruce forested terrain to provide weapons effects information for artillery delivered VX nerve agent-filled shells. The munitions used were M121A1 (155m) and M426 (8-inch) artillery shells filled with VX nerve agent.

Munitions were statically detonated and M-109 self-propelled howitzers were also used to dynamically fire shells on the target. Manikins dressed in undyed cotton overgarments were used to estimate direct contamination of standing personnel in the area of a munition detonation. A three-quarter ton truck and an eight-by-ten foot tent wall were used to measure deposition on equipment.

Devil Hole, Phase II trials were conducted at the Gerstle River test site near Fort Greely, Alaska, from July through September 1966.

DEVIL HOLE II
2-2-2-2

Test Name	Devil Hole, Phase II (DTC Test 66-1)
Testing Organization	US Army Deseret Test Center
Test Dates	July – September 1966
Test Location	Gerstle River test site, near Fort Greely, Alaska
Test Operations	To provide weapons effects information for artillery delivered VX nerve agent-filled shells detonated in temperate, forested terrain.
Participating Services	US Army, Deseret Test Center personnel
Units and Ships Involved	Not identified
Dissemination Procedures	Munitions were statically detonated and M-109 self-propelled howitzers were used to dynamically fire shells on the target.
Agents, Simulants, Tracers	VX Nerve Agent
Ancillary Testing	Not identified
Decontamination	Not identified
Potential Health Risks Associated with Agents, Simulants, Tracers	VX Nerve Agent – (Synonyms: Phosphonothioic acid, VX) VX nerve agent is extremely lethal. It is an oily liquid that is clear, odorless, and tasteless. Death usually occurs within 10-15 minutes after absorption of a fatal dosage. VX nerve agent is one of the most toxic substances ever synthesized. Symptoms of overexposure may occur within minutes or hours, depending upon the dose. They include: constriction of pupils, headaches, runny nose, salivation, tightness in the chest, nausea, vomiting, anxiety, difficulty in thinking, muscle twitches, tremors, and weakness. With severe exposure, symptoms progress to convulsions and respiratory failure. There is little information available regarding the

	long-term human health effects of exposure to low doses of VX. (Sources: Centers for Disease Control and Prevention http://www.bt.cdc.gov/Agent/Nerve/VX/ctc0006.asp [as of January 25, 2002]Zajtchuk R (ed.), Textbook of Military Medicine (part 1, Medical Aspects of Chemical and Biological Warfare, 1997), Office of the Army Surgeon General, Washington DC, 1997. SBCCOM Online, Edgewood Chemical Biological Center http://in1.apgea.army.mil:80/RDA/msds/vx.htm [as of April 2, 2002]World Health Organization, Department of Sustainable Development & Environmental Protection, http://209.61.192.180/phe/factsheet_5.htm [as of April 2, 2002] Department of the Army Pamphlet 40-8: Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX http://books.army.mil:80/cgi-bin/bookmgr/BOOKS/P40_8/CCONTENTS [as of February 5, 2002]) [as of February 5, 2002])

Senator CLELAND. From the information released yesterday, we know that some Deseret tests were categorized as land-based tests and were conducted in Alaska, Florida, Hawaii, Maryland, Utah, and included Canada and Great Britain.

Let me say that I'm extremely disappointed to learn that DOD had been testing military service members with chemical and biological agents and simulants during the 1960s and 1970s when we were at war in Vietnam. What is most disappointing is that the Department of Defense is just now acknowledging these tests some 30 years after they were conducted.

It took the determination of veterans to force the Department of Defense to acknowledge and recognize these tests. It is my hope that an outcome of this hearing will ensure that the Pentagon not treat our military service men and women as guinea pigs and be more forthcoming in dealing with our service members on issues important to their quality of life.

Despite my concern and frustration, the purpose of the hearing today should move beyond blame and disappointment. We cannot change what happened back in those days. Today's hearing is going to focus on what we can learn from this situation and how to help our veterans.

Today we must work to see that our veterans are getting the health care that they deserve. We must also focus on what additional resources we, as Congress, can provide the DOD and the VA in order to expedite these veterans' claims. In addition, we must be assured by both agencies that they are working together to share information and resources for the good of current military personnel and future veterans. Ultimately, we have to ensure that the military services and the Department of Defense are no longer conducting this kind of test on our military men and women.

As I pointed out with the Congressman, what an incredible irony that we are here all focused on weapons of mass destruction such as sarin gas and VX in another country and expending all of this energy getting the world focused on this, and we're having to pull, like teeth, information out of our own Government about what we did to our own people with these agents over 35 years ago.

Before we move on to our panelists, I'd like to acknowledge the work that has been done on this issue by other individuals. SHAD was first made public by Eric Longabardi, producer and investigative journalist for Telemedia News Productions. We appreciate his dedication and his discovery of this story and for his tireless effort to bring attention to this important issue.

I understand that Mr. Longabardi is present today. Mr. Longabardi, would you stand up, so we can recognize you and thank you for your work? Thank you very much, sir.

I also want to thank the Vietnam Veterans of America, who have, over the years, compiled a large amount of information on these tests and have kept the pressure on the Departments of Defense and Veterans Affairs to disclose information about the tests. They provided us invaluable help in preparing for this hearing.

This organization has submitted a statement for the record of this hearing. Without objection, their statement will be included in the record.

[The prepared statement of Richard Weidman follows:]

PREPARED STATEMENT BY RICHARD WEIDMAN

On behalf of Vietnam Veterans of America (VVA), and our National President, Thomas H. Corey, we would like to thank the Senate Armed Services Committee and the Subcommittee on Personnel for tackling an issue that has been ignored for more than 40 years. In addition, we would like to recognize the following individuals, without whose strong leadership and steadfast pursuit of the truth in these matters, information vital to the health of our Nation's veterans which would still remain hidden. To the distinguished Chairman of the full committee, the Honorable Carl Levin and Ranking Member Senator John Warner, as well as Senators Tim Hutchinson and Max Cleland, our sincere gratitude for your leadership. A special thank you is owed to Senator Bill Nelson for his tireless efforts as well. VVA must also recognize and thank Representative Mike Thompson for his zealous quest for the truth in the House of Representatives.

Most of all VVA is grateful and wishes to pay respect to the individuals who were exposed to live chemical warfare agents, live biological warfare agents, and perhaps strong dosages of radiation. These men have pursued the truth of these matters as civilians just as faithfully and determinedly as they fulfilled their duties to America in military service.

Sadly, the reason that this issue has not come to the attention of the American public and Congress sooner is because it appears that our military has treated its own personnel without regard for their health and safety, and obfuscation when those who have served their country require information that might affect their very lives. This delay has been further exacerbated by inaction and, occasionally, deliberate measures, on the part of individuals within the Department of Veterans Affairs (VA) who have assisted the Department of Defense (DOD) in the obfuscation of the truth, thereby allowing the VA to deny veterans claims for the adverse health effects of exposure to the agents used in Project SHAD (Shipboard Hazard and Defense). Military personnel deserve the truth surrounding health consequences related to military exposures, military testing or any event in which the DOD may be culpable. More importantly, they deserve treatment, healthcare, and compensation for resulting disability(-ies).

More than 40 years ago, Navy and Army personnel were involved in a series of tests to determine shipboard vulnerabilities. Some of these men were required to sign non-disclosure agreements to ensure their silence, others were simply not informed of the test in which they were involved or the possible health effects of such testing.

In testimony today, we will hear of the impassioned pleas of the veterans who have consistently demanded answers from the Federal Government. The committee will witness firsthand the concealment and dissemination of misinformation undertaken by the DOD and middle management gate keepers within the Department of Veterans Affairs. All of this deception and obstruction were designed to simply do two things: (1) prevent the truth from being known; and (2) delay or prevent the cost of healthcare and compensation for those affected.

This pattern has repeated itself over and over again. Consider the plight of military personnel and veterans concerning the effects of gas in World War I; radiation in World War II; Agent Orange in Vietnam; and toxic exposures in the Persian Gulf. Nevertheless, young men and women continue to serve this great Nation. One day, they may decide that the burden is too much to bear if someone does not step up to the plate and restore the confidence in our military and the Federal veterans' healthcare and compensation system. That confidence can only be restored by a national commitment that if our servicemen and women are harmed in any way as a result of their service, our Nation will do its part to make the service member whole without delay, without denial, and without reservation.

VVA could provide rather lengthy detail about how the Projects 112 and SHAD developed and who was responsible for its conduct from the 1960s through the 1970s. However, rather than give a history lesson, we want to focus on the facts, followed by some very specific recommendations.

THE FACTS

- National Security Action Message (NSAM) 235 described the scope and complexity of "Large Scale Scientific or Technological Experiments with Possible Adverse Environmental Effects." This document is submitted to demonstrate the level of concern and information requirements needed to conduct or cancel any future testing of this nature.
- The Geneva Convention, to which the United States is a signatory, requires informed consent when using humans in any kind of testing. This informed consent also covers vaccines, investigational drugs, testing deliv-

ery methods, testing protective measures, and any other testing where data is gathered through the use of human subjects.

• SHAD veterans were not afforded Geneva Convention protection in clear violation of international law. The United States Government, the Department of Defense, and the Department of Veterans Affairs withheld the knowledge that SHAD testing had actually occurred; each Department or Agency with varying degrees of complicity for well over 40 years.

• SHAD veterans have suffered needlessly because critical health and exposure data were not released for more than 40 years. Many veterans have died and others currently suffer adverse health effects that are, to this day, being dismissed as having no connection to the testing.

• As early as 1975, the United States Senate in the 94th Congress conducted hearings to understand the use and storage of toxic agents with respect to intelligence activities of the CIA and military. In this report, many of the tests discussed were under Project 112, but the Senate probe was not made aware of the full scope of the program.

• In 1977, the Department of the Army published the report titled "U.S. Army Activity in the U.S. Biological Warfare Programs," Volumes 1 and 2. Chapter 5 of this document discusses the period in which SHAD veterans were used to conduct shipboard vulnerability testing. Specifically noteworthy in this chapter is the section on page 5–6 which states, "[i]n addition, review and approval by the Office of the Secretary of Defense (OSD) and the President's Scientific Advisory Committee (PSAC)" were required. Coupled with the Deputy Secretary of Defense approval of only part of the test, these documents demonstrate the extreme care taken to assure the ultimate in safety, the highest level of review and approval, and appropriate government coordination. These reviews of proposed Biological Weapons/Chemical Weapons tests focused on the need to place governmental controls on any experiment that could have adverse effects on the environment; and precipitated NSAM 235.

• The level of consideration and review required makes it difficult for VVA to understand why DOD and the Deployment Health Support Directorate (DHSD, the office formally known as OSAGWI) is claiming that some of the tests may not have actually been conducted and that they can find no records of other tests clearly slated to be conducted. This program did not allow for fly-by-night testing to be conducted or canceled without the highest level of review. What information remains unknown concerning military testing that DOD has not admitted to? Will there be a need to meet again in the years to follow to hear admissions of additional testing?

• In 1992, the Army responded to Senator Steve Symms' personal request for information regarding a constituent who claimed he was part of a project designed to test the vulnerabilities of ships and humans to various chemical and biological agents. The answer provided to the Senator in 1992 describes almost exactly what we know about the project today.

• In 1993, Senator John D. Rockefeller, in an unrelated request, tasked the General Accounting Office (GAO) to perform a comprehensive search for all chemical and biological testing under the guise of "Military Human Experiments." This research was required in order to set the record straight on the last 50 years of human testing, including new investigational drugs and vaccines that were subsequently used during the Gulf War. The reason such exhaustive research was required was because veterans could not prove they had been part of these secret testing programs. Even though they believed that they suffered adverse health consequences of being experimented upon, absent official records of exposure, the VA could deny medical treatment and compensation because the veteran could not meet their burden of proof. According to the GAO report, the VA had knowledge of secret Army chemical tests that involved Army and Navy personnel as early as 1992.

• In 1994, many other individual veterans began to seek assistance from their Senators and Representatives to get information about the health risks and consequences of the testing. Senator Dianne Feinstein received a response from the Army which stated that "[t]he Army will respond to the VA request for information associated with personnel exposure by providing verification of exposure if possible, identification of agents used, and available information on possible dosage and effects." This statement, not unexpectedly, did not seem to apply to the GAO report then underway in 1994. In fact, as far as the VVA can ascertain, no SHAD veteran has ever re-

ceived an award of service-connected benefits for any disease or illness based upon an assertion of an etiological relationship to BW/CW testing.

• On December 8, 1994, Senator Rockefeller submitted a report titled "Is Military Research Hazardous to Veterans Health?" This report was based on the GAO investigation and was supposed to contain comprehensive findings concerning all human subject testing. In its investigation, the GAO had queried all Federal agencies, including the DOD, the VA, and any other agency believed to possess information on human testing. Nevertheless, SHAD is not mentioned in the GAO report, nor is it discussed in the Rockefeller report. Yet, even now, increasing numbers of SHAD-exposed veterans are asking for information from both the DOD and the VA. Veterans are trying to obtain the evidence that is required in order to substantiate claims for VA compensation and healthcare. The only logical possible explanation for the current situation is that the Department of Defense was neither truthful nor forthcoming in responding to the GAO about the existence of SHAD testing. Sadder still, the Department of Veterans Affairs has, until recently, acted as if its does not understand the nature of these veterans' claims or whether the testing actually occurred. Responses to VVA's Freedom of Information Act (FOIA) requests for documentation have borne out these scenarios.

• Records obtained through FOIA requests demonstrate that middle-level managers within the Department of Veterans Affairs had full knowledge of the scope and adverse heath consequences faced by service members who participated in SHAD testing. These individuals had been in direct contact with the Department of Defense concerning these matters. They include, but are not limited to, the VA's Compensation and Pension Service, Environmental Hazards, and the Veterans Health Administration. It appears that these individuals have affirmatively sought to hide the truth from senior VA management, Congress, the USOs, and the American Public.

RECOMMENDATIONS

In light of the foregoing, in order to facilitate SHAD-exposed veterans access to VA healthcare and compensation benefits before their health deteriorates further, VVA recommends the following.

• SHAD and Project 112-related information must be immediately declassified as to exposed personnel, agents employed, and dosage levels.

• Exposed veterans should be notified as soon as they are identified and called in for immediate examination and claims preparation.

• A national registry should be created for these veterans, with thorough examination and diagnostic testing protocols.

Furthermore, VVA requests an investigation be conducted by the Inspectors General for the VA, DOD, and the Justice Department into why and how information was withheld from those who needed it most, including VA leadership. The actions of those in the DOD and VA that have withheld information and/or mislead others must be rectified through investigation, proper disciplinary action, and criminal prosecution, where warranted.

Once again, VVA would like to express its gratitude to the committee for the opportunity to present its views in this matter of vital importance to our Nation's veterans. In addition, we would be remiss if we did not acknowledge and thank the Secretary of Veterans Affairs, Anthony Principi, for his sincere commitment to our service personnel, whose unknowing exposure to hazardous agents have resulted in long-term health consequences. Those men and women who have been adversely affected by their service to our country deserve no less. VVA stands ready to assist Congress and the executive branch in any way in accomplishing this task.

Senator CLELAND. Today's hearing consists of three panels. We're honored to have Congressman Michael Thompson, who just spoke, who has been working on uncovering the mysteries of SHAD and Project 112. Our second panel includes DOD and VA representatives. Our third panel includes three veterans who were actually involved in the SHAD tests.

Senator Akaka, would you like to make a statement?

Senator AKAKA. Yes, Mr. Chairman. Thank you very much for holding this hearing. The more I learn, Mr. Chairman, about what these tests entailed, the more concerned I become.

A lot of the focus from the Department, and rightly so, is on the release of BG—that's Bacillus globigii. It was released over the island of Oahu, the most densely populated island in Hawaii. It is my understanding that thousands of civilians could have been exposed to BG during this test. I'm concerned about the potential adverse health consequences of such exposure for people who may not meet the definition of "healthy."

I am particularly concerned about the tests involving sarin and MAA, a sarin simulant, on the Big Island of Hawaii. While simulants are considered harmless to healthy people, there are definite adverse health consequences related to the exposure to sarin, which is one of the weapons of mass destruction we believe to be in the possession of Saddam Hussein.

America has a sad legacy of weapons testing in the Pacific. I have worked for many years to aid residents who were adversely affected by our nuclear testing in the Marshall Islands, where people were removed from their homes and their islands used as targets. Many of them are still unable to return because of the plutonium left behind. While this was a completely different and separate testing program, there are common concerns about the adverse health impacts and the timely release of information, as you have pointed out, Mr. Chairman.

I look forward to hearing the testimony this morning and to answers to questions that I have pertaining to these tests.

Thank you very much, Mr. Chairman.

Senator CLELAND. Thank you, Senator.

Senator Bill Nelson of Florida.

Senator BILL NELSON. Thank you, Mr. Chairman.

Mr. Chairman, first of all, I want to thank you for holding this hearing, a request that I made to you when we were down in South Florida.

This all started with a number of people in South Florida telling me that there had been some mysterious and secret activity that had gone on at the old Boca Raton airfield, which was the old World War II training field. This activity started to occur in the 1950s. That area of Florida today is quite heavily developed. It now is the location for Florida Atlantic University, one of our major State universities, the Boca Raton Airport, a general aviation airport, a community college, and a research center for private industry that is connected with Florida Atlantic.

Interestingly, on the north border of the airport and Florida Atlantic is an unused, undeveloped 60-acre parcel, which we have been trying to identify. It's my expectation that in Florida tomorrow I will have historical aerial photographs of the old location comparing it with the new location today of what is undeveloped. Ostensibly, this activity was to develop a spore that could kill the Soviet wheat crop.

Along with this research, since it came to my attention from a number of our constituents, I wrote to the Department of Defense early in the year and was basically told to buzz off. As we then started to hear complaints from other veterans that are retired in Florida about a number of other tests that were conducted, not in the 1950s, but in the 1960s and the 1970s, many of these under the acronym SHAD, where ships in the Pacific basically were

gassed in order to see if their protective systems against biological or chemical agents were effective. As these veterans started coming forth, we learned they were never informed about this. Some of them were not informed until they started receiving letters earlier this year from the Department of Veterans Affairs saying, "You might want to come in and have a medical checkup." Well, 30 and 40 years later, that sounds to me like it's rather unconscionable.

Other veterans, one of whom is here with us today from Palm Beach Gardens and will testify, were not in the Pacific. He was in the Atlantic. He was ported out Newfoundland. Planes would come in and spread out and lay down a pattern of gas, and the ship would then sail through that gas. This Florida veteran who is going to testify today will tell you that they were told nothing about it. During the conduct of the test, they were not told to use any kind of protective gear. After the test, they were told, "Mind your own business." He finds out about this in 1998, because somebody is onto this doing investigation for a TV outfit in another State.

So I am grateful to you, Mr. Chairman, for your leadership in recognizing the potential here that service men and women, as well as civilians, have been subjected as guinea pigs to tests without ever being informed and, three and four decades later, are being informed that they'd better come in and have a medical examination. That is unconscionable.

Now, it's also interesting, of the 120 or so tests that were conducted even though I have been pressing the Department of Defense for information about what was going on at Boca Raton—and, of course, this committee is entirely capable of receiving classified information—that what was released day before yesterday with regard to Florida was the wheat spore test at Yeehaw Junction, which is some 70 miles from Boca Raton. But other tests that were conducted in Florida in Ft. Pierce, in Avon Park, in Panama City, and at Eglin Air Force Base, in addition to Yeehaw Junction, and the mother ship test being done in Boca Raton, none of that information has been forthcoming.

Since the Department of Defense has resisted this member of the committee to find out what went on to see if we have any kind of health hazard in Florida, I am all the more grateful to you, Mr. Chairman, for calling this hearing so that we can get to the bottom of it.

Thank you, Mr. Chairman.

Senator CLELAND. Thank you. Would you yield for a question? Do you find it as ironic as I do that we're mustering the support of the international community to go after Saddam Hussein, because he possesses the very weapons that we possess and possessed in those days and used them on our own people, our own veterans, without their knowledge in the Pacific, in the Atlantic, and in States in this country? Do you find that ironic?

Senator NELSON. Mr. Chairman, that is highly ironic. Interestingly, of the first 622 letters that were sent out by the Department of Veterans Affairs saying that the veterans had better come in, "We don't think that you have a health hazard, but we want you to come in and have it checked if you would like to"—of those 622, most of those letters of any State went to California, but the second highest, some 52 of those letters, went to veterans that are retired

in Florida. The Senator from Georgia, our Chairman, had a number of those letters. As a matter of fact, there are not many States in this Union that weren't represented in that initial batch of a paltry 622. When we get through with declassifying all these 122 tests, how many thousands is it going to be? I know that a lot of them are going to be in the State of Florida, and I know a lot of them are going to be in the Chairman's State of Georgia.

Senator CLELAND. Thank you very much.

Senator Ben Nelson, do you have any further comment?

Senator BEN NELSON. No, other than to say, Mr. Chairman, I am very pleased to be a cosponsor of this legislation. I am very anxious to learn more about the difference between classified information and sensitive information. We apparently have the opportunity to receive classified information, but perhaps not sensitive information. I think that's a distinction that shouldn't exist and I hope won't continue to exist in the future. I hope that we will be able to receive the kind of information that we need to regardless of whether it's classified or just simply considered too sensitive to release. There's no distinction as far as I'm concerned.

Senator BILL NELSON. Mr. Chairman?

Senator CLELAND. Senator Nelson?

Senator BILL NELSON. May I insert my formal opening statement in the record?

Senator CLELAND. Without objection, so ordered.

[The prepared statement of Senator Bill Nelson follows:]

PREPARED STATEMENT BY SENATOR BILL NELSON

Thank you, Mr. Chairman, and thank you for calling for this important hearing. You are truly a champion of veterans' rights and welfare in the Senate, and your leadership on this issue is appreciated across the country.

The work that lies ahead of us is daunting; this hearing is an important step in what will no doubt be a long journey of national self-examination and, where necessary, correction. I look forward to working with you and this subcommittee.

I would also like to welcome and thank today's witnesses.

Our colleague, Representative Mike Thompson of California, has been out front on this issue for many years. We owe him a debt of gratitude for his recognition of the dangers apparent in our own history of Chemical and Biological Warfare experimentation, his abiding concern for the welfare of those veterans who may have been wittingly or unwittingly exposed to the dangers of that experimentation, and his unwillingness to accept the Department of Defense's denial, delay, or deflection of their responsibility to provide the information necessary to care for those veterans. Congressman Thompson, we are honored that you join us here today.

Mr. Chairman, I join in welcoming our witnesses from the Departments of Defense and Veterans Affairs. No doubt they are fully aware that we depend upon their contributions both here and outside of the hearing room as we consider how we will move forward as a Nation to ensure the public safety, regain the public trust, and protect the rights of the possibly thousands of veterans who dutifully and faithfully put themselves in harm's way during America's years of chemical and biological warfare testing.

Mr. Chairman, I am particularly pleased to welcome and thank the veterans here with us. Gentlemen, you honor us with your presence. You have no idea how important it can be to those of us in Congress to be able to put a human face on a challenge as complex and difficult as this. Today you represent thousands of your shipmates from so many years ago. No doubt they are already proud of what you are doing, as are we in the Congress.

Over the last several months, and indeed over the last few years, we have become increasingly alarmed and disappointed by the Defense Department's acknowledgements that experimentation during the Cold War, known as Project 112 and SHAD, used chemical and biological agents that exposed service members unwittingly to potentially lethal toxins.

These tests were initiated and conducted in a different time and under different security challenges. It occurs to me that many in America may not have a clear recollection of the tensions related to the Cold War and a very real and dangerous Soviet empire. The Soviet Union was doctrinally committed to the first use of chemical weapons in support of its operations on land and at sea.

The military necessity of anticipating, understanding, and mitigating the vulnerability of our Armed Forces to gas attack was and, even today, remains indisputable. However, using our service members, or citizens, intentionally or not, as human guinea pigs is reprehensible.

Up to now, the Department of Defense has been slow to acknowledge that testing occurred, slow to acknowledge the scope of the testing, and slow to release relevant, unclassified information necessary to identify risks to public safety or the veterans who may have participated in those tests. Confidence is low among veterans that the Department of Defense has the ability or, more importantly, the willingness to provide the information necessary to identify potentially affected service members and help get them the medical care they may need.

Delay in disclosing this testing history has denied our veterans the care to which they might be entitled. Evidence available to us suggests that we have lost almost 10 years due to the Defense Department's denial, delay, over-classification, and avoidance of accountability.

Incomplete disclosure of these tests undermines the effectiveness of the effort to identify all the veterans potentially affected and getting them the care they may require.

Immediate and full disclosure is essential to the fastest possible identification of service members potentially affected by harmful agents and their rapid integration into the veterans' health system for the care they may need and deserve.

Mr. Chairman, we must work harder. The Department of Defense must finish its review of classified documents relative to Project 112 within months, not years, and get the information necessary to identify potentially affected veterans to the Department of Veterans Affairs.

We simply cannot allow anything to delay this effort, especially not bureaucratic challenges or an unwillingness to make this the national priority it deserves to be. That is why Senator Cleland and I have introduced S. 2407, the Veterans Right to Know Act of 2002. It would require the Department of Defense to systematically and comprehensively research, declassify, and disclose information relative to our chemical and biological warfare testing regardless of year or project.

Project 112 may only be the tip of the iceberg. I wonder what other chemical or biological weapon or defense test regimes may have been conducted in similar circumstances, at other times?

Mr. Chairman, through the three long generations of the Cold War, there may have been imagine hundreds of developmental and operational tests that may have exposed military personnel or even civilians to actual or simulated chemical and biological agents.

How many more late and incomplete disclosures of possible damage to the health of our veterans, or risks to our communities, will trickle out of the Department of Defense?

It is time to establish conclusively the true scope of our own chemical and biological weapons history, and to examine ways to balance our legitimate requirements for the continued secrecy of these programs and the disclosure necessary to identify and locate people potentially harmed by these tests.

We must make right whatever harm may have occurred in our past.

We must come to grips with our own history of chemical and biological weapons and defense testing if we ever hope to lead the world away from the development or use of these weapons of mass destruction.

Mr. Chairman, I have always tried to be perfectly clear about our purposes. We are not asking the United States to unravel those military secrets necessary to protect our national security.

We are asking for the Department to make available all information necessary to identify personnel who may have been exposed to harmful agents so that they may be located and afforded the appropriate medical evaluation or care.

Mr. Chairman, I am eager to work with you, this committee, our colleagues, the leadership, and the Departments of Defense and Veterans Affairs to ensure that we take a comprehensive approach to this challenge and do the right thing for our veterans and citizens.

I look forward to the testimony of these distinguished witnesses and what we will learn today. Thank you.

Senator CLELAND. I'd like to invite the next panel to come forward. We welcome our second panelists, the Honorable William Winkenwerder, Jr., Assistant Secretary of Defense for Health Affairs; Mr. Robert Epley, Associate Deputy Under Secretary for Policy and Program Management for the Department of Veterans Affairs; and Dr. Michael Kilpatrick, Deputy Director for Deployment Health Support Directorate for the Department of Defense.

Gentlemen, thank you very much for coming. We'll begin with Dr. Winkenwerder. You may begin your opening statement at this time.

STATEMENT OF HON. WILLIAM WINKENWERDER, JR., ASSISTANT SECRETARY OF DEFENSE FOR HEALTH AFFAIRS; ACCOMPANIED BY DR. MICHAEL E. KILPATRICK, DEPUTY DIRECTOR FOR DEPLOYMENT HEALTH SUPPORT DIRECTORATE, DEPARTMENT OF DEFENSE

Dr. WINKENWERDER. Thank you, Mr. Chairman.

Mr. Chairman and members of the subcommittee, thank you for the opportunity to appear before you today and to inform you on the progress of the Department in investigating the operational testing conducted by the Deseret Test Center.

With your permission, I would like to submit my written testimony for the record and provide the subcommittee with brief opening remarks.

Senator CLELAND. Without objection.

Dr. WINKENWERDER. I'd also like to introduce Dr. Michael Kilpatrick, who is here with me, as you've noted, who is our Deputy Director for Deployment Health, and who has been my lead right hand, so to speak, in overseeing these investigations. He's a well-known expert in this area, and, with your permission, I may ask him for input to answer some questions that are of a technical nature.

From 1962 to 1973, a number of operational tasks were conducted by the Department of Defense to assess certain biological and chemical agents and the Department's biological and chemical capabilities. The Department has undertaken a review of this testing and has shared with the Department of Veterans Affairs all medically-relevant information so that the VA may appropriately determine benefits and services for veterans who participated in this testing.

Yesterday, as has been noted, the Department released an additional 28 fact sheets that detailed the land- and sea-based operational testing. I first want to provide some background and place all of these activities in some context.

In 1961, the Kennedy administration, led by Secretary McNamara, as you've noted, undertook a broad review of Defense programs, numbering more than 150 different management initiatives. There were 150 Defense programs that were to be looked at. During this period, obviously, there were serious and legitimate concerns about the Soviet Union's chemical and biological warfare programs. I think we've learned since that time that that was not an unfounded concern. We're still dealing with that today.

In Secretary McNamara's review, the 112th of these programs reviewed was the Department's chemical and biological programs,

and that's how the name, "112," came into being. It was merely an ordinal number. It did not have, for the record, anything to do with the number of tests. An agenda for Project 112 was soon established, and that was to be overseen by scientists at the Deseret Test Center.

A subset of Project 112 was a series of tests done at sea known as Project SHAD, Shipboard Hazard and Defense. The purpose of SHAD was to identify U.S. warships' vulnerabilities to attack with biological or chemical warfare agents, to develop procedures to respond to such attacks while maintaining a warfighting capability. The purpose of the land-based test was to learn more about how chemical and biological agents behaved under a variety of climatic, environmental, and use conditions.

Here is what we know about these operational tests so far. The Department planned 134 tests under Project 112. Of these 134 tests, we know that 62 were cancelled. We know that 46 tests did take place. We're investigating the remaining 26 planned tests, though our preliminary findings suggest that most of these tests were likely not to have been performed. They were towards the end of the period 1970 to 1973.

Our review of the record indicates that around 1970, President Nixon declared an end to the offensive-related biological and chemical warfare programs, and that is, in fact, what led to a winding down of the Deseret Test Center activity.

Of the 46 tests that were completed, we now have released information on 37 of them and have turned the medical information over to the VA. For 5, we continue to seek the final reports. An additional 4 are pending review.

We decided to release what we've released now as much as we could as soon as we could. I've indicated, as I did to Senator Rockefeller, I'm absolutely committed to getting this information out as rapidly and as accurately as possible.

We've made rapid progress in our investigation, declassification, and release of information to the public over the past 4 months. What we've released since this time does account for the great majority of the total information that's been made available.

The information we have released in the past 13 months adds more detail to the public record first created in 1977. There is some public record on this, when the Army released a report titled, "U.S. Army Activity in U.S. Biological Warfare Programs," and I've got a copy of that here. It is, I think, useful to read to know a bit more about the program, how it came into being, its oversight. There were hearings at the time before the Senate Subcommittee on Health and Scientific Research.

From these and other reports, there is documentation in here that, at least in the view of folks at that time—it's certainly open to question today, but in their view then—that extreme care was taken to assure the ultimate in safety, the highest level of review and approval, and appropriate governmental coordination.

There is also evidence of coordination with State and local Government agencies at the time of the tests, though it's hard to obtain documentation on that and exactly what was said to whom and when.

Discussions with scientists involved with planning and conducting these tests also indicate that care was taken to inform and appropriately protect personnel when real or harmful chemical or biological agents were used. Although these operational tests were conducted without the level of occupational safety and environmental procedures that we would expect today, we have no evidence that the tests using harmful substances were performed without an attempt at appropriate protective measures. When simulants were used, these simulants were not believed to be harmful to humans at that time.

As far as we can determine today, no service members have suffered harmful health effects from participation in those tests, but obviously this is a topic that needs further rigorous scientific review and study, and we're working on this. The VA will be able to describe a study, in fact, that is being undertaken to look at this.

Again, I want to emphasize that the purpose of these operational tests was to test equipment and capability to fight under these conditions when there were biological or chemical agents. The tests were not conducted to look at or evaluate the effects of dangerous agents on people. So, as such, they were not medical research tests on people; they were to look at warfighting capability.

That said, people participated in these tests, so we are concerned for any adverse effect that may have occurred, obviously.

Today, no research, development, test, and evaluation in the Department of Defense involves the exposure of human subjects to chemical or biological agents. The military services do still use simulants during operational testing and training following specific Federal laws, which are much more considerable today with the need to comply with OSHA and EPA standards.

Small quantities of chemical agents are used in indoor controlled facilities to operate and test protective equipment and to operate detection and decontamination systems.

The Department has worked diligently to release the medically relevant facts about this testing and to ensure that the VA has the information it needs to respond to questions and benefit claims from veterans.

We're clearly on track to meet our stated promise, my promise, that we would have all relevant information released by next spring. I'm optimistic that we can exceed that goal that we set 2 or 3 months ago and will have concluded that effort before this time.

Mr. Chairman, I thank you again for inviting me here today. I'm pleased to accept your and the other subcommittee members' questions.

[The prepared statement of Dr. Winkenwerder follows:]

PREPARED STATEMENT BY DR. WILLIAM WINKENWERDER, JR., M.D., M.B.A.

Mr. Chairman and members of the subcommittee, thank you for the opportunity to be here today. Moreover, I want to thank you for your continued support of the men and women who have served in our Armed Forces.

As Assistant Secretary of Defense for Health Affairs, I want to stress that the Department of Defense (DOD) is absolutely committed to an aggressive and thorough investigation of all chemical and biological warfare tests planned and performed by the Deseret Test Center between 1962 and 1973. The purpose of the investigation is to provide relevant medical information to the Department of Veterans Affairs (VA). The Deseret Test Center was established as a result of Project 112. Project

112 was one of 150 management initiatives begun by Defense Secretary McNamara, after his review of the Department of Defense in 1961. Under Project 112, the Deseret Test Center planned and conducted a joint chemical and biological testing program that included shipboard and land-based testing. Project Shipboard and Hazard Defense (SHAD) was the shipboard portion. SHAD was designed to test ships' vulnerability to biological or chemical attack.

When I testified before the Senate Veterans' Affairs Committee in July of this year, I expressed that we are dedicated to finding and declassifying all relevant medical information from those tests. Additionally, we are committed to sharing this information with the VA by June 2003. Today, I would like to discuss what we have done, what we have learned, and what are currently doing.

Since August 2000, when the Department of Veterans Affairs requested that the Department of Defense provide information concerning classified Project SHAD tests, we have developed a close working relationship with the VA. From the beginning of this process, VA staff members have met regularly with our investigators to review their activities and to verify that the information being sought was what VA needed to assist them in addressing health care matters and settle benefit questions. A team from our Deployment Health Support Directorate meets regularly with VA personnel, to ensure we provide the VA with the relevant medical information they need to address veterans' concerns.

To date, our investigation has revealed a great deal about tests planned and conducted by the Deseret Test Center. The Center planned 134 tests between 1962 and 1973. So far we have verified that 46 tests were conducted and 62 were cancelled. We are working to determine the status of the remaining 26 tests. The majority (24) were planned for 1970–1974, a period in which plans were being made to close the Deseret Test Center.

We are working closely with the Department of the Army to facilitate declassification of the necessary data, focusing on relevant medical information. Because many of the same agents remain a threat to our forces today, the records cannot be casually declassified. Our investigators identify the relevant medical information and request declassification of this specific information in a process that has been significantly expedited.

As information becomes available, it is provided to the VA in the form of fact sheets. To date we have published 45 fact sheets on 41 tests which involved more than 5,000 servicemembers. The fact sheets detail which ships and units were involved in tests, when the tests took place and what substances the crew may have been exposed to. In order to expedite the VA's notification to affected veterans, we now provide names and service numbers of service members involved in each test to the VA as soon as we identify the ship or unit involved; we do not wait for the declassification process to be completed. To date, we have provided the VA with the names of 4,990 veterans from 16 of 18 known shipboard tests and are searching for classified reports which identify the ships used in the remaining two tests.

Our investigation has confirmed that Deseret Test Center tests were primarily conducted using simulants believed to be safe in place of chemical or biological warfare agents. In those instances when potentially harmful substances were used, there is no evidence that any of the service members involved were exposed to them without proper protection. Service members were vaccinated before testing that involved live biological agents. If actual chemical agents were used they were confined to airtight sections of their ship. When appropriate, protective clothing was also worn. While some service members may not have known all the details of these tests, it is likely they knew that they were participating in testing due to use of precautionary measures. We have learned that the scientists involved informed senior leaders about tests using simulants. Like other operational activities, service members were not informed of these tests.

Information is presented to the VA as quickly as possible and is posted on our web site, http://deploymentlink.osd.mil. A chart located on that web site shows the status of our investigation for each of the tests and is updated regularly. In addition to responding to letters, e-mails, and telephone calls placed to our toll-free number, we have also attended the reunion of the crew of the U.S.S. *Power* and have asked other crews to allow us to attend their reunions to help us better understand the concerns of these veterans. We have also sought out scientists and senior officials involved with the tests to increase our understanding of what happened during the tests.

With the termination of the U.S. offensive chemical and biological weapons programs and with changes to operations and health research standards, the use of live agents on humans is severely restricted. With modern technology we can determine the effectiveness of defensive measures by using mannequins. The military services do still use simulants during operational testing and training. We are reviewing all

policies governing the use of simulants during testing and training. Additionally, small amounts of live agent are used in training at the chemical school. Our objective is to ensure that concerns like those surrounding the Deseret Test Center tests do not arise in the future.

Mr. Chairman, this concludes my statement. I thank you and the members of this committee for your outstanding and continuing support for the men and women of the Department of Defense. I look forward to addressing your questions.

Senator CLELAND. Thank you, Dr. Winkenwerder.

Mr. Epley?

STATEMENT OF ROBERT J. EPLEY, ASSOCIATE DEPUTY UNDER SECRETARY FOR POLICY AND PROGRAM MANAGEMENT, DEPARTMENT OF VETERANS AFFAIRS; ACCOMPANIED BY DR. KENNETH CRAIG HYAMS, CHIEF CONSULTANT, OCCUPATIONAL AND ENVIRONMENTAL STRATEGIC HEALTHCARE GROUP

Mr. EPLEY. Mr. Chairman, members of the subcommittee, thank you for the opportunity to testify about VA's activities surrounding Project 112 or Project SHAD.

I do want to mention that I'm accompanied today by Dr. Craig Hyams. Dr. Hyams is our Chief Consultant on Occupational and Environmental Strategic Healthcare Group, and he will assist in medical-related questions.

Based on your subcommittee request, I'll try to provide background on VA involvement in Project SHAD and outline our current efforts to identify involved veterans and to provide the appropriate outreach, benefits, and services to them. I'll also try to summarize our ongoing cooperative efforts with DOD.

I would ask permission to submit my written testimony for the record.

Senator CLELAND. Without objection, so ordered.

Mr. EPLEY. VA involvement with Project SHAD began in 1997 stemming from development of an individual claim for benefits. We were advised at that time that all the relevant records about the tests were classified and that general access to the material was not possible. The matter resurfaced later through a congressional inquiry. In October 2000, the VA/DOD working group was established. Our agencies have worked together on the issue since then.

On July 10 of this year, Under Secretary for Benefits Daniel Cooper testified before the Senate Committee on Veterans' Affairs about Project SHAD. The Under Secretary outlined our progress in identifying SHAD test participants. He related that VA had mailed outreach letters to 622 veterans, which has already been alluded to today, from the first three declassified tests and that VA/DOD efforts were ongoing to identify additional test participants.

Based on a request from Senator Arlen Specter during that July hearing, VA submitted a report to the Senate Veterans' Affairs Committee and a copy to the House Veterans' Affairs Committee summarizing our efforts and the analyses of the SHAD participant contacts with VA. That report has been supplied to your subcommittee in advance of this hearing.

Since the Senate Veterans' Affairs Committee hearing, VA has continued to work on outreach to SHAD participants and the VA employees. In August, we mailed 777 additional outreach letters to veterans who participated in 9 other declassified tests. We have

provided medical and other background information about Project SHAD to our medical staff through a series of information letters and hotline calls. We've put out that same information on our SHAD web site, and we have linked our web site to DOD's so that people who are inquiring can find out about the test and about information available through the VA.

Our Veterans Health Administration can now track health care utilization by special groups of veterans such as the veterans who participated in Project SHAD. This capability allows VA to evaluate the health of veterans every time they obtain care in the VA and to provide a broader and longer-term assessment of the healthcare status of SHAD participants.

Also, it's important to note, on September 30, 2002, VA contracted with the National Academy of Sciences to conduct an epidemiological study of the mortality and morbidity among SHAD participants compared to veterans who did not participate in Project SHAD. This will be an independent epidemiological study, and it will give us the clearest possible picture of the health status of SHAD veterans and tell us whether their health was harmed by participation in the SHAD tests. The study will compare the current health of veterans who participated in the SHAD tests more than 30 years ago with the health of veterans from the same era who served on ships not involved with the testing. We're taking all the appropriate actions we can to learn about Project SHAD and to inform the test participants.

Our work with DOD and the cooperation of the two agencies has been accelerating. In September 2002, DOD provided VA with information on about 2,100 additional veterans involved in the test. VA and DOD personnel have stepped up the declassification process, and DOD has helped VA by designing, building, and updating a computerized roster of Project 112 veterans for VA's use.

We intend to share the DOD toll-free telephone number in our future outreach so they can access DOD, as well as VA.

We appreciate DOD's efforts, and we understand the difficulty of their task. We're confident that collaboration will continue. While we cannot change what happened in the past, as you said, Mr. Chairman, in the future, VA can better serve the Nation's veterans if we have complete medical evidence on what existed whenever service members are deployed to areas that may place their health at risk. VA, therefore, supports DOD's efforts to collect greater health and exposure data during any such hazardous deployments.

In conclusion, VA welcomes DOD's accelerated efforts to provide information about Project 112, and we look forward to receiving information on the remaining tests as quickly as possible so that we can assist veterans in addressing their healthcare matters and properly adjudicating their benefit claims.

That concludes my testimony, Mr. Chairman, and I'd be happy to answer questions.

[The prepared statement of Mr. Epley follows:]

PREPARED STATEMENT BY ROBERT J. EPLEY

Mr. Chairman and members of the subcommittee, thank you for the opportunity to testify today on the efforts of the Department of Veterans Affairs (VA) to provide health care information and benefits to veterans who participated in tests conducted by the U.S. Army's Deseret Test Center, including Project SHAD.

PROJECT SHAD/DESERET TEST CENTER PROJECT 112

Project SHAD, an acronym for Shipboard Hazard and Defense, was part of the Deseret Test Center chemical and biological warfare test program known as Project 112, which was conducted by the Department of Defense during the 1960s and 1970s. SHAD encompassed a series of tests designed to identify U.S. warships' vulnerabilities to attacks involving chemical or biological warfare agents. Other Project 112 tests involved similar land-based tests.

VA first learned of SHAD when a veteran filed a claim for service connection for disabilities that he felt were related to his participation in Project SHAD. In two meetings held with DOD in late 1997, VA was advised that all relevant records about these tests were classified and general access to that material was not possible, but that it could be provided on a case-by-case basis.

In May 2000, VA's Under Secretary for Benefits responded to a Congressional inquiry requesting assistance for veterans involved in Project SHAD. A VA/DOD workgroup was subsequently established and met for the first time in October 2000. Since that time, DOD and VA have worked together collaboratively to assess the possible health impact of participation in Project 112. DOD has committed to provide VA with all medically relevant data and a complete roster of participants involved in tests conducted by the Deseret Test Center in the 1960s and 1970s.

AUGUST 5, 2002 REPORT

On July 10, 2002, VA's Under Secretary for Benefits, Daniel Cooper, testified before the Senate Committee on Veterans' Affairs. Under Secretary Cooper stated that DOD had provided VA with information on 12 SHAD tests and that VA had initiated a significant outreach program to locate and contact veterans. At that time, VA had mailed outreach letters to 622 veterans who participated in the initial three Project SHAD tests declassified by DOD for whom social security numbers and addresses had been obtained.

DOD continues to release the names and service numbers of veterans of Project 112. As new names are received, VA initiates an exhaustive process to locate these veterans and to provide them with information about their participation in Project 112 and about possible health effects related to the chemical and biological warfare agents used in those tests. For SHAD veterans VA had been unable to identify, Under Secretary Cooper advised the committee that we had established a SHAD Helpline (at 1–800–749–8387), Internet web-site (at www.VA.GOV/SHAD), and an e-mail address (at SHADHELPLINE@VBA.VA.GOV).

During the July 10 hearing, Senator Arlen Specter, the ranking member, asked VA to send the committee a report about the health and disability status of veterans who participated in Project SHAD. A report dated August 5, 2002, titled "VA Health Care and Compensation for Project SHAD Veterans" was provided to the Senate and the House Committees on Veterans' Affairs, on August 9, 2002, and subsequently provided to your subcommittee.

By that time, DOD had provided VA with the names of participants for two additional SHAD tests that had not yet been declassified.

This brought the total number of names of SHAD participants DOD provided VA to approximately 2,900 veterans who participated in the 12 declassified and 2 classified tests. In addition to the statistical data VA provided the committee regarding compensation claims previously filed by Project SHAD participants, VA reported that 11 of the 622 veterans who had been mailed outreach letters in May 2002, subsequently enrolled for VA health care for the first time. VA also reported that as of August 1, 2002, there were compensation claims pending decisions for 28 veterans alleging disabilities due to exposure to agents and substances while participating in Project SHAD.

Activities Subsequent to the Report of August 5, 2002

Working with the Internal Revenue Service, VA was able to obtain addresses of some participants in the remaining group of nine declassified tests. We had not obtained these participants' social security numbers at the time of the July 10 hearing. On August 15, 2002, VA mailed outreach letters to 777 veterans who participated in the nine subsequent declassified tests and to participants in the initial three tests who DOD identified being involved in multiple tests. Before finalizing the language in that outreach letter, VA received helpful input from the Vietnam Veterans of America, which we incorporated in the final letter.

Relevent medical and other background information about Project SHAD has been provided to VA medical staff through regular publication of information letters from VA's Under Secretary for Health. The information letters provide VA health care personnel with background information on Project SHAD, along with information

about the potential short- and long-term health effects of the specific chemical and biological agents that DOD tells us were used in these tests. On August 26, 2002, Under Secretary for Health's Information Letter (IL 10–2002–016), "Possible Occupational Health Exposures of Veterans Involved in Project SHAD Tests" the third information letter in this series was issued, based on additional information obtained from DOD. This information has been made available on our SHAD web site at www.va.gov/SHAD, which contains the information letter and other relevant information.

In addition to information letters, the Veterans Health Administration (VHA) has engaged in an extensive outreach effort to ensure that VA medical centers know about SHAD veterans and their potential hazardous exposures during Project 112. VA hospital directors have been regularly apprised of Project SHAD through hotline calls, as have VA health care personnel involved in deployment health problems. A directive has been issued by VHA that makes facility directors responsible for ensuring that enrolled SHAD veterans requesting care are clinically evaluated by knowledgeable health care providers. Additionally, as suggested by the Vietnam Veterans of America, the VA and DOD web sites, which provide information on Project 112, have been linked to provide ready access to health data among VA and DOD health care personnel and veterans.

To date, relatively few Project 112 veterans have sought care from VA in response to the recently released information. Among 1,399 Project 112 veterans who have received a notification letter since May 2002, inviting them to receive a clinical evaluation from VA if they have any health concerns, 31 veterans have newly enrolled for VA health care. VA will continue to provide up-to-date information on Project 112 to its health care providers in order to ensure that these veterans receive optimal health care.

VA is engaged in a comprehensive process to augment its medical record system and to connect computerized health databases into a coherent network. Because of progress in integrating VA's computerized health databases, VHA can now track health care utilization by special groups of veterans such as the veterans who participated in Project SHAD. For evaluating the health of Project SHAD veterans who come to VA for health care, the use of these standard health care databases provide several important advantages over special clinical programs, which have been used in the past to evaluate particular cohorts of veterans, such as Vietnam and Gulf War veterans. The use of VA's health databases allows VA to evaluate the health utilization of veterans every time they obtain care in the VA, not just on the one occasion that they elect to have a registry examination. This will provide a much broader and longer-term assessment of the health status of these veterans because many veterans return frequently for VA health care, and because veterans are often seen in different clinics or even different parts of the country for specialized health care.

In September 2002, DOD provided VA with the names and service numbers of about 2,100 additional veterans who were participants in tests just recently declassified. VA is currently matching this data against its Beneficiary Identification and Records Locator Subsystem (BIRLS) and Compensation and Pension Master Record file to identify and extract data for these individuals, to include social security numbers where available. To date, DOD has provided VA with the names of about 5,000 individual participants of Project 112.

On September 30, 2002, VA entered into a three million dollar contract with the Medical Follow-up Agency of the National Academy of Sciences to conduct, over the next 3 years, a formal epidemiological study of mortality and morbidity among SHAD participants in comparison with veterans who did not participate in Project SHAD. In contrast to a special clinical program, which cannot provide scientific data about the health risks of this group, this independent, epidemiological study will give us the clearest possible picture of the health status of SHAD veterans and tell us whether their health was harmed by participation in SHAD tests. The study will compare the current health of veterans who participated in the SHAD tests more than 30 years ago with the health of veterans from the same era who served on ships not involved with the testing. The study will also compare the mortality rates of the two groups.

We are looking to multiple sources to identify Project 112 veterans and determine their social security numbers, as recommended by veterans service organizations. For example, on September 26, 2002, the names and service numbers for Project 112 veterans whom we had not been able to identify were matched against the National Cemetery Administration's database. The match produced social security numbers for 58 veterans and the date of death for 24. VA is also working with the National Personnel Records Center in St. Louis to review personnel and medical files for veterans for whom we have been unsuccessful in finding social security numbers. The

social security numbers will be used to obtain addresses and initiate outreach to more Project 112 veterans.

Through the week ending September 27, 2002, VA has received 417 calls on its toll-free SHAD Helpline. As of September 30, 2002, VA had compensation claims pending decisions for 53 veterans alleging disabilities due to exposure to agents and substances while participating in Project 112. Just as the number of compensation claims has increased, so has the number of veterans recently enrolled for VA health care. As noted earlier in my testimony, since May 1, 2002, 31 veterans who received outreach letters alerting them of possible adverse exposures, have newly enrolled for VA health care for the first time. High quality medical care can be provided right now for each SHAD veteran who seeks a clinical evaluation in the VA.

DOD Working with VA

As I previously stated, DOD has committed to provide VA with all medically relevant data and complete rosters of participants involved in tests conducted by the Deseret Test Center. They've stepped up efforts to complete the declassification process as quickly as possible and have committed to sharing all information with VA by June 2003. In fact, VA just recently received Fact Sheets for 27 additional tests.

DOD and VA personnel meet regularly to discuss the status of the declassification process. The working relationship between the two Departments continues to improve. In addition to stepping up the declassification process, DOD has helped VA by designing, building, and updating a computerized roster of Project 112 veterans for VA's use. DOD has also agreed to allow VA to include its toll-free phone number in future outreach letters so that veterans who need help verifying participation in Project 112 or who have questions about the tests themselves, can communicate directly with DOD representatives.

We appreciate DOD's efforts. We understand that it's problematic to locate and declassify records that are 30–40 years old. We also understand that, according to DOD's testimony here today, these records cannot be casually declassified because many of the same agents still remain a threat to our military men and women.

While we cannot change what happened in the past, in the future, VA can better serve the Nation's veterans if complete medical evidence exists whenever service members are deployed to areas that may place their health at risk. VA, therefore, supports DOD's efforts to collect greater health and exposure data during hazardous deployments.

In conclusion, VA welcomes DOD's accelerated schedule for providing relevant information about Project 112 and the veterans who were involved in these tests to us. VA looks forward to receiving information on the remaining tests as quickly as possible so that we can assist veterans in addressing their health care needs and properly adjudicating their benefit claims.

This concludes my testimony. I will be happy to answer any questions that the committee may have.

Senator CLELAND. Thank you, Mr. Epley.

Dr. Winkenwerder, it's interesting, in today's paper we find that the Senate Intelligence Committee is trying to get information declassified from the CIA about Saddam Hussein's biological and chemical weapons, and we're trying to get information declassified from our own Government about biological and chemical weapons used on our own soldiers long before Saddam Hussein ever came to power. Do you find that ironic?

Dr. WINKENWERDER. Well, what I would say is that biological and chemical weapons are a scourge that have been with us since, as my reading of the history is, a good part of the last century, and it is clear that we have had concerns of our own and had concerns about what our adversaries were doing.

I think that my view, honestly, Senator, is that the folks at that time were honestly trying to do what they thought was the right thing to protect this country. That said, in retrospect, and even applying a better standard to that time, in that day, more could have been done and should have been done to inform those who participated in those operational tests of risks that might be associated with their participation. I think we owe it to our service members

to give them that kind of information. I think we're working today to do that, to expose risk wherever we find it and get it right out in front of people so that we can protect them.

Senator CLELAND. Congressman Michael Thompson, as has been pointed out today, has introduced legislation on the House side that provides for full disclosure on Project 112 and SHAD so that the veterans and the VA can understand what happened. All of us present at this hearing today are cosponsors of similar legislation on the Senate side.

Does the administration support this legislative effort? If not, why not?

Dr. WINKENWERDER. We support making this information available. That's why we're taking these steps. I think it is unfortunate that those requests that were made apparently during the last 10 years or so did not produce answers. But there should be no question about this Department's, this administration's, commitment to get this information out.

I came on board in September 2001 and, frankly, did not become aware of this until the spring of this year, and upon learning of that, had no hesitation that this is the kind of information that we need to get out. It's taken a lot of work and effort.

I think we're doing, right now, what the legislation would have us do. So, in principle, we're agreeing with the purpose.

I haven't had the opportunity to actually look at the legislation to see it in detail and so can't give you an answer on that just now, but there shouldn't be any doubt about our commitment to move forward and produce the information that people deserve to have.

Senator CLELAND. Hopefully the administration will look positively on the fact that we've included the essence of our bill in the pending National Defense Authorization Act and have asked the conferees to expand it to include all of Project 112. I'm hopeful that the conferees will agree to include it.

I would like to go now into our round of questions. Dr. Winkenwerder, what assurances can you give us that DOD is not conducting or planning to conduct chemical and biological tests on our current military personnel?

Dr. WINKENWERDER. We've asked that very question, and my office and Under Secretary Chu's office, who is responsible for all personnel and readiness issues in the Department, Dr. Chu has sent a letter to Under Secretary Aldridge, who oversees all of these programs, as well as secretaries of all the services, to assure us that the things that we're doing today in no way bring people into harm or risk that they should not be brought into.

Obviously, there are some kinds of training that we do where, at the end stage, after using simulants, in a controlled, closed-air environment, chemical agents are used. People have full gear on, obviously, in order to gain their confidence about dealing in a chemical or biological environment. Those substances are used, but I have been assured that there's no open-air testing or anything that would remotely look like this series of tests.

Senator CLELAND. Mr. Epley, have there been any discoveries of medical records that would indicate that the military service members may have suffered side effects as a result of exposure during SHAD tests?

Mr. EPLEY. Mr. Chairman, so far the number of claims that we've received has been limited. We did a review of our claims system at the end of September. We had 53 pending claims from people who believe that disabilities may have been associated with Project SHAD. Those claims are pending right now.

We also looked at the number of veterans currently receiving disability compensation and found that we had 299 veterans who are on the list of SHAD participants, who had filed claims independently, and who have one or more service-connected disabilities. The array of their disabilities does look like the rest of the veterans that we're paying compensation to, generally. The most common disabilities on that list were hearing loss, scars, and musculoskeletal disabilities, like knee and lower back conditions. I believe the same array, although it's a very small sample, is true on the medical side.

Dr. HYAMS. That's true. The SHAD veterans have been accessing our healthcare system at about the same rate as other military veterans. But right now, it's sort of a moving target. We keep getting names from DOD about the participants in the SHAD experiments. We're going to have to update our data as we go along. But up to this point, they've been accessing the VA healthcare system at about the same rates.

I'd like to add, I think the best chance of finding out whether or not their health was harmed back during the Project SHAD testing is through our IOM study, the Institute of Medicine, and the study that they will be conducting. It'll be a comprehensive epidemiologic study, independently-conducted by a first-rate group of researchers. It'll really tell us whether or not their health was harmed in the past.

Senator CLELAND. As a former head of the Veterans Administration, I have a sense of dejá vu all over again here. In 1978, the question of Agent Orange broke. We did a serious look at the accessing of the VA healthcare system by Vietnam veterans, and they were not using it any more or less than any other veterans. That didn't tell us a whole lot.

What ultimately did tell us a lot was beginning an epidemiological study and really sticking with it over a period of time. As time went on, in the 1970s and 1980s, we began to see that Agent Orange, the dioxin in the defoliant that was used in Vietnam, that terrible chemical agent was impacting more lives than we assumed.

I hope the Veterans Administration, as you get the information from DOD, will stick with it over a period of time and continue to communicate to veterans and inform them of the services available.

Dr. Winkenwerder, one of the outcomes of the Gulf War was stories that DOD administered shots or medication and vaccines to combat possible chemical and biological attacks on our forward-deployed forces. Now that we're thinking about going back into the Persian Gulf area, what has DOD put in place to ensure that military men and women are told what's being administered to them? What has DOD done to ensure that military personnel medical records are up to date and accurate, especially in a combat situation?

Dr. WINKENWERDER. Thank you, Senator, for the question. We believe that we've made considerable progress over the 1990s in

our efforts to prepare for and mitigate the risks against the use of chemical or biological weapons. That issue has been my top priority since I've been at the Department, starting last fall with our effort to get licensure for an anthrax vaccine, our subsequent efforts to work very closely with the Department of Health and Human Services on the matter of smallpox, and our efforts to work collaboratively across all three services and with the acquisition community on issues that relate to medical surveillance, recordkeeping systems, and things like detectors and protective clothing and equipment.

I believe that, although there's obviously no way to give 100 percent assurance, if we face that horrible situation, about the outcomes, I believe that we're as well prepared as we can be and we're taking every step we know how.

Senator CLELAND. Thank you very much, Doctor.

Senator Akaka, any questions?

Senator AKAKA. Thank you very much, Mr. Chairman.

Dr. Winkenwerder, I understand you believe the universe of veterans involved is about 5,500.

Dr. WINKENWERDER. Yes, sir.

Senator AKAKA. Do you have any idea how many civilians have been exposed?

Dr. WINKENWERDER. No, sir. I don't know the exact number for that. I do know that, in the case of Hawaii, it is likely with the use of the simulant Bacillus globigii, thought to be harmless, that there may have been many civilians, into the thousands, that could have been exposed with an air release of that substance. There could have been small handfuls possibly in the areas of Puerto Rico or Florida that are the two additional locations that we think. In all other cases, we don't believe that there's any evidence from the record or anything that we can learn today that says that other civilians might have been exposed.

Senator AKAKA. The reason for this was, they were looking for a tropical island setting, and so Hawaii suited that. Was this done over both land and water?

Dr. WINKENWERDER. Yes.

Senator AKAKA. Do you have any plan to provide notice to civilians?

Dr. WINKENWERDER. We have had communications. I did speak with the Governor just about this issue the day before yesterday, I believe it was, and I think Secretary Chu has talked to Senator Inouye. We actually tried to reach your office, as well, and I'm sorry we didn't get connected.

We are making this information available. I think it is unfortunate. It is going to be difficult, because of the time lapse, to know which individuals were there at that time and whether there's been any adverse effect. Again, this particular simulant occurs naturally in the environment, so it should not have created any problem, certainly for healthy people. I think today we've learned more, we didn't know these things then, that some of these kinds of agents could pose a risk for people with compromised immune systems.

Senator AKAKA. At yesterday's press conference, you stated that thousands of civilians were exposed to simulant BG.

Dr. WINKENWERDER. Yes.

Senator AKAKA. Which was released over Oahu in May and June 1965.

Dr. WINKENWERDER. I think that's correct.

Senator AKAKA. What were the specific dates of these tests?

Dr. WINKENWERDER. Let me turn to Dr. Kilpatrick for that.

Dr. KILPATRICK. Again, we can get those from the specific records. They were done as trials in a series. They were released at different locations at different times. I think to get you that accurate information, we'll have to take that for the record and respond.

Senator AKAKA. I certainly would want to request that information.

[The information referred to follows:]

Extracted from Test 65-6 Big Tom (U) Final Report - Table 8 (U) dated January 6, 1967

Trial	Date (1963)	Time[a] (LST)
A-1	24 May	2029
A-1R1	26 May	2053
A-2	27 May	2037
A-3	28 May	2003
A-4	3 Jun	2000
A-5	4 Jun	2000
A-6	7 Jun	2006
A-7	15 Jun	1955
A-8	16 Jun	2019
A-9	17 Jun	2001
A-10	18 Jun	1959
B-1	31 May	2007
B-2	1 Jun	2001
B-3	2 Jun	2000
B-3R1	11 Jun	2000
B-3R2	14 Jun	2001
B-4	9 Jun	1958
B-5	10 Jun	1953
B-6	12 Jun	1943

[a] Time of BG release; FP releases were made prior to and after the BG releases.

Senator AKAKA. Which or how much BG was used during those tests?

Dr. KILPATRICK. Again, that is in the classified information, but we can provide that to you. The reason we've not extracted all of those concentrations is, in dealing with the VA, our initial purpose was to get medically-relevant information for the VA to be able to take care of veterans. Their concern was any exposure, regardless of concentration, would be presumed to be sufficient concentration to cause illness if those agents are recognized to cause illness. So, in the information we release to the public, we've not focused or tried to determine concentrations. But what amount was released is in the classified information, and we can certainly provide that to you.

[The information referred to follows:]

Information on quantities and concentrations of agent or simulant used in Project 112/SHAD testing remains classified. The question posed by Senator Akaka during testimony was addressed by Dr. Kilpatrick in a separate classified briefing. That briefing occurred on October 18, 2002, at a secure briefing site in the U.S. Capitol Building to Senator Akaka and selected staff members. There were no follow-on questions or tasks from that briefing.

Senator AKAKA. After going through 5,000 pages of documentation, did you or your staff come across any evidence of adverse health impacts on the civilian population?

Dr. KILPATRICK. We saw nothing regarding the civilian population in any of the records of these tests. We also have seen nothing in the records of anything with the military personnel who were involved in these tests. However, we have found one record that said, for the 11-year duration of the Deseret Test Center, that only four people were infected, and they were treated and cured. We don't know who they were. We don't know what the infection was. We are continuing to look in the records, and we'll keep looking until we either decide that there's nothing more to look at or we find an answer.

But it indicates that those people who were involved in this testing were appropriately protected when live agents were used. Certainly when we see the medical effects, we've not seen anything in those records. Now, those are not health records.

For the shipboard tests, we've looked at ship's logs, not the individuals' health records, but shipboard logs, and they do not indicate any evidence of illness outbreaks in the crew during or immediately subsequent to the testing.

Senator AKAKA. The fact sheet states that BG is considered harmless for, and Dr. Winkenwerder used the word, "healthy" individuals. The question is, what are the consequences for individuals who are not considered healthy? What is your definition of healthy?

Dr. KILPATRICK. We are not trying to define whether this Bacillus globigii (BG) is a harmful agent or not; we're looking at what the EPA and CDC have put out as far as hazard from these organisms. Each of those agencies have said that this is an organism that is present in soil, as many as 100,000 to a million spores per gram of soil, that this is not pathogenic or toxigenic to humans.

However, when we take a look at people being hospitalized and cultures from people, the organism has been cultured from people who have had intravenous lines who are immunocompromised in a hospital. It has been cultured from lungs, from meninges of critically ill people. It is an organism that is in our environment. It certainly can become an organism that can cause illness and infection in an immunocompromised person, one under chemotherapy, those sorts of conditions.

Senator AKAKA. Mr. Chairman, I have further questions. I don't know whether you have a limit of time here.

Senator CLELAND. If you have one more question that you'd like to offer, that would be fine.

Senator AKAKA. Dr. Winkenwerder, while a lot of the focus so far has been on the Big Tom test, because of the exposure to civilians, I was very concerned to learn about the release of sarin in the testing that occurred outside of Hilo on the Big Island, called Waimea Forest Reserve. How much sarin was used in the comparison to the simulant?

Dr. WINKENWERDER. I'm going to turn to Dr. Kilpatrick again, because I don't know the answer to that question.

Dr. KILPATRICK. Again, the purpose of that study was to take a look at different delivery systems, bomblets in a jungle environment, to see what is the release amount and what is the duration of that nerve agent being present.

There, the area used was a remote area. There were no people there. The monitors that conducted the test were looking at the persistence of that agent in that environment over time. Sarin is an agent that degrades fairly quickly, in a matter of hours to days, depending on sunlight, humidity, and many other conditions. It would be rendered nontoxic in that environment.

So, again, we can provide for you specifically what were the numbers of those bomblets that were released. That, again, is part of the classified information.

[The information referred to follows:]

Information on quantities of bomblets containing agent or simulant used in Project 112/SHAD testing remains classified. Dr. Kilpatrick addressed the question posed by Senator Akaka during testimony in a separate classified briefing. That briefing occurred on October 18, 2002, in a secure briefing site in the U.S. Capitol Building to Senator Akaka and selected staff members. There were no follow-on questions or tasks from that briefing.

Senator AKAKA. Yes, and of what you said my interest would be, how close were the closest civilians to that test? What kind of coordination was done with local officials?

Dr. KILPATRICK. Sir, all we have to look at is the records that we've been able to find, and it just says that there was coordination with local officials. As Dr. Winkenwerder said, we're not sure what that means. Was that a telephone call? Was that a sit-down conference? The U.S. military had done an agreement with Hawaii to conduct research in those reserves. How much detail of what that research was, I don't know.

Senator AKAKA. How many people do you think were exposed to sarin gas?

Dr. KILPATRICK. I don't believe anybody was. I think that if they had been, we would have certainly seen something in the records. There would have been a person who would have become critically ill.

Senator AKAKA. Finally, if you can answer, what would the effects of sarin be if one were to be exposed to it?

Dr. KILPATRICK. Again, that depends on the concentration. If it's what we call the "clinically effective" concentration, you would start to have difficulty with vision, tearing, difficulty with breathing. This, if the concentration is high enough, will lead to stupor, to convulsions, and then eventually to paralysis and death, and that happens in a very short time frame.

Senator AKAKA. Thank you very much, Mr. Chairman.

Senator CLELAND. Thank you, Senator Akaka.

Senator Nelson?

Senator BILL NELSON. Thank you, Mr. Chairman. Thank you again for holding this hearing.

Gentlemen, thank you for coming and participating. I realize that a lot of this occurred long before your watch. So what we're trying to do is to get to the bottom of it and see how best to protect

the interests of the veterans, what we can learn from the mistakes that were made in the past so that they're not repeated in the future. In order to do that, we have to have the cooperation of the Defense Department.

Now, you can tell by my opening statements, I have not been a happy camper with the Defense Department, and I just want you all to know that we're going to get to the bottom of this. We have the full support of the Chairman of this committee and the ranking member of this committee, Senators Levin and Warner. We have the support of Senator Rockefeller and the Veterans' Affairs Committee, so we're all in this together. I have visited with them ad infinitum, and I'm delighted that it's in the hands of a Chairman who is an expert in this area, as the former head of the VA, as our Chairman, Senator Cleland, is. We need your help. We need your cooperation so that we can get to the bottom of this.

Now, you said there were about 134 tests, and some 62 of them were cancelled, so you're still looking at about 72 tests.

Dr. WINKENWERDER. Forty six we know about, with certainty, that they were conducted. Information, as of yesterday, has been released on 37. Take that additional 9 plus 37 is 46. Those are in process through declassification, and we're hopeful to release that soon.

We couldn't get all that work done as of today. We wanted to release as much as we could as quickly as we could. If you add the numbers up, that leaves 26 additional tests. We believe, because of the timing of the schedule of when those were planned, that it's likely that most of those were canceled and were not conducted, but we don't know that.

I've asked Dr. Kilpatrick and his staff to—and we've placed additional people and resources to move with all due speed, and they have done a great job. People have worked overtime over the last several weeks and months to get this information.

Senator BILL NELSON. Well, we appreciate it very much. You had these fact sheets that describe the tests. When did the declassification occur on these 28 fact sheets?

Dr. WINKENWERDER. Within a matter of the last few days, they came through in a batch. Monday a week ago.

Senator BILL NELSON. Monday a week ago?

Dr. WINKENWERDER. Right.

Senator BILL NELSON. Today is Thursday, so about 11 days ago?

Dr. WINKENWERDER. Yes.

Senator BILL NELSON. Why did you wait to release them until 2 days ago?

Dr. WINKENWERDER. There was a security review. There is nothing, sir, to the timing of this other than—and I just would assure you that we're—as soon as the information becomes available, we're releasing it.

Senator BILL NELSON. What is the security reason that you wait 10 days to release something when it's been declassified?

Dr. WINKENWERDER. This is a process that involves, well, let me let Dr. Kilpatrick describe it.

Dr. KILPATRICK. I've been intimately involved with this process, sir, and when we submit the original records with what we request to be declassified, medically relevant information, there is a process

that the Army goes through. Normally, that had been taking 6 weeks.

When we had this bolus of information, they actually sped this up and got it done in a period of about a week and a half, which was focused solely on this area. As soon as that came back declassified, we had to then construct the fact sheets—take the information out of the declassified documents and put them into the fact sheets. The fact sheets then had to be submitted for security review. That, again, that could be a 2- to 3-week process, was expedited.

That information was available probably at the earliest, all put together and packaged, about Saturday evening, about 11:00. My staff and I had it together, because we had to have it ready for release and to present for the press conference yesterday.

So that is the timing. There's no intention at all of holding that information up. It's a matter of getting it packaged for release.

Senator BILL NELSON. All right. I asked the Defense Department in January about the tests that were conducted in Boca Raton in the 1950s. The answer that I received was that this was classified. There was no explanation of going through the declassification method. There was no attempt on behalf of the Department of Defense to say, "We will bring the information to the committee to share with you the classified material." So tell me, where do we stand with regard to the Boca Raton 1950s test?

Dr. WINKENWERDER. Senator, if you could, at some point, provide me with the information as to whom those letter or letters were sent and when, I will follow up and track that down, and we will get back to you. I don't believe it came to my office. We are involved in the health area, because this is related to, obviously, health concerns.

Senator BILL NELSON. Well, that's part of the problem.

Dr. WINKENWERDER. Yes.

Senator BILL NELSON. Because sometimes one hand doesn't know where the other hand is.

Dr. WINKENWERDER. That can be true. So I will follow up for you if you'll let me know.

Senator BILL NELSON. I would appreciate it, because the only recourse we have is to go straight to the Secretary.

Dr. WINKENWERDER. Yes. Even then and there, depending upon someone in that office using his or her best judgment about where to send this as it goes into the organization for a response, we may or may not know about it. If it related to a health concern for veterans, we should receive it. Obviously we've been on point for this issue, though obviously the testing program itself and facts that are related to that really were a Department of Army responsibility that goes back many years.

Senator BILL NELSON. Mr. Chairman, would you want to go on and question? Because I have a number of questions, and it doesn't make any difference; I'm prepared to stay here as long as possible, as long as it takes.

Senator CLELAND. Well, go right ahead and use a little extra time. I did. Senator Akaka did. You can.

Senator BILL NELSON. I'm curious. There were multiple tests in Florida. There were tests in the public domain in Panama City and

Key West; in the public domain at what is Cape Canaveral: this is listed as Cape Kennedy because the test was in 1962. In fact, in 1962, it was named Cape Kennedy, although its name was officially changed to its old traditional name, Cape Canaveral, shortly thereafter. Another one in the public domain in Yeehaw Junction; another one in the public domain in Avon Park on four different dates; and a second one in Yeehaw Junction. Those are all in the public domain.

Then there were tests not in the public domain. This is just Florida—Eglin Air Force Base, 1953, 1954, 1956, 1957, 1958, 1969; also not in the public domain at Eglin in 1951; not in the public domain at Avon Park in 1954, 1956, and 1957.

Out of all those tests, only one, Yeehaw Junction, testing basically the effectiveness of a weapons system on an F–4 to reduce wheat crop yields, which was done between October and December of 1968, that's the only one that's been released. Can you explain why the others haven't been released?

Dr. WINKENWERDER. Well, what we were looking at, what we were asked to look at, what we have done is to look at the testing that was under the auspices of the Deseret Test Center program from 1962 to 1973. So from your description, these other tests look like they went back into the 1950s, and I would presume were conducted under a different programmatic oversight, and I, candidly, do not know who had that oversight responsibility or where it reported to.

Senator BILL NELSON. A lot of these tests emanating from what you have released with regard to Yeehaw Junction were trying to figure out how we could kill the Soviet wheat crop in the midst of the Cold War. If we got into a war with them, how were we going to starve them? Why were the tests conducted in Florida? We don't grow wheat in Florida.

So likely what was happening—you put this material that was going to kill the wheat, in a spray mechanism; in this case, in Yeehaw Junction, you put it in an F–4. They'd put out pots of wheat and then see what the effect was. That way we weren't going to damage our own wheat crop, which was more in the northern and central plains of the United States.

I am led to believe, which is why I asked for this last January, that all of this started back in the 1950s in Boca Raton. You can see the concerns that we have if there is a public health hazard—and I'm not suggesting there is—but there are 60 acres that's suspiciously not used at the north end of the Boca Raton Airport and Florida Atlantic University.

Dr. WINKENWERDER. Today?

Senator BILL NELSON. Today. Everything else is developed. I'm going to show aerial photographs tomorrow that I have being prepared for me as to the old facilities and where the tests were conducted, and then match that to the 60 acres that are undeveloped today that have high intensity development all around it. So I want to see if we have a problem.

By the way, I just want you to know, I'm a little sensitive about this, because where does a lot of this stuff start? It starts in Florida. Where did anthrax start? It started in Florida. We have the AMI building in a corporate park closed up because nobody will ac-

cept responsibility right now on how we're going to clean up the anthrax, and that's only, interestingly and just coincidentally, a stone's throw from this particular site that we're talking about next to Florida Atlantic University. So I would certainly appreciate some answers on behalf of the people from Florida.

Now, turning to another one of the tests that you have declassified on the SHAD, this particular one called "Copperhead," and this is the one that our veteran from Florida, George Brocklebank, will be testifying on later. This fact sheet tells us that, in 1965, off of Newfoundland, his target ship was being tested by laying down a mist of spray from an A–4B aircraft of Bacillus globigii, BG, and zinc cadmium sulfide. Before he testifies, do you want to give us some of your impressions about that, please?

Dr. WINKENWERDER. I'm going to turn to Dr. Kilpatrick, because I believe he'll be most familiar with the details of that particular test.

Dr. KILPATRICK. This testing procedure uses Bacillus globigii, which is also called today Bacillus subtilis, a bacteria that behaves much like anthrax. It forms a spore, and its aerodynamics and its longevity are much like anthrax. It is that same related bacterium, but it is believed to be a harmless bacteria to humans. At the other end of that spectrum is Bacillus anthracis, which we know is dangerous.

This testing was done in multiple climates using the Bacillus globigii and the zinc cadmium sulfide as a tracer to say where is the cloud going, to take a look at ships' operability in different conditions—steaming, battle conditions, buttoned up—and to determine how far would that penetrate into the ship, how good were the protective measures.

The scientists that we've talked to—again, we weren't there—telling us, "Were people informed?" We've heard from veterans that they knew nothing about what was going on. What we were told is that the scientists informed senior leadership. There apparently was no effort made, with simulant testing, to inform individuals of what the test was about, what the threat could or could not be to them, and what the purpose of the test was.

Clearly, the test done off Newfoundland was done to determine effectiveness of those protective measures or vulnerability in cold conditions. Looking at the temperatures at the time, they were in the 30s or below. So that is a procedure that was used, not only there, but in ships southeast of Hawaii, in the ocean and off the coast of San Diego. As you've talked about tests done in Florida in the 1950s, we also have indications in this 1977 Army report being done in the 1950s on ships out of Norfolk, Virginia.

Senator BILL NELSON. So this was all a part of SHAD?

Dr. KILPATRICK. That's right.

Senator BILL NELSON. In Mr. Brocklebank's testimony that we'll receive in awhile, it was up in Newfoundland, but it's the same thing that Senator Akaka was talking about, the test down off of Hawaii and elsewhere in the Pacific?

Dr. KILPATRICK. Correct.

Senator BILL NELSON. Do you see any hazardous health results by what information you have gathered thus far?

Dr. KILPATRICK. Again, what we're looking at is documents from that time. There's no indication of people becoming ill at that time. Looking at what could be long term health effects, I think the VA has accurately reflected what we believe they're doing, an epidemiological case-controlled study, is the best way to determine is there any long-term health effect. The medical literature does not indicate that exposure to this organism results in a recognized disease or symptom process in the future.

Senator BILL NELSON. Why were these sailors not informed that they were going to be test guinea pigs?

Dr. KILPATRICK. Again, I think it comes down to people doing the tests, and I'm not trying to defend them; I'm trying to tell what we see in the documents, that these tests were done as operational tests. There was no effort to take a look at, "How do these organism affect human beings?"

I have talked to sailors who said, "Well, I had nose swabs, or I had throat gargles taken." Again, with simulants, the objective of the test was to say, "Dropping this amount from this airplane at this height, what sort of amount do you get on a ship?" There is a very fine line between offensive and defensive, and I think that some of these tests may have been designed to understand if we had to offensively use the real agent, what the delivery capability would be?

Senator BILL NELSON. We have a vote in progress, Senator Akaka, so if you're chairing, we're going to have to recess and go vote. But I want to continue a line of questioning. On a number of these fact sheets that they have released on these tests, there have been indicated the side effects that can occur from the materials or simulants that were used in the test, and I'd like you to go through each one of those and to tell us how that matches up with what you're finding in your medical exams.

Shall we go vote?

Senator AKAKA. Yes. Do you want to come back and question the same panel?

Senator BILL NELSON. Oh, yes, sir. I do.

Senator AKAKA. All right.

Senator BILL NELSON. Absolutely.

Senator AKAKA. Then the subcommittee will recess until the Chairman returns. [Recess.]

Senator BILL NELSON. All right, the meeting will come to order as we resume from the recess. We apologize, but this is the nature of the legislative process that, when votes are called, you have to go to the floor to vote. We are on the Iraq resolution, so it's a very important series of votes.

Continuing on with the questioning that I had before, could we get you to enumerate for us, in the SHAD tests, a number of the agents that were used, whether or not they were thought to be not harmful at the time, and what have we found about them now? Let's go through. Let's list those for the record.

Dr. WINKENWERDER. Okay. Let me list the simulants, starting with the chemical agents. What we know today is the following were used—bis-2 ethylhexyl hydrogen phosphite. I'm sure these are not commonly known, except to chemists and such types, what

these agents are. That agent, bis-2 ethylhexyl phthalate, DEHP——

Senator BILL NELSON. All right, but before you leave the bis hydrogen phosphite, what is the harm of that agent having been used, that we know now, regardless of what it was thought of then?

Dr. WINKENWERDER. Okay. I'm going to turn to Dr. Kilpatrick.

Dr. KILPATRICK. Again, we have taken a look at information by chemists. We've relied heavily on the Centers for Disease Control's (CDC) Agency for Toxic Substances and Disease Registry to enumerate in these information sheets, fact sheets, for people what are known side effects of exposure to these agents. We certainly, I think, have tried to paint what the worst-case scenario would be, and it's not data or information generated or created by Department of Defense, but what's out there in medical science. I think that the facts sheets will clearly enumerate what those are.

I think the question for the veterans is, what are the health problems that they're having, and is there an association between that kind of exposure and today's current problems or problems that they've had over the years? I think that, again, we're not going to be able to answer until the VA study is done.

Senator BILL NELSON. Okay. Now, let's answer the question. Pull out the fact sheets, and let's go through each one of these and tell us what are the side effects.

Dr. Winkenwerder had just mentioned bis hydrogen phosphite.

Dr. WINKENWERDER. That's right.

Senator BILL NELSON. What are the side effects?

Dr. WINKENWERDER. If it's okay with you, Senator, I'll read all of them, giving Dr. Kilpatrick a little bit of time to try to find each one, and we will go through each one.

The second chemical simulant, di(2-ethylhexyl) phthalate, DEHP.

Senator BILL NELSON. All right, but just listing all these things isn't going to get to what I want.

Dr. WINKENWERDER. I understand.

Senator BILL NELSON. That's just going to be a bunch of words.

Dr. WINKENWERDER. I'm just trying to give it to you for the record, and then we'll go through each one, if that's okay.

Senator BILL NELSON. Well, since you all are not prepared to answer this, let me go through it for you.

Dr. WINKENWERDER. Okay.

Senator BILL NELSON. All right. BG, it's thought to be harmless to humans. It is a biological tracer for anthrax. Typical household bleach and water will kill BG. It is not known to consistently cause disease in healthy adult humans. Would you agree with that?

Dr. KILPATRICK. Yes, sir.

Dr. WINKENWERDER. Yes.

Senator BILL NELSON. All right. Betapropiolactone, there is evidence that it is a carcinogenic. Is that correct?

Dr. KILPATRICK. That is correct. In information from the Agency for Toxic Substances and Disease Registry, in cell culture and animal studies it has been shown to cause cancer.

Senator BILL NELSON. It was used as one of these agents.

Dr. KILPATRICK. It was used as a decontaminate after Bacillus globigii had been sprayed over a ship. It was used to determine the ability to decontaminate a compartment that was contaminated.

Senator BILL NELSON. Okay. Bis hydrogen phosphite, it's harmful by inhalation, ingestion, or skin absorption. The vapor or mist can be irritating to the eyes, mucous membranes, and upper respiratory tract. It can also cause skin irritation. It is not carcinogenic and there are no chronic health hazards. Is that an accurate description?

Dr. KILPATRICK. That is correct.

Senator BILL NELSON. Do we have testimony that the veterans were receiving those kinds of irritations that we just described?

Dr. KILPATRICK. Again, each of those decontaminate agents have been listed as having been used in this process of evaluating the ability to clean up and continue in a warfighting situation.

Senator BILL NELSON. Calco fluor, may cause mild eye irritation.

Dr. KILPATRICK. That's correct.

Senator BILL NELSON. Anything more that we need to know about that?

Dr. KILPATRICK. Again, that was used as a tracer agent, and there are obviously many of these chemical agents that certainly, concentrated, can cause severe problems; in diluted concentrations, are not as harmful.

Senator BILL NELSON. Coxiella burnetii, it causes Q fever in humans. How about that?

Dr. KILPATRICK. That is an agent that was believed to be a potential biological warfare agent at the time. The Department of Defense had developed a vaccine to protect people against that. The test records indicate that people who were exposed to this agent had been vaccinated. It's very clear to us that it was not an FDA-approved vaccine. It would have been considered an investigational vaccine. We don't have any indication in the test records that people had signed any sort of informed consent, but it was an agent that was used in one of the SHAD tests.

Senator BILL NELSON. Hepatitis or pneumonia could develop in the early stages of that. In severe complications, you could have damage to the aortic heart valve. Is that correct?

Dr. KILPATRICK. That is correct.

Senator BILL NELSON. All right. Diethyl phthalate, it can irritate the nose and throat. If it's splashed in the eyes it can cause eye pain, but only slight eye damage. Ingestion in high concentrations can cause gastrointestinal irritation. What else do we need to know about that?

Dr. KILPATRICK. That, again, is a chemical simulant agent that, in concentrations, can cause the symptoms that you've described. When we use things like common bleach to clean an area, that certainly can also, if ingested or inhaled, can cause the same sorts of irritation described.

Senator BILL NELSON. All right. E. coli—stomach cramps, diarrhea, bloody stools, kidney failure, and, in some cases, the bacteria can be deadly.

Dr. KILPATRICK. That's correct. Taking a look at what is in the medical literature at the time of that testing, E. coli was a very commonly used bacteria as a simulant. The strain that was used is not identified in the test report that we've seen. There are many other tests using E. coli strain 242 that was not shown to be toxigenic to humans. E. coli is one of the most common bacteria in

the human body—the strains that I think we're aware of today, contaminating hamburgers, if you will, causing severe illness and death in people. Certainly E. coli would not be used today as a simulant.

Senator BILL NELSON. That was used during these tests?

Dr. KILPATRICK. During those tests, correct.

Senator BILL NELSON. As was Pasteurella tularensis that can cause ulcerating lesions developing at the site of infection, such as the arm, the eye, or the mouth. The regional lymph nodes enlarge and then drain. Pneumonia, meningitis, and peritonitis may complicate the infection. The mortality rate is about 6 percent.

Dr. WINKENWERDER. That would have been a real, live agent, both the Q fever and the Pasteurella are neither of those are simulants. Those would have been real agents.

Senator BILL NELSON. They were used.

Dr. KILPATRICK. Yes, sir.

Senator BILL NELSON. From what you found out what happened back then, when the tests were done with these kind of live agents, were the sailors told so that they could put on protective gear?

Dr. KILPATRICK. The test records indicate the sailors were vaccinated against those, and we have records showing the Army had vaccines against both Q fever and tularemia. As I said on Q fever, neither of these were FDA-approved vaccines, investigational vaccines. We do not have an FDA-approved vaccine for either of those agents today.

Senator BILL NELSON. To the best of your knowledge, when a sailor was the subject of this test, he basically was not informed.

Dr. KILPATRICK. Looking at the records, it says people were informed. It doesn't indicate the sailors were informed. Talking to sailors, I believe that they were not informed.

Senator BILL NELSON. Phosphorous 32, doses in excess of ten rems—it can be pretty bad, can't it?

Dr. KILPATRICK. That's correct.

Senator BILL NELSON. Do we know were any doses in excess of that given?

Dr. KILPATRICK. No, sir. The phosphorous 32 was used in a test where a barge that was not habited, there were no sailors on board, was towed a kilometer behind a ship. There was a device at the prow of that barge to release VX, a persistent nerve agent. VX had phosphorous 32 added as a tracer. The purpose of the test was then to test a decontamination device that was mounted on the barge to decontaminate the barge. So when people did go aboard to see if there were remnants of VX, they were able to look for radioactive tracers of phosphorous 32. Those people that did go aboard that barge, after the test, were the test conductors. They knew what they were looking for. They were appropriately protected against both VX and radioactivity.

Senator BILL NELSON. Sarin nerve agent, it can do the whole bit—confusion, drowsiness, coma, and death. To what degree was it used?

Dr. KILPATRICK. It was used in one SHAD test. In this test, the sailors were in a citadel that had been specially constructed aboard the vessel, an airlock so that they would not be exposed. The purpose of this test was to take a look at the behavior of sarin on the

ship and then to subsequently subject the ship to methyl acetate, MAA, which is a simulant for sarin, to see if essentially MAA could be used in future tests as a simulant and not have sarin potentially expose human beings.

Senator BILL NELSON. Did we have any evidence that we had bad——

Dr. KILPATRICK. Indications are that there were no negative outcomes from the people that were on board the ship at that time. Again, sarin was the first pass. The second pass was the MAA.

Senator BILL NELSON. Here's one, shorthand, called SM, and it can cause infections of the endocardium, blood, wounds, and urinary and respiratory tracts.

Dr. KILPATRICK. Yes, sir. That is a bacteria called Serratia marcescens. It was believed to be a harmless agent to humans at the time, used extensively in simulant testing for bacteria. There were studies done, actually, in San Francisco using this as an agent. Following those studies, there were some concerns about patients being hospitalized with serious infections with this organism. This organism is not used as a simulant today.

Senator BILL NELSON. Staphylococcal enterotoxin, type B, cough can persist for up to 4 weeks. You can have chest pain, shortness of breath, nausea, vomiting, diarrhea. It's not generally thought of as lethal. However, it may incapacitate soldiers and sailors for 1 or 2 weeks. Military protective masks are effective against the exposure.

Dr. KILPATRICK. Yes, sir. This is like a powder, a toxin that can be inhaled or ingested. It can be used to contaminate food. It is an offensive agent. The tests that were done were done over a land area and at sea. Clearly, the Marshall Islands were involved in part of this testing.

There are concerns that have been expressed, looking at this information and trying to patch with what else is in the literature, that the Marshall Islands had two people, one young individual, one old individual, who died at about the time of this testing. I think that that is something that the Navy and the Marshall Islands are still discussing.

Senator BILL NELSON. A lethal nerve agent, which, of course, can go the whole way, to death, was that used?

Dr. KILPATRICK. VX is one of those very lethal nerve agents. Sarin is one of those very lethal nerve agents. Tabun is one of those very lethal nerve agents. Soman is one of those very lethal nerve agents. In the land-based testing, all of those agents were used.

Senator BILL NELSON. A series of sulphur dioxide, TOF, uranine dye, all of those have irritant effects upon eyes, skin, respiratory tract, and so forth—those were all used, as well.

Dr. KILPATRICK. Yes, sir. The TOF was used as a simulant for VX, a persistent nerve agent, and it was used in evaluating marines going ashore in protective gear with the flyover of that agent.

Senator BILL NELSON. Mr. Chairman, I wanted to get this on the record, for the obvious reason of what the testimony has brought out, that this is serious stuff. As we examine this, we're not pointing any fingers of blame; we're asking policy questions about how our Government could do these kind of tests and, 3 and 4 decades

later, we are just now getting around to notifying the veterans. They affect the entire country. There's a concentration of these folks in my State, where they come to live, in retirement.

I want to leave this panel with this thought, as well, that, as you give us continued reports, I want you all to get to the bottom of these multiple tests that occurred in Florida, whether or not it involved the spore trying to kill the wheat crop, or whether it involved many other things, including hog cholera, including SM and BG simulants, whether or not it included other biological simulants, cereal stem rust spores in LX. I want you to get to the bottom of that, and I want you to report to us.

Since some of this stuff is still classified, I want you to come and brief the Chairman and me very shortly on this, and then we can get to the question of at what point will it go through the normal declassification process. But I need to know if we've got some kind of health hazard down in the State of Florida, where all of these multiple tests were taking place.

Thank you, Mr. Chairman.

Senator CLELAND. Thank you, Senator Nelson. This panel here is not only authorized but directed to get to the bottom of this, and we shall continue this investigation until we do.

Thank you all very much for coming. Thank you for your patience.

We'd now like to call three distinguished Americans. Let me say that we thank them for coming across the country to take part in this important hearing. Their presence here today shows that these men are still willing to serve their country. We thank them for their testimony, and we welcome you to this effort.

I can't tell you how much we appreciate your being willing to come and share your stories with us. We'd like for you to tell us a little bit about when you served, the name of your ship, where you served, and what your own personal story is in relationship to the SHAD projects.

We'd like to begin with Lieutenant Commander Jack Alderson, United States Navy, Retired. Commander Alderson, please tell us a little bit about yourself, your years of service, where you served, and the ship that you served on.

STATEMENT OF LT. CDR. JACK B. ALDERSON, USN, RETIRED

Commander ALDERSON. Thank you, Mr. Chairman.

My name is Jack Alderson. I live in Eureka, California. I am a retired Navy lieutenant commander. I was on Active duty from 1956 until 1970. I then went in the Navy Reserves and stayed in the Reserves until 1977, when I retired from the Reserves. I am here today to describe my experiences with the Project SHAD technical staff.

In 1964, I was Active duty in the United States Navy, and I was ordered to Project SHAD technical staff on board the U.S.S. *Granville S. Hall* in Pearl Harbor, Hawaii. I was ordered there as officer in charge of a division of five Army light tugs (LTs). The purpose of these tugs was to test, at sea, biological weapons. As I recall, the test names included Operation Shady Grove, Fearless Johnny, Big Tom, and there were others.

Senators, there are two pictures of the tugs in front of you. One is the 2085, and the other is the 2080.

[The information referred to follows:]

I had five tugs under my command. They were Army tugs with Navy crews with an officer, a lieutenant in the United States Navy, as the skipper. Four of the ships were the same configuration. The 2080 was a little different. She was outfitted as a disseminator and, of course, with sailor humor, gallows humor, we named her Pepe Le Pew. [Laughter.]

Each LT, as I said, was manned by a Navy crew. I herein stress that during the test, every safety precaution within the knowledge and technologies we were acquainted with at the time was taken. Remember, though, I'm a sailor, and I wasn't a medical technician of any kind.

Some time ago, I became aware that some of the Project SHAD personnel were having health problems, namely respiratory and cancer. In communication with a knowledgeable medical person involved with Project SHAD, he informed me that some of the materials used to decontaminate or decon, with after the tests are now known as deleterious to human health. Concern is also voiced that some of the inoculations given to SHADers may contribute to adverse health conditions later in our lives.

The security classification under which we worked precluded any of this from being placed in our health records. In fact, some of our health records are missing.

The concerns that we have are that all the people who worked for me and with full trust in the United States Navy may not know that they have a problem and/or that the problem relates to what they did with Project SHAD in the mid-1960s. Most importantly, their present attending physicians would not know what to look for or what to expect.

With these concerns, letters were written, without getting any meaningful answer. In fact, I and others were told that—through our elected representatives, that we were part of Autumn Gold. However, later, when I received a copy of the final report of Autumn Gold, it was dated May 1964. I did not report to Project SHAD until October 1964.

The Army kept saying that they had concerns during this period of time, but they certainly gave none of us any satisfaction. During this period, I found out that I had a malignant melanoma. I did not believe and do not believe that this had any connection with the testing carried out by Project SHAD, but it brought home to me what I had heard about others. Since then, I've been diagnosed with the loss of some of my lung capability, and I am presently undergoing treatment for prostate cancer.

In one letter, the Army states that cooperation will be given to personnel involved in chemical and nuclear testing, not biologicals. In fact, a letter from Major General J.M. Cosumano, Assistant Deputy Chief of Staff for the Army, dated August 23, 2000, states that everything remains classified, that only simulants were used, and protective clothing worn. Untrue.

On 13 September 2001, fact sheets were released by DOD. One of these was for Operation Shady Grove, in which my LTs were involved. When most of us arrived at Pearl Harbor in October 1964, we manned the LTs and commenced training and inoculations. We were considered ready for operations before the holidays and were told to be prepared to get underway right after the New Year. We

were ready on 2 January 1965. However, we were delayed until President Lyndon Baines Johnson signed the authorization for the tests. He signed it on 21 January 1965. We were underway on 22 January 1965, proceeding to Johnston Island for Operation Shady Grove, the testing of biological weapons.

The fact sheets omit that these toxic agents were used, Q fever and Tularemia. There were others. Decontamination agents are not identified in the fact sheet, and they also state that protective clothing "should" have been worn. I was not aware of any protective clothing, except gas masks, for the use of the outside decon crew. Other bio agents tested were omitted, also.

During Shady Grove and prior to getting underway from Johnston Island, the LTs were thoroughly briefed on what they were going to do. In other words, we prescripted the operations at sea because we were on electronic silence. At twilight, the test subjects were placed in cages topside, and the crew went into the citadel. A pair of Marine A–4s would come over, one spreading the toxic agent, the other would spread the trace elements. The LTs were lying on a grid. Sometimes the grid was as much as 100 miles long. At morning light, the three-man exterior decon crew would exit, take down the test subjects and place them in the doghouse, take down the samplers and the other material that was used to collect samples of the clouds, and take those to the doghouse. Then they would commence the exterior decontamination of the ship. Then the tug would proceed to the *Granny* and trade test subjects, passing the exposed test subjects onto the *Granny* for lab tests, and picking up a new set of subjects for the following day—or that evening.

Six days at a time was what was imposed on the LTs' at-sea operations for safety purposes, in other words, crew fatigue, because we were a crew of 10 operating around the clock. After a series of tests, we would move the tugs to Area Three on Johnston Island, a downwind position, and thoroughly decon the interior.

The decon agents are my chief worry on what is happening to the crews of the LTs. I understand security classification and the sensitivity of the operation in which we were engaged. I am also proud of the job that the LT division did, the professionalism and the patriotism.

Senator Nelson, I want to give you an idea of the quality of the crews, because one of your constituents, Tom Gwise, who lives in Merritt Island, was my senior electronic technician on the LTs. When he left the LTs, he was promoted to warrant officer. When he got out of the Navy and retired, he went ahead and got a Ph.D. in education. This was the quality of the people. One of my tug skippers became a senior vice president of Litton Industries. So it was a good crew.

I'd like to point out that they have also maintained their silence, in accordance with the departure debriefing. However, I was the LT division Officer in Charge and have a responsibility to those crews, as does the Navy and participating services in this country.

On behalf of all the SHADers, I would like to pay special acknowledgment and appreciation to you, Mr. Chairman, and to you, Senator Nelson, and to my Congressman, Mike Thompson, for introducing the Veterans Right to Know Act of 2002.

In conclusion, I have some recommendations. I respectfully request for the declassification and full disclosure as to weapons, simulants tested, decontamination agents, and inoculations utilized with trace elements identified along with the protocols, units, locations, and dates. Then a board of toxicologists and medical people should be supported by a medical service corps officer from Project SHAD—and I certainly recommend Commander Norman LaChappelle, whose present position is health officer of Memphis and Shelby Counties, Tennessee. He is also the State of Tennessee's bioterrorism coordinator—and myself as the LT division commander; I am familiar with the operations. I would also recommend that a representative of each one of the units that was also in the 112 tests who is familiar with the operations of their unit during the testing be part of this. I recommend that the board evaluate the information as to what symptoms and conditions might appear, then get that information to the Veterans Administration doctors for what to look for in the physicals. This, along with a realistic campaign to locate the service personnel and/or what might have caused their demise.

I say this, on a realistic campaign because of the fact that the classification of Project SHAD, I can tell you that my crew members still will not talk.

Thank you. I would be pleased to answer any of your questions.

[The prepared statement of Lieutenant Commander Alderson follows:]

PREPARED STATEMENT BY JACK B. ALDERSON, USN (RET.)

Thank you, Mr. Chairman. My name is Jack Alderson. I live in Eureka, California. I am a retired Lieutenant Commander in the Navy Reserves. I served in the Navy from 1956 to 1970 on active duty and until 1977 in the Reserves. I am here today to describe my experiences with the "Project SHAD Technical Staff."

In 1964 I was on active duty in the U.S. Navy and was ordered to the "Project SHAD Technical Staff," as Officer in Charge of a Division of five Army Light Tugs (LTs) at Pearl Harbor. The purpose of these LTs were to test, at sea, biological weapons. As I recall the tests names included Operation Shady Grove, Fearless Johnny, Big Tom, and others.

Each LT was manned by a Navy crew, with a Navy Lieutenant as OinC. These were Army vessels, with Navy crews, operating under a joint command. These were not volunteers, but hand-picked Navy personnel, with Final Secret clearance, ordered in to do a job. The job was done and done well. During the 3 years I was with the LTs they never missed a commitment, completed all tasks assigned and executed same with a fine safety record. This was at times a very dangerous job, and had very stringent safety precautions and procedures in place.

I herein stress that we took every safety precaution within the knowledge and technologies we were acquainted with in the 1960s. Sometime ago I became aware that some of the Project SHAD personnel were having health problems, namely, respiratory and cancer. In communication with a knowledgeable medical person connected with the tests, he stated, "that some of the materials used to clean up with (decon) after the tests were now known to be deleterious to human health." Concern is also voiced that some of the inoculations given the SHADers may have adverse health conditions later in our lives. The security classification under which we worked precluded any of this from being placed in our official health records. In fact some of our health records are missing.

The concerns that we have are that the people who worked for me, with full trust in the U.S. Navy, may not know that they have a problem, and/or that the problem relates to what they did with Project SHAD in the mid 1960s. Most importantly, their present attending physicians would not know what to look for or expect. With these concerns letters were written without getting any meaningful answers. In fact I and others were told through our elected Representatives that I was part of Autumn Gold, not SHAD. However, when I received a copy of the Autumn Gold final report it was dated May 1964, 5 months before I reported in to Project SHAD. In

fact, I and others were told that no such testing occurred. The Army kept saying that they had concerns, but gave no satisfaction. My guess is that the DOD did not want to admit to the full SHAD and 112 operations.

During this period, I found out that I had a malignant melanoma. I did not believe that this had any connection to the testing carried out by project SHAD, but it brought home to me concerning what I had heard from others. (Since then I have been diagnosed with loss of some lung capability, and am presently undergoing treatment for prostate cancer.) In one letter, the Army states that cooperation will be given to personnel involved with chemical or nuclear testing. Not biologicals. In fact, a letter from Maj. Gen. J.M. Cosumano, Assistant Deputy Chief of Staff for the Army, dated August 23, 2000, states that everything remains classified but that only simulants were used, and protective clothing worn. UNTRUE.

On 13 Sept. 2001, Fact Sheets were released by DOD, one of which was for operation "Shady Grove," of which my LTs were involved. When most of us arrived at Pearl Harbor in October 1964, we manned the LTs and commenced training and inoculations. We were considered ready for operations before the holidays and were told to be prepared to get underway right after the first of the year. We were ready on 2 January 1965, however, we were delayed until President L.B. Johnson signed the authorization on January 21, 1965. We were underway on the 22, proceeding to Johnston Island for the execution of "Operation Shady Grove." The testing of biological weapons, not simulants. The Fact Sheets admit that these toxic agents will cause Q fever and Tularemia.

Decontamination agents are not identified and they also state that protective clothing should have been worn. I was not aware of any protective clothing except gas masks for the outside decon crew. Other bio-agents tested were omitted.

During Shady Grove and prior to getting underway from Johnston Island the LTs were briefed as to the next 6 days operation as radio silence was imposed. The LTs would pick up the test subjects from the U.S.S. *Granville S. Hall* ("*Granny*") and proceed to their assigned position on the grid. At twilight the test subjects were placed in cages top side and the ship buttoned up. The Marine A–4s would disseminate the agent and trace elements. The LTs were lying to on the grid and after the cloud had passed by and at morning light the three man exterior decon crew would exit, take down the test subjects, samplers and such, decon the exterior of the tug. Then proceed to the *Granny* and trade test subjects and do it all over again. Six days at a time was what was imposed on the LTs at sea operations for safety purposes i.e., crew fatigue. After a series of tests we would move the tugs to area three on Johnston Island, a down wind location, and thoroughly decon the interior. The decon agents are my chief worry.

I understand security classifications and the sensitivity of the operations in which we were engaged. I am also proud of the job that the LT division did, the professionalism and patriotism shown by the LTs and their crews. Senator Nelson, to give you an idea of the quality of the crews, Tom Gwise from Merritt Island, Florida was the senior electronic technician with LTs, as he left the LTs he was promoted to warrant officer and upon retirement, earned a Ph.D. in education. Here, I would like to point out that they have also maintained their silence in accordance with the departure debriefing. However, I, as LT Div. OinC, have a responsibility to those crews, as does the Navy, all participating services and this country.

On behalf of all SHADers, I would like to pay special acknowledgement and appreciation to Senators Cleland and Nelson and Congressman Thompson for introducing the "Veterans Right to Know Act" of 2002.

In conclusion, Mr. Chairman, I have some recommendations:

I respectfully request for the declassification and full disclosure as to weapons and simulants tested, decontamination agents and inoculations utilized with trace elements identified, along with protocols, units, locations, and dates. Then a board of toxicologists, medical people along with a SHAD medical service corps officer, I recommend Cdr. Norman LaChappelle who is presently the health officer for Memphis and Shelby Counties TN, and the states bio-terrorism coordinator. Myself from the LT Division as I am familiar with the operations and a representative of the other units involved that are familiar with the operation of their units during testing. That the board evaluate the information as to what symptoms and conditions might appear then getting that info to the Veterans Administration doctors for what to look for in the physicals. This along with a realistic campaign to locate the service personnel and/or what might have caused their demise.

Thank you for the opportunity to speak. I would be pleased to answer your questions.

Senator CLELAND. A real quick question, Commander. You mentioned "subjects that were tested," and then, "down into the dog-

house." The subjects that were tested were humans or dogs or what?

Commander ALDERSON. No, sir. The test subjects were Rhesus monkeys, they would be in cages, and anywhere from three to six would be hung around the ship. A seasick monkey is not a pleasant thing to deal with, but they would be hung around the ship. The crew would go down inside, seal up the ship. At the morning twilight, and after the cloud had passed the tugs, then three sailors would go topside, pick up the Rhesus monkeys, take then down, and place them in the doghouse. They would pick up the samplers, the petri dishes, and so forth, and take those down to the doghouse, seal that up. They would then decon the exterior of the tug, and the tug would get underway, go alongside the *Granville S. Hall.* We would take our samples and our test subjects, pass them to the *Granville S. Hall,* and get new subject and equipment for the next day, proceed back to the grid to the next assigned position.

Senator CLELAND. Thank you.

Mr. Robert Bates, please tell us a little about yourself, your years of service, where you served, and the ship that you were on.

STATEMENT OF ROBERT W. BATES

Mr. BATES. Mr. Chairman, I graduated from high school in Klamath Falls, Oregon, and enlisted in the U.S. Navy on June 16, 1961. I went through boot camp and Electrician's Mate School in San Diego, California, and came out of school as an electrician's mate fireman apprentice on January 26, 1962. I then attended MPO school in San Diego and left to catch my ship, which had already departed for a West Pacific cruise.

I reported aboard the U.S.S. *Navarro* APA 215 on February 15, 1962, at White Beach in Okinawa. While on board the *Navarro,* I worked as electrician on both the ship's electrical systems and our landing craft's electrical systems. I stood all of my watches in the engine room where our generators and electrical switchboards were located.

After I was promoted to electrician mate third class on May 16, 1963, I was placed in charge of our 24 landing craft, where I rode the boats on amphibious landings to ensure that they were properly functioning.

During the first part of 1963, my ship spent a lot of time in and around Hawaii. Prior to going there, we heard, through rumors, that it was for amphibious operations. We then heard that the rumors had changed, that this had been cancelled due to high surf, but we were going anyway for rest and relaxation.

While we were in Hawaii, we were told that we would be in some exercises called Operation Autumn Gold, which was just some sort of ship's exercise. I didn't think anything about this, as we participated in exercises on a regular basis. We were never advised exactly what was going on in this operation or asked to give our consent to participate in a biological or chemical test.

Over a period of about 2 months, the ship went out overnight on many occasions to participate in Operation Autumn Gold. The command history for 1963, which is written by the captain, shows that the ship received a grade of 92.92 percent for Autumn Gold. I don't believe that this score had any relation to the crew's performance

whatsoever, but, instead, to the delivery of a biological system. I believe this score was part of a comprehensive effort to cover up the true meaning of the operation.

On October 23, 2001, the office of the Under Secretary of Defense sent me a letter stating that I was on the ship 8 of 9 times that participated in the Autumn Gold exercises, but the letter didn't say anything about any other tests.

I did not hear of Eager Belle II until about 3 months ago when the VA, through their SHAD help line, advised me that I had also been in this test in early 1963. My medical records also show I was diagnosed with pneumonia on March 11, 1963, and admitted to sick bay on my ship to recover. The VA advised me that this was about halfway through the SHAD tests.

While at sea during the Autumn Gold or Eager Belle II exercises, I went to the ship's mess deck to get some coffee while on watch. Near the mess deck, I came across a person wearing a full chemical/biological suit operating some kind of a machine that I had never seen before. I asked what he was doing and other such questions, but I did not receive any kind of a reply from him. He didn't even acknowledge that I was there. I thought at the time that this was very strange, because I had never seen anybody aboard my ship ever wear anything like this, and this person wouldn't even talk to me. The ship's crew was not issued any protective clothing, and I'm not even sure that the ship carried any for us to use in case we ever did need it.

The engine room on my ship was extremely hot, as there were two oil-fired boilers where I stood my watches. I had to stand under large air blowers that were almost always on to beat the heat. Without the air blowers, the temperature in the engine rooms would have been too high for most people to bear. These blowers blew outside unfiltered air into the engine room to help keep the temperature down to a liveable level. These air blowers would also have forced large quantities of the Bacillus-laced mist into the engine room. The air from these blowers was so strong that you could not smoke under them, as your pipe or cigarette would burn out immediately.

I stayed on the ship until I was discharged from Active duty on July 31, 1964, while in Oakland, California. I continued on in Active Reserve until June 15, 1967, when my 6-year obligation was completed and I received my honorable discharge. I joined the Navy Reserve again in 1987 and received my second honorable discharge in 1990.

I had always been bothered by the fact that I didn't know what was used on me during Autumn Gold, so in 1980 I filed a VA disability claim. I had trouble breathing, which I thought might be attributed to Autumn Gold, and I had already had one surgery in 1968 or 1969 for torn cartilage on my right knee.

I was checked at the VA Hospital in Spokane, Washington. The doctors there told me that I had a 20 percent diminished lung capacity and I needed additional surgery for torn cartilage in my right knee.

The main reason I filed this claim was to find out more about Autumn Gold, but it didn't work. The VA denied my claim, saying

that Autumn Gold never took place and that the problem with my knees was not caused by anything I did while in the Navy.

It appeared to me at this time that the VA makes its decisions in a purely arbitrary manner. I didn't appeal this claim, as I didn't have any way at the time to prove that Autumn Gold did take place or exactly when the cartilage in my knee first started tearing or when exactly I lost 20 percent of my lung capacity.

I let this matter go until I contacted former Congresswoman Jolene Unsoeld in 1993. She was very helpful in obtaining copies of my service and medical records as well as a 1963 command history report and other information, but nothing that spelled out what Autumn Gold was all about.

I did find that the 1963 command history report mentioned Autumn Gold by name. I thought at the time that if I could find some official document that showed that Operation Autumn Gold did, in fact, take place, why couldn't the VA? Even though this document did not spell out what took place, it did prove that it, in fact, happened.

Congresswoman Unsoeld was unsuccessful in obtaining any detailed information on Autumn Gold, so around 1994/1995, my brother-in-law, Josh West, contacted an investigative reporter named Eric Longabardi in New York and gave him a brief description of what I thought had happened during Autumn Gold. Not too long after, Mr. Longabardi called me, and I gave a more detailed description of what I remembered about Autumn Gold. I guess this got his interest, as he started to investigate for additional information.

In November 1998, Mr. Longabardi came to my home in Vancouver, Washington, to tape a television interview. During the interview, he showed me a VHS copy of a recently declassified film. The film showed my ship during Autumn Gold, as well as how they distributed Bacillus in front of my ship. The tape also showed a person wearing a full chemical and biological suit operating a piece of equipment that looked like the one I remembered being on my ship during Autumn Gold. The tape went on to show another operation called Copperhead.

Mr. Longabardi then interviewed other people who were on the ships that participated in the SHAD tests and produced the stories that aired in two segments on *CBS Evening News* on May 15 and 16, 2000, with a follow-up piece a short time later. I asked Mr. Longabardi to send me a VHS copy of this tape, which he did, and I have it with me.

On September 28, 1998, I was hospitalized in Vancouver, Washington, with congestive heart failure and atrial fibrillation. Several times the doctors tried to get my heart back into a normal rhythm. They tried chemically to stop and restart my heart, and twice they used a defibrillator to stop and restart my heart over the course of 3 years, but all their efforts failed.

I continued working for 2 more years, but I noticed that I tired more easily every day. So, in October 2000, my doctor and I decided I could no longer work, and I retired on a disability. I now receive disability pensions from my union and Social Security.

On October 8, 2000, I reopened my VA claim, as I was more convinced than ever that the agents used in Autumn Gold were re-

sponsible for my heart condition. I also had more surgery done on my right knee, and I have arthritis in both knees now. I have also had to wear hearing aids due to what I believe is long exposure to extremely loud engine room noises where I stood my watches without benefit of hearing protection.

I listed participation in Autumn Gold on my claim form and that I believed this was the cause of my heart problems. I used the VA web site to file this claim online, but it did not print any of the information I put on the form. I have asked the VA on two different occasions for a copy of the completed form for my records. The VA did not respond to my request either time.

On October 12, 2001, the VA sent me a letter saying that they would allow 10 percent service-connected disability for the ringing in my ears, but they rated my hearing loss at 0-percent disability. The VA also deferred any decision on my heart condition, pending a review by the central office.

On August 15, 2002, I received another letter from the VA advising me that my claim for health problems caused by Autumn Gold was denied. They said in their letter that exposure to, quote, "BG, zinc cadmium sulfide, and chemical agents GB and VX" during the SHAD tests probably did not cause any of my health problems, even though such exposure could have resulted in the pneumonia I came down with on March 11, 1963.

It doesn't appear that the VA investigated my claims as thoroughly as they should have. They didn't even get their facts straight, as they made no mention of Eager Belle II or any of the decontaminates that were used. This information was brought to my attention by the VA SHAD help line on the Internet prior to receiving this letter. I understand that I was exposed to these agents even more in Eager Belle II than I was in Autumn Gold, as this test lasted longer.

Mr. B.L. Flint, service center manager at the Seattle, Washington regional office for the VA, should have been aware that I was involved in at least one other test, and he failed to mention it. I understand that there are a lot more of these tests that are still classified. It is even possible that I was involved in more than the two tests that I know about.

On August 15, 2002, 3 days after receiving this letter from Mr. Flint, I received a letter from Daniel L. Cooper, the Under Secretary of Veterans Affairs for Benefits in Washington, DC. He advised me that the VA is still investigating the long-term health effects of exposure to biological and chemical agents used in the SHAD tests. This makes me wonder. How can the VA make any determination on my case, or any other, if they don't know what the long-term health effects are?

During the past 2 months, I have contacted the VA in Seattle, Washington and asked for copies of my 1980 claim form and their letter of disposition. These requests have gone unanswered. I sent a release form to them to release this information to Mr. Longabardi, and he received the requested documents within 1 week.

The VA has not acknowledged any request for information that I have sent to them since I've filed this disability claim. They have not even acknowledged the Notice of Appeal letter that I sent to

them. I am also told that 28 people have filed SHAD-related claims, and that mine is the only one to have been completed and denied.

I am now getting my health care at the VA Clinic in Vancouver, Washington, and the VA Hospital in Portland, Oregon, because of my 10 percent service-related disability for the ringing in my ears. The doctors there are still trying to determine why I'm so short of breath. They don't believe that my congestive heart failure is responsible for it all, but they haven't found out what is causing it.

The VA has never contacted me about being checked out for problems associated with the SHAD tests. On my disability claim, they only had the doctor examine me for problems that I knew about and had provided them with the information on my claim form.

The VA doctors are still trying to find the answers, only because they are my health care provider, and the doctors have not mentioned any directive they have received regarding any veterans involved in the SHAD tests.

Those other veterans who are having problems associated with SHAD may not be so fortunate. Those veterans may be having serious problems with undiagnosed illnesses, and the VA will not look for them until the veteran can tell the VA specifically what is wrong.

Since 1963, when these SHAD tests were conducted and I became suspicious of what was happening, the U.S. Government has denied and lied to me about what took place. I have not been told the truth by any governmental agency about what actually took place. The DOD's so-called fact sheet says we were not test subjects, but test conductors. They also say that test conductors wore protective clothing, but the ship's crew didn't have any protective clothing. Some of the ship's company was subjected to throat and nasal swabs after the tests.

The DOD also says that we were fully informed and given extra chemical and biological training. We were not informed as to the true nature of the exercise or given any extra training.

If the DOD's fact sheet is correct, and all these tests were supposed to have been conducted as they are spelled in the fact sheet, then somebody needs to be prosecuted for gross misconduct, as these things never happened, and none of the tests on my ship were conducted by those procedures.

As children, we are taught by our parents to be responsible for our actions, but it seems that this lesson is lost when a person becomes a Government official or a high-ranking military officer. They change from being responsible to lying and coverup.

I can see the need for security if the issue is classified due to a need to protect our country, but the DOD, Army, Navy, VA, et cetera, have carried it to the extreme so as not to take the blame for a gross mistake in using our sailors as guinea pigs in their chemical and biological tests.

The sad thing is, I and probably all of my shipmates would have volunteered to undergo these tests if we had been informed as to their nature and importance and given assurance that they would follow up with medical checks and health care, if needed, for any medical problems that might have arisen from the tests.

It's this kind of action that makes a lot of people distrust the Government. Our service men and women need to know that the Government and VA are there to aid them when needed and not to lie to them. I am surprised that our volunteer military has been able to obtain such quality people since the draft was eliminated; however, this can't go on forever unless our Government stops lying and becomes more truthful and helpful to our military men and women.

Thank you.

Senator CLELAND. Thank you, Mr. Bates. That's a powerful testimony. Thank you for being here.

I would like to ask Mr. George Brocklebank to please tell us a little about yourself, your years of service, where you served, and the ship that you were on.

STATEMENT OF GEORGE J. BROCKLEBANK

Mr. BROCKLEBANK. Thank you, Mr. Chairman.

My name is George James Brocklebank, and I live in Palm Beach Gardens, Florida. I attended Great Lakes Boot Camp and then went to Radio A School in Bainbridge, Maryland. Upon graduating, I was assigned to the U.S.S. *Power* DD–839, homeported in Mayport, Florida.

I attained the rate of second-class radioman and became the leading radioman when I was discharged from the Navy. I served a little over 4 years in the Navy and on board the *Power* from August 1963 to October 1966.

I remember well our deployment to Argentia, Newfoundland, in the winter of 1965. I could not understand sending a ship from Florida to the North Atlantic. We were never told why we were going up there. We knew nothing about Copperhead tests or the word "SHAD" at that time.

One of the quartermasters said he was told it was something to do with studying wind conditions in cold weather. Myself, being in the radio room, had access to pertinent information and still had no idea why we were sent there.

I can remember monitoring stations being set up in certain areas of the ship and civilian personnel wearing special suits. We were never briefed about this experiment. We were never issued any protective clothing, and we did not give consent to be sprayed with a bacteria, zinc cadmium sulfide, or to be exposed to the decontaminate agents used to clean the ship.

The civilian people would come and go, and, after some of the days at sea, would take throat and gargle samples. This had the crew really wondering what was going on, and we would ask questions and were told to go about our business.

I never thought much about the Argentia, Newfoundland, deployment until I was contacted by Eric Longabardi, a TV investigative journalist from Los Angeles, about 4 years ago. He contacted me in late 1998 and came to my home in Florida in February 1999 to interview me for a report on television. He also showed me a film about Copperhead, after which I was rather disgusted and felt betrayed by the Navy for letting this happen without my knowledge or consent.

He later produced some reports that were aired on *CBS Evening News* in 2000. At that time, I and many of my shipmates learned what had really happened in these tests in Argentia. This was information that I had never been told about by the Government, ever. After the reports were on TV, we all felt betrayed by our Government.

I have attended six reunions of my ship, the U.S.S. *Power,* in the past 6 years and have had contact with many of my shipmates over the years. Many of them have problems now and have in the past. My wife had three miscarriages in our first 3 years of marriage, and the doctors were at a loss to know why. Other shipmates had similar problems, like mine, after getting married and after discharge from the service. I also have circulatory problems in my legs.

No one from the Government has ever contacted me about participating in the test called Copperhead for almost 40 years. I guess they just wanted to wait until we were all dead, and then the problem would disappear and no explanation would be needed.

I know some of my shipmates would be in better health if their doctors knew what they had been exposed to in earlier years. Some of them might even be alive today.

I have a new VA hospital 5 miles from me in Riviera Beach, Florida. I signed up for care and was turned down for budget deficits and means policies. I was told, when I signed up the Navy, health care would be a benefit for me, which turned out not to be true. Now, with my Senator's help, Bill Nelson from Florida, I am going to have access to the new facility near me.

I know of one shipmate who sent for his medical records, and he was told that the year 1965 was missing. This seems strange to me. The Defense Department says we were test conductors, but when you take throat swabs and saliva samples from sailors, that makes you a test subject.

I think it is time for the military and our Government to stop stonewalling and release the truth about these tests and help the many sailors with their medical problems. When enlisting in the Navy, you are told you will be eligible for health care at VA facilities, but you are not told how difficult it is to obtain such care.

I just hope these hearings bring out the truth, and all of us who were betrayed can be taken care of and live out our golden years peacefully.

Thank you.

Senator CLELAND. Thank you very much, Mr. Brocklebank.

You all present to us incredible stories. You add tremendous insight into what we're about here, and that is getting the full story and pulling back the curtain on this sad chapter in American history where we used biological and chemical weapons against our own people and didn't tell them about it.

Senator Nelson, do you have further comments?

Senator BILL NELSON. Mr. Chairman, I just want to thank you again. You, of all people, have the sensitivity to grasp this idea that I suggested to you that this was worthwhile, to determine what is proper governmental policy. I think the testimony of these three gentlemen speaks for itself.

This is inexcusable. It's not only ironic, as you say, what we're dealing with, with regard to Iraq; it's inexcusable. It's unconscionable.

I have a few specific questions, if I may, but I'm in no rush.

Senator CLELAND. Go ahead.

Senator BILL NELSON. I want to thank you, by the way. You have cosponsored this legislation with me, and this is just another vehicle which we're going to use to get to the bottom of this, and I thank you very much, Mr. Chairman.

I know Mr. Brocklebank was in Copperhead. Mr. Bates, you said that there were two.

Mr. BATES. There were two, sir. Yes, sir.

Senator BILL NELSON. Which were your two?

Mr. BATES. Autumn Gold was the one I had heard about when I was in the Navy—heard of the name, anyway.

Senator BILL NELSON. Autumn Gold.

Mr. BATES. Autumn Gold. About 2 or 3 months ago, the SHAD help line tells me I was in Eager Belle II, also during 1963.

Senator BILL NELSON. Okay.

Mr. BATES. I had never heard that name until a couple of months ago.

Senator BILL NELSON. Oh, I see.

Mr. Alderson, which one were you in?

Commander ALDERSON. I was in Operation Shady Grove, Big Tom, Fearless Johnny, probably two or three others. Shady Grove was the important one. No, that was the one that tested the real biological weapons. The others were testing simulants. We used BG, SM, and E. coli. We used British E. coli as the simulants, in some cases, there. We used several other things as trace elements.

In this latest disclosure, I saw other names of tests. I was there for 3 years, and not only was I involved in some of the testing, but I was also involved in some of the planning for future tests, and I have a little difficulty, this many years later, on some of these that are just being disclosed.

But Shady Grove is the first one and the most important one, I think, that I was involved with.

Senator BILL NELSON. The reason I ask is because at one point I thought that one of you—perhaps Mr. Bates—was thinking that he was only involved in Autumn Gold. I was curious about that, Mr. Chairman, because, in Autumn Gold, what has been released as a fact sheet by the Under Secretary of Defense is that they only used Bacillus globigii—BG, in other words—and it says it has characteristics similar to those of anthrax in particle size and dispersal, but it's the one that household bleach and water solution can kill.

I was hearing the symptoms coming from you, Mr. Bates, that involved so many of these other tests, such as the decontamination chemical that now there is evidence that it is a carcinogen. That was in Copperhead and in Shady Grove. Coxiella burnetii, OU, symptoms include fever, headache, muscle pains, joint pain, hepatitis, or pneumonia—I heard pneumonia coming out of this—may also develop during the early stages. Then UL—Pasteurella tularensis: pneumonia, meningitis, peritonitis may complicate the infection whose mortality rate is about 6 percent.

So there was some lethal stuff, there was some bad stuff that was being used. Of course, that was what we were trying to do, apparently, to determine, how you could defend against these. They were clearly showing the toxicity using these monkeys. Where you all were kept below deck while the monkeys were exposed—and I take it that the monkeys were dead.

Commander ALDERSON. No, sir.

Senator BILL NELSON. They were not dead?

Commander ALDERSON. No. When we transferred the monkeys, they were still in the live condition. They went aboard the *Granville S. Hall*, went down into a lab. They were isolated in the laboratory. The scientific types—I didn't spend much time in the lab—watched the reactions of the monkeys for a period of time, then they were euthanized, given autopsies and put in an autoclave, ground up, and put in the ocean.

Senator BILL NELSON. Along with your testimony, we have pictures of the ships.

Commander ALDERSON. I had five Army light tugs under my command. Those are the five. The color photograph, as I said, is the 2080. She also had disseminating capability, and the other four just acted as receipt.

Senator BILL NELSON. Were you resident on one of those five ships?

Commander ALDERSON. No, sir, I was not.

Senator BILL NELSON. You were in a command ship?

Commander ALDERSON. I was on Johnston Island on the radio in immediate communications if there was ever a problem. Because of the importance of the tests, we operated five tugs with six crews. I was the sixth skipper and the senior skipper, and I was prepared at the time, if one of the other skippers got sick, to go aboard his ship and take command immediately and continue the operation.

Senator BILL NELSON. What was the port that you were out of on those?

Commander ALDERSON. Pearl Harbor was where we operated out of, but for the Shady Grove, we operated out of Johnston Island.

Senator BILL NELSON. What were your thoughts at the time about your assigned duty as a commanding officer of these ships? What did you think about at the time of these tests?

Commander ALDERSON. At the time, we were very carefully explained what we were going to be doing. All of our people knew what they were doing. One of the things that was explained to us is that the Russians did have chemical and biological capabilities, and that if we were going to continue to have detente, we must have the same capabilities as the Russians. We already had detente in nuclear, but if they were developing chemical and biological, we had to, too. We understood our position, and the crews understood it, and they're very patriotic, and that's why they have not complained, to this day.

Senator BILL NELSON. Including your crewman from Merritt Island, Florida.

Commander ALDERSON. Yes, sir.

Senator BILL NELSON. That's my home area.

Commander ALDERSON. He was also in Fearless Johnny, and he remembers walking around with his atropine solution in a syrette, in his uniform.

Senator BILL NELSON. I see. Tell me, in your testimony you said that you were concerned about the decontaminants that were used to clean up after the test. Tell us about that.

Commander ALDERSON. Yes, sir. In the morning after the cloud had passed by, three members of the crew went topside. There was a supervisor, and then there was one with a soap-HTH solution. HTH is a household chlorine, extremely concentrated, calcium hypochlorite. Then there was a third guy with a fire hose. The soap solution was added to the HTH to have it cling to the vessel and then was washed off.

One of the guys that was in the decon crew reminded me just a week ago, "You remember, boss," he says, "we were creating chlorine gas." When you put the chlorine, the HTH, against the engine room's stack and the generator stacks, we were creating chlorine gas.

I have often wondered why the skippers of the LTs, all of them, have respiratory problems. Well, in the intakes for the interior of the vessel, we had filters, but they were micron filters for the pathogens that we were testing. They weren't any good against the gas.

When they finished their decon exterior, they went down to the port side. On the port side amidships, you'll see a hatch. Outside of that hatch was a metal GI can. The sailors took off their protective clothing—cotton coveralls, gloves, boots, and a gas mask—no hat. They placed all of that in the container. They sealed the container and had a canister of ethylene oxide, which they fired off for contact time on the interior of that canister. Then they went inside, took showers, went to the interior of the vessel. Once they were on the interior, the ship got underway and went and exchanged monkeys.

Ethylene oxide, I noticed—caught my attention in May 29, 2000, *Time Magazine*. It was listed as a new carcinogen, one which can cause non-Hodgkin's lymphoma and leukemia. That's why I'm worried.

After we had had a series of tests, we would go to the south end of Johnston Island, where we would decon the interior of the ships. What we would do was, we had what we called "challengers," which were glass containers with aerosol makers on top. We would place these throughout the tugs, get the aerosols being generated, and we had a series of electric fans throughout the ship that would circulate this stuff. We'd seal up the vessel, go away, give it about a 4- or 5-hour contact time. Then we would come back, open up, air out the ship, go back inside. This stuff would still be coming off the bulkheads and running and so forth, but the sailors were going back inside. You open up the galley, start feeding. The guys start repairing, go back, sleep, put on their clothes, whatever that was on the interior.

What we used on the interior of the vessel to decon at that time was betapropiolactone and formalin, both of which are known to be highly carcinogenic.

Senator CLELAND. Just a couple more minutes.

Senator BILL NELSON. Yes, if you don't mind.

Mr. Brocklebank, why don't you describe how the airplanes would come and lay down this blanket of spray and then your ship would head through it. Tell us where you were at the time.

Mr. BROCKLEBANK. My position on the ship was up in the main radio room. I could not see outside, so I really couldn't see these airplanes coming through, but I heard from the signalmen who were up on the signal deck, sometimes they could hear the planes. Usually they would fly in a straight line and spray out a long cloud, usually miles ahead of the ship. Then we would continue on a certain course and go through this cloud. Sometimes we'd go through more than once. A lot of times, the weather conditions weren't right, so we'd return to port without anything happening.

Myself, I never saw one of the planes, because I was in an enclosed room, but I heard from some of the signalmen that they could hear them in the distance. But you couldn't actually really see the cloud, like fog or something, but they say it was there.

Senator BILL NELSON. Because you were in very cold weather, did you observe that some of this mist crystallized, that it froze and was on the ship?

Mr. BROCKLEBANK. Well, anytime we used to go out, when we'd get back in, they had to clear the ship of ice. So if it was on there, I don't know.

Senator BILL NELSON. You mentioned in your testimony that certain civilians wore special suits. Tell us about that.

Mr. BROCKLEBANK. They used to take care of the monitoring stations that they'd put on the ship. There were around 9 or 11 of these little test stations that were supposedly to absorb some of these things they were spraying on us. The civilians used to wear overalls and masks and so forth, and they would come in and do a decontamination on the rooms in the ship. They'd come, go, and we wouldn't see them again until we'd go out for more tests. They're the only ones that had the suits.

Senator BILL NELSON. At the time, you were told nothing about this test?

Mr. BROCKLEBANK. That's correct. We were completely in the dark.

Senator BILL NELSON. Either before, during, or after.

Mr. BROCKLEBANK. Definitely, and never heard anything after it happened, for 30-some years.

Senator BILL NELSON. Were you ever given any protective gear to wear yourself?

Mr. BROCKLEBANK. No, sir.

Senator BILL NELSON. None of the crew, that you observed.

Mr. BROCKLEBANK. Well, at our last reunion, one of our shipmates, whose general quarters station was on the main deck behind the forward gun mount, brought a jacket that he said was issued to him, and all it was was a foul weather jacket.

Senator BILL NELSON. No further questions, Mr. Chairman.

Senator CLELAND. Thank you all. Thank you, Senator Nelson, for bringing this to my attention.

To Eric Longabardi, thank you for bringing it to the Nation's attention. I understand you have received some recognition in your journalistic profession, but you certainly deserve more recognition.

Hopefully we can get to the bottom of this sad chapter in American history, in hopes that we can make sure that this never happens again to our service men and women.

I will say that my father was stationed at Pearl Harbor after the attack in World War II and was stationed there in 1944/1945, and so I have a certain connection to Pearl Harbor in a special way, and to the Navy.

I was in the Army, served in the military in Vietnam and was wounded and came back and had a real disaffection with my Government and a sense of let-down by the VA and my own Government, and I feel the sense of distress in your voices about your Government letting you down.

We hope that we can pick the ball up here and through better follow-up from the Veterans Administration and the military with you all and the people who were involved in the SHAD experiments, that we can do justice by you from now on. We hope that this chapter in our history never happens again, and that's one of the reasons we're meeting.

Senator BILL NELSON. Mr. Chairman?

Senator CLELAND. Senator Nelson?

Senator BILL NELSON. As we continue to dig in this, I appreciate your tenacity. Because of who you are, your tenacity will make sure that this thing continues. But we have policy questions here, that we've heard from the testimony, of concealment, policy questions on deception, and the policy question of human guinea pigs without proper protection or information, and all of those policy questions beg answers.

Senator CLELAND. This subcommittee is determined to find them.

Thank you very much. Our subcommittee hearing is adjourned.

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR MAX CLELAND

OTHER TESTING REGIMES

1. Senator CLELAND. Dr. Winkenwerder, what assurance can you give us that there aren't more SHAD or Project 112 testing regimes just waiting to be uncovered?

Dr. WINKENWERDER. At this time it is premature to give such assurances. Although evidence we have found so far indicates that a total of 134 tests were planned by the Deseret Test Center, the possibility remains that there could have been more. Our investigators continue to search Deseret Test Center data sources, and will not consider their job done until they can definitively state that they have information on all Deseret Test Center tests planned. DOD is committed to completing this investigation and releasing all medically relevant information by June 2003.

ACKNOWLEDGING TESTS

2. Senator CLELAND. Dr. Winkenwerder, though you were not at DOD at the time of these tests, why do you think it has taken DOD almost 30 years to acknowledge these tests?

Dr. WINKENWERDER. DOD acknowledged most of these tests in 1977 when the Army released its report titled "U.S. Army Activity in the U.S. Biological Warfare Programs." In the same timeframe, DOD presented congressional testimony about these tests, as well as classified briefings to some congressional personnel.

There were sound operational security reasons for not making details of these tests public. Also, there was little reason to release those details, because the scientific community believed that there was very little chance of heath effects resulting from involvement in these tests.

QUESTIONS SUBMITTED BY SENATOR BILL NELSON

COMMUNITY REQUESTS FOR INFORMATION

3. Senator BILL NELSON. Dr. Winkenwerder, my office has received several calls since the Department of Defense's announcement about wheat stem rust biological tests conducted in the public domain in the vicinity of Yeehaw Junction, Florida, in 1968. The fact sheet provided by DOD identifies summary technical data relative to the test—agents, dates, methods of delivery, etc.—but does not provide the kind of detail that any community used as a laboratory would expect to have available to do its own risk or consequence assessment. Will you rapidly respond to communities' requests for amount of agents used, or other information useful to an independent analysis or survey? If not, how do you intend to answer these communities' legitimate questions about the levels of risk to which they may have been exposed or levels of risk that may still exist in the public domain?

Dr. WINKENWERDER. We will respond to such requests on a case-by-case basis. We will respond to community requests if we are able to locate the information requested, and if the information can be declassified without risk to national security. Because most tests used simulated agents, the health risks to communities were minimal. Tests using real chemical or biological agents were conducted under tightly controlled conditions in restricted areas in order to pose no hazard to civilians.

DOD/VA COOPERATION

4. Senator BILL NELSON. Dr. Winkenwerder, at the request of Congress in 1991, the GAO was to gather information on all DOD chemical/biological (chem/bio) experiments during the last 50 years and review VA handling of claims from veterans who believe they may have been exposed to agents during military testing. In its 1993 report, the GAO noted that, "There were at least three secret chemical experiments conducted between 1942 and 1975 . . . [and that] all of these tests have been declassified by the services since at least 1975."

We know now that this was not the case. All the chem/bio experiments planned or conducted since WWII were not revealed to the GAO, certainly those associated with Project 112 seem to have been overlooked or not disclosed. For example, a Department of the Army report dated 24 February 1977 titled "U.S. Army Activity in the U.S. Biological Warfare Programs" list several tests that pre-date or are contemporaneous with Project 112. This report identifies several tests in and out of the public domain that used biological agents, pathogens, and simulants across the country.

I am particularly concerned about the tests done in Florida, according to this report, at or near Panama City, Eglin AFB, Avon Park AFB, Cape Kennedy, Belleglade, and Fort Pierce. Please explain why the GAO apparently did not get the full cooperation of DOD in 1993 such that we have lost nearly 10 years of time for research, declassification, and notification of veterans?

Dr. WINKENWERDER. Because none of the current Defense officials were involved with the GAO's 1993 investigation, we cannot comment on the degree of cooperation the Department may have provided. Our investigation has yielded a great deal of information in the last 2 years to enable the Department of Veterans Affairs to adjudicate benefit claims for our veterans.

INCONSISTENCY BETWEEN LISTS

5. Senator BILL NELSON. Dr. Winkenwerder, how do you explain the inconsistency between the list provided in the 1977 Army report and the list provided by Project 112?

Dr. WINKENWERDER. The list established by Project 112 is different from the list provided by the 1977 report for several reasons. First, Project 112 began in 1962, after some of the tests reported in the 1977 report took place. Also, the 1977 report focused on biological testing, while Project 112 encompassed both chemical and biological testing.

6. Senator BILL NELSON. Dr. Winkenwerder, how do you plan to resolve these inconsistencies?

Dr. WINKENWERDER. In our effort to find the information the VA needs to help veterans, we started with a blank slate. Our objective is not to verify or deny previous reports, but to accurately present the information we find.

7. Senator BILL NELSON. Dr. Winkenwerder, will you prepare and release fact sheets on these tests as well?

Dr. WINKENWERDER. Our investigation will end when we have released fact sheets on all the tests conducted by the Deseret Test Center. To date, we have received no request from the VA for help with information on tests conducted before or after those tests performed by the Deseret Test Center.

DISCLOSURE OF TESTING INFORMATION

8. Senator BILL NELSON. Dr. Winkenwerder, the apparent problem we have faced over time appears to be DOD's unwillingness to disclose information relating to the scope of our own chemical and biological warfare past. The issue for this hearing is DOD's responsibility and the actions necessary to "come clean," if you will, with our past and provide the information necessary to assess and deal with the risks to public safety and our service members' health that this testing may have or continue to pose. What systems are in place now to expand the investigation beyond Project 112 to find and disclose other chem/bio research and development, either before or after Project 112 and the close of the Deseret Test Center, that may have exposed service members or the public to potential danger?

Dr. WINKENWERDER. Since beginning our investigation of Deseret Test Center testing, we have focused on gathering, declassifying, and releasing the information the Department of Veterans Affairs needs in order to process veterans' claims. To date, we have received no request from the VA for help with information on tests prior to or after those tests conducted by the Deseret Test Center. However, Dr. David Chu, Under Secretary of Defense (Personnel and Readiness) has asked for additional information on chemical and biological warfare agent research and testing. In a letter to the Under Secretary of Defense (Acquisition, Technology, and Logistics), Dr. Chu requested more data about the use of chemical and biological warfare agents and their simulants throughout DOD, stating that the data was necessary to meet our obligations in the area of force health protection and occupational health.

9. Senator BILL NELSON. Dr. Winkenwerder, we appreciate that the greatest challenge to the fastest possible discovery and release of information relating to these tests and experiments is the labor-intensive effort that is required.

What are your estimates for how long it will take to complete the release of names to the VA relative to SHAD and Project 112?

Dr. WINKENWERDER. Our investigation into all SHAD, Project 112, and Deseret Test Center tests will be completed by June 2003. All crew lists will be sent to the VA before then.

10. Senator BILL NELSON. Dr. Winkenwerder, what additional resources do you need to go faster?

Dr. WINKENWERDER. This investigation requires specialized knowledge and skills. No further resources are required, nor would additional resources accelerate the investigation.

11. Senator BILL NELSON. Dr. Winkenwerder, what additional resources do you need to expand the effort and work those programs that predate or followed Project 112?

Dr. WINKENWERDER. To date, the scope of an expanded effort has not been determined. It is premature to establish what additional resources would be necessary.

NOTIFYING VETERANS

12. Senator BILL NELSON. Mr. Epley, please describe the technical challenges associated with translating the information that DOD has been providing regarding the Project 112 tests and your efforts to notify veterans who may have been exposed to toxic or simulated chem/bio agents.

Mr. EPLEY. The Department of Defense provides the Department of Veterans Affairs with the names and service numbers of Project 112 veteran participants. Using that information, VA attempts to obtain each veteran's social security number. That information is then used in an attempt to acquire the veteran's current address.

VA initially matches name and service number data against its Beneficiary Identification and Records Locator Subsystem (BIRLS) and the Compensation & Pension Master Record (CPMR) file. If social security number information is found in either system, it is extracted along with numerous other data elements for each veteran.

The names and service numbers of veterans not identified with a social security number are then run against the National Cemetery Administration database for matches.

Those records, for which VA is unable to obtain social security numbers using VA systems/databases, are referred to the National Archives and Records Administration (NARA), National Personnel Records Center (NPRC), in St. Louis, Missouri. NPRC personnel review military personnel records, extract social security numbers and, if available, return that information to VA.

The veterans' names and social security numbers are then referred to either the Internal Revenue Service (through an existing interagency agreement with the National Institute for Occupational Safety and Health) or ChoicePoint (a private provider of information) to obtain current addresses. Once the addresses are received, VA prepares and mails outreach letters to Project 112 participant veterans.

13. Senator BILL NELSON. Mr. Epley, how would you characterize DOD's cooperation in this effort over the years?

Mr. EPLEY. Our history on this project shows that cooperation was slow in developing, but the pace of positive interactions has been accelerating significantly in recent months. In two meetings held with DOD in late 1997, VA was advised that all relevant records about these tests were classified and general access to that material was not possible, but that it could be provided on a case-by-case basis. In August 2000, DOD asked that SHAD inquiries be narrowed to specific veteran claims.

A VA/DOD workgroup was subsequently established and met for the first time in October 2000. VA and DOD continue to meet regularly to discuss the status of the investigation and other ancillary Project 112/SHAD issues. In July 2002, DOD committed to provide VA with all medically relevant data and a complete roster of participants involved in tests conducted by the Deseret Test Center in the 1960s and 1970s. They have stepped up efforts to complete the declassification process as quickly as possible and have committed to sharing all information with VA by June 2003.

The working relationship between the two Departments continues to improve. In addition to stepping up the declassification process, DOD has helped VA by designing, building, and updating a computerized roster of Project 112 veterans for VA's use. DOD has also agreed to allow VA to include its toll-free telephone number in future outreach letters so that veterans who have questions about the tests themselves, can communicate directly with DOD representatives.

14. Senator BILL NELSON. Mr. Epley, there is tremendous pressure to rapidly conclude our research and declassification efforts relative to Project 112. Veterans want to know now what their risks may have been. We owe them the fastest possible resolution of their potential exposure and consideration of any claims they may make. What improvements have you requested to the current process of information transfer from DOD to the VA?

Mr. EPLEY. Following VA's request in June, DOD is providing to VA the names and service numbers of veterans who participated in each test (which is not classified information) as soon as DOD identifies the ship or unit involved, without waiting for the declassification process to be completed on other relevant information. This enables VA to begin locating the veterans sooner and expedites our outreach efforts.

15. Senator BILL NELSON. Mr. Epley, in your view, what is the potential impact of expanding the discovery and declassification effort beyond the Project 112 tests that have been disclosed so far?

Mr. EPLEY. We understand that DOD is reviewing its records regarding chemical and biological tests that may have been conducted either before or after Project 112. When DOD provides information about any additional tests to VA, we will initiate identification and notification of veterans who participated in these tests, as appropriate. Without knowing the number of veterans involved in such tests, it is not possible to estimate the impact of expanding the discovery and declassification efforts.

[Whereupon, at 12:48 p.m., the subcommittee adjourned.]